NFC TEST REPORT

No.I21Z61051-IOT27

for

TCL Communication Ltd.

GSM/UMTS/LTE/NR Mobile phone

T767H

FCC ID : 2ACCJH140

with

Hardware Version: PIO

Software Version: 2B56

Issued Date: 2021-07-30

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
I21Z61051-IOT27	Rev.0	1st edition	2021-07-30

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

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

Location 2: CTTL(CuiHu)

Address:	CuiHu Cloud Center No.1 Gaolizhang Road,Wenquan Town,Haidian District,Beijing,China

1.3. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature:	-20/+50℃
Normal Relative Humidity:	20-75%
Normal Air Pressure:	86Kpa-106Kpa

1.4. Project data

Testing Start Date:	2021-06-28
Testing End Date:	2021-07-28

1.5. Signature

Zhou Bin
(Prepared this test report)

Zhang Qiang
(Reviewed this test report)

Zhu Liang
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address:	5/F,Building 22E,22 Science Park East Avenue,Hong Kong Science Park,Shatin,NT,Hong Kong
Country:	China
Contact:	Gong Zhizhou
Telephone:	0086-755-36611722
E-mail:	zhizhou.gong@tcl.com

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address:	5/F,Building 22E,22 Science Park East Avenue,Hong Kong Science Park,Shatin,NT,Hong Kong
Country:	China
Contact:	Gong Zhizhou
Telephone:	0086-755-36611722
E-mail:	zhizhou.gong@tcl.com

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

3.1. About EUT

Description	GSM/UMTS/LTE/NR Mobile phone
Model name/HVIN	T767H
Brand name	TCL
FCC ID	2ACCJH140
UMTS Frequency Band(s)	FDDI/II/IV/V/VIII
GSM Frequency Band(s)	GSM850/900/1800/1900
E-UTRA Frequency Band(s)	FDD1/2/3/5/7/8/20/26/28/32CA TDD38/40/41
CA Frequnecy Band	CA_1A-1A,CA_1A-3A,CA_1A-5A,CA_1A-7A,CA_1A-8A,CA_1A-20A,CA_1A-28A,CA_1A-32A,CA_1A-38A,CA_3A-3A,CA_3A-5A,CA_3A-7A,CA_3A-8A,CA_3A-20A,CA_3A-28A,CA_3A-32A,CA_3A-38A,CA_3C,CA_5A-7A,CA_7A-7A,CA_7A-8A,CA_7A-20A,CA_7A-28A,CA_7A-32A,CA_7C,CA_8A-32A,CA_20A-38A,CA_20A-32A,CA_28A-32A,CA_40C
CA UL Frequency Band	CA_1A-3A,CA_1A-7A,CA_1A-8A,CA_1A-20A,CA_1A-5A,CA_1A-28A,CA_3A-5A,CA_3A-7A,CA_3A-8A,CA_3A-20A,CA_3A-28A,CA_3C,CA_7A-8A,CA_7A-20A,CA_7A-28A,CA_7C
5G NR SA Band	FDD n1/ FDD n3/ FDD n5/ FDD n7/ FDD n8/ FDD n28/ TDD n40/ TDD n78
5G NR EN-DC Bands	UL combinations: EN-DC_3A_n1A,EN-DC_7A_n1A,EN-DC_8A_n1A,EN-DC_20A_n1A,EN-DC_28A_n1A,EN-DC_1A_n3A,EN-DC_3A_n3A,EN-DC_7A_n3A,EN-DC_8A_n3A,EN-DC_20A_n3A,EN-DC_28A_n3A,EN-DC_1A_n7A,EN-DC_3A_n7A,EN-DC_20A_n7A,EN-DC_28A_n7A,EN-DC_1A_n8A,EN-DC_7A_n8A, EN-DC_1A_n28A,EN-DC_3A_n28A,EN-DC_7A_n28A,EN-DC_1A_n40A,EN-DC_3A_n40A,EN-DC_7A_n40A,EN-DC_28A_n40A,EN-DC_1A_n78A,EN-DC_3A_n78A,EN-DC_7A_n78A,EN-DC_5A_n78A,EN-DC_8A_n78A,EN-DC_20A_n78A, EN-DC_28A_n78A DL combinations: EN-DC_3A_n1A,EN-DC_7A_n1A,EN-DC_8A_n1A,EN-DC

	_20A_n1A,EN-DC_28A_n1A,EN-DC_3C_n1A,EN-DC_3A_3A_n1A,EN-DC_3A_7A_n1A,EN-DC_3A_20A_n1A,EN-DC_7A_28A_n1A,EN-DC_7C_n1A,EN-DC_7A_7A_n1A,EN-DC_8A_3A_n1A,EN-DC_20A_3A_n1A,EN-DC_20A_7A_n1A,EN-DC_20A_32A_n1A,EN-DC_28A_3A_n1A,EN-DC_1A_n3A,EN-DC_3A_n3A,EN-DC_7A_n3A,EN-DC_8A_n3A,EN-DC_20A_n3A,EN-DC_28A_n3A,EN-DC_1A_32A_n3A,EN-DC_1A_7A_n3A,EN-DC_8A_1A_n3A,EN-DC_20A_32A_n3A,EN-DC_20A_1A_n3A,EN-DC_20A_7A_n3A,EN-DC_28A_1A_n3A,EN-DC_28A_7A_n3A,EN-DC_1A_n7A,EN-DC_3A_n7A,EN-DC_20A_n7A,EN-DC_28A_n7A,EN-DC_1A_n8A,EN-DC_7A_n8A,EN-DC_1A_n28A,EN-DC_3A_n28A,EN-DC_7A_n28A,EN-DC_1A_1A_n28A,EN-DC_1A_3A_n28A,EN-DC_1A_7A_n28A,EN-DC_1A_32A_n28A,EN-DC_3A_7A_n28A,EN-DC_3A_32A_n28A,EN-DC_7A_32A_n28A,EN-DC_1A_n78A_n28A,EN-DC_3A_n78A_n28A,EN-DC_7A_n78A_n28A,EN-DC_1A_n40A,EN-DC_3A_n40A,EN-DC_7A_n40A,EN-DC_28A_n40A,EN-DC_1A_28A_n40A,EN-DC_3A_28A_n40A,EN-DC_1A_7A_n40A,EN-DC_3A_7A_n40A,EN-DC_7A_28A_n40A,EN-DC_1A_n78A,EN-DC_3A_n78A,EN-DC_5A_n78A,EN-DC_7A_n78A,EN-DC_8A_n78A,EN-DC_20A_n78A,EN-DC_28A_n78A,EN-DC_1A_1A_n78A,EN-DC_1A_3A_n78A,EN-DC_1A_5A_n78A,EN-DC_1A_7A_n78A,EN-DC_1A_8A_n78A,EN-DC_1A_20A_n78A,EN-DC_1A_28A_n78A,EN-DC_1A_32A_n78A,EN-DC_1A_40A_n78,EN-DC_3A_3A_n78A,EN-DC_3A_5A_n78A,EN-DC_3A_7A_n78A,EN-DC_3A_8A_n78A,EN-DC_3A_20A_n78A,EN-DC_3A_28A_n78A,EN-DC_3A_32A_n78A,EN-DC_3A_38A_n78A,EN-DC_3A_40A_n78A,EN-DC_3C_n78A,EN-DC_5A_7A_n78A,EN-DC_7A_7A_n78A,EN-DC_7A_20A_n78A,EN-DC_7A_28A_n78A,EN-DC_7C_n78A,EN-DC_20A_32A_n78A,EN-DC_1A_n3A_n78A,EN-DC_1A_n5A_n78A,EN-DC_1A_n7A_n78A,EN-DC_1A_n40A_n78A,EN-DC_3A_n1A_n78A,EN-DC_3A_n5A_n78A,EN-DC_3A_n7A_n78A,EN-DC_3A_n5A_n78A,EN-DC_3A_n40A_n78A,EN-DC_7A_n5A_n78A,EN-DC_7A_n5A_n78A,EN-DC_7A_n1A_n78A,EN-DC_8A_n1A_n78A,EN-DC_20A_n1A_n78A,EN-DC_20A_n3A_n78A,EN-DC_28A_n1A_n78A,EN-DC_28A_n7A_n7

	8A,EN-DC_7A_n40A_n78A,EN-DC_28A_n40A_n78A,
Operating Temperature	-10/+55℃
Nominal Voltage	3.8V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.5V

3.2. Internal Identification of EUT

EUT ID*	IMEI/SNI	HW Version	SW Version	Date of receipt
44a	354382910002090/ 354382910002108	PIO	2B56	2021-06-17
33a	354382910001332/ 354382910001340	PIO	2B56	2021-06-17

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

3.3. Internal Identification of AE

AE ID*	Description	SN
AE2	Adapter	/
AE21	Adapter	/
AE22	Adapter	/
AE23	Adapter	/
AE3	USB Cable	/
AE4	USB Cable	/
AE5	Battery	/

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

AE2

Model	CBA0059AGTC5
Manufacturer	/
Length	/

AE21

Model	CBA0059AATC5
Manufacturer	/
Length	/

AE22

Model	CBA0059ABTC5
Manufacturer	/
Length	/
AE23	
Model	CBA0059ACNC5
Manufacturer	/
Length	/
AE3	
Model	CDA0000123C8
Manufacturer	PUAN
Length	/
AE4	
Model	CDA0000123C1
Manufacturer	JUWEI
Length	/
AE5	
Model	TLp043E7
Manufacturer	VEKEN
Capacitance	4500mAh
Nominal voltage	/

*AE ID: is used to identify the ancillary equipment in the lab internally.

3.4. EUT Set-ups

Table 1：Eut Set-ups

EUT Set-up No.	Combination of EUT and AE	Remarks
Set.NFC01	33a + AE2 + AE3/AE4 + AE5 + NFC Card	--
Set.NFC02	33a + AE2 + NFC Card	--
Set.NFC03	44a	--

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

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters, referring to Annex A for detailed information, are supplied by the client or manufacturer, which are the bases of testing.

4.2. Reference Documents for testing

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.	2019
CFR 47 Part 15	Part 15 — Radio Frequency Devices.	2019
	Subpart C — Intentional Radiators.	
	§ 15.35 Measurement detector functions and bandwidths.	
	§ 15.207 Conducted limits.	
	§ 15.209 Radiated emission limits, general requirements.	
	§ 15.215 Additional provisions to the general radiated emission limitations.	
	§ 15.225 Operation within the band 13.110–14.010 MHz.	
ANSI C63.10	American National Standard of Procedures for Compliance	2013
	Testing of Unlicensed Wireless Devices	

5. Test Results

5.1. Summary of Test Results

Table 2：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)	B.1	P(Set. NFC02)
2	Electric Field Strength of Outside the Allocated Bands	CFR 47 § 15.225(b) CFR 47 § 15.225(c)		P(Set. NFC02)
3	Electric Field Radiated Emissions	CFR 47 § 15.209	B.2	P(Set. NFC01)
		CFR 47 § 15.225(d)	B.3	P(Set. NFC01)
4	Frequency Tolerance	CFR 47 § 15.225(e)	B.4	P(Set. NFC03)
5	20dB Bandwidth	CFR 47 § 15.215(c)	B.5	P(Set. NFC03)
6	Conducted Emissions	CFR 47 § 15.207	B.6	P(Set. NFC01)
The measurement is carried out according to ANSI C63.10. See **ANNEX B** for details.				

Test Conditions:

For this report, all the test cases listed above were tested under normal Temperature, Voltage, humidity and Air Pressure except the Frequency Tolerance test case. The specific conditions of Frequency Tolerance test case are listed in section B.4.3

See Table 3 for terms for result verdict:

Table 3 Terms for result verdict

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

5.2. Statements

The test cases listed in Section 5.1 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

6. Test Facilities Utilized

Table 4：Test Facilities Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL. DUE DATE	CAL. INTERVAL
1.	Spectrum Analyzer	RSA3408A	B010277	Tektronix	2021-10-23	1 Year
2.	Climatic chamber	SH242	93008658	ESPEC	2022-01-22	1 Year
3.	LISN	ENV216	101459	Rohde & Schwarz	2022-02-22	1 Year
4.	Test Receiver	ESU26	1100766	Rohde & Schwarz	2022-02-23	1 Year
5.	Test Receiver	ESU26	1100376	Rohde & Schwarz	2021-10-04	1 Year
6.	H-field Antenna	HFH2-Z2	829324	Rohde & Schwarz	2021-12-10	1 Year
7.	Test Receiver	ESU26	100235	Rohde & Schwarz	2022-02-23	1 Year

7. Measurement Uncertainty

Table 5: Measurement Uncertainty

Item	Uncertainty
Frequency Tolerance	*U* =77 Hz, k=2
20dB Bandwidth	*U* =77 Hz, k=2
Radiated Emissions (<1GHz)	*U* =4.86 dB, k=2
Radiated Emissions (>1GHz)	*U* =5.16 dB, k=2
Conducted emission	*U* = 3.08 dB, k=2

ANNEX A: EUT parameters

/

ANNEX B: Detailed Test Results

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

B.1.1. Reference

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

B.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:

Table B-1: Measurement bandwidth

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)

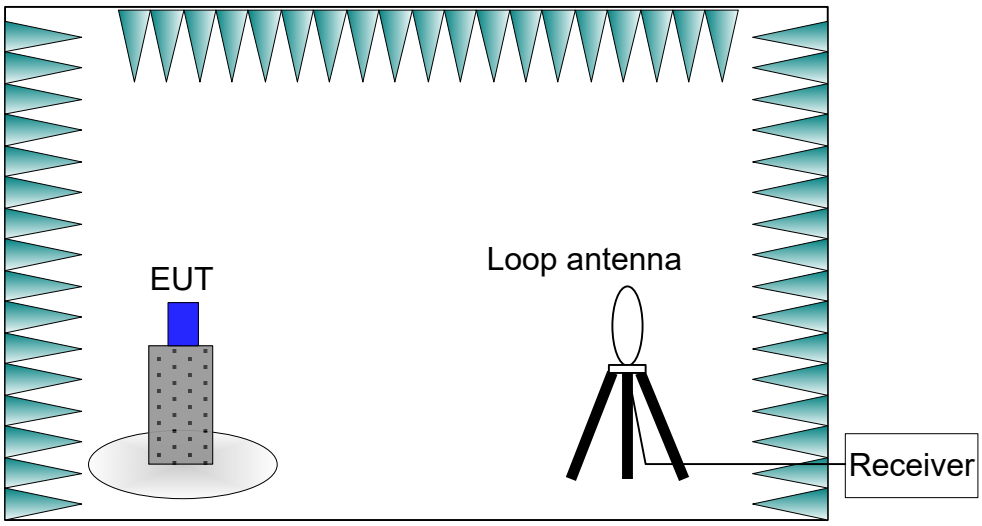

Figure B-1: Measurement Setup

B.1.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC(See 3.4).

The EUT is powered by a travel adapter.

All possible configurations were investigated and only the worst case is reported.

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

B.1.4. Limits

Table B-2: 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 13.567 to 13.710	+334	90
13.110 to 13.410 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:		

$$\text{Extrapolation(dB)} = 40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$$

B.1.5. Measurement Results

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

Conclusions: Set.NFC02, **PASS**.

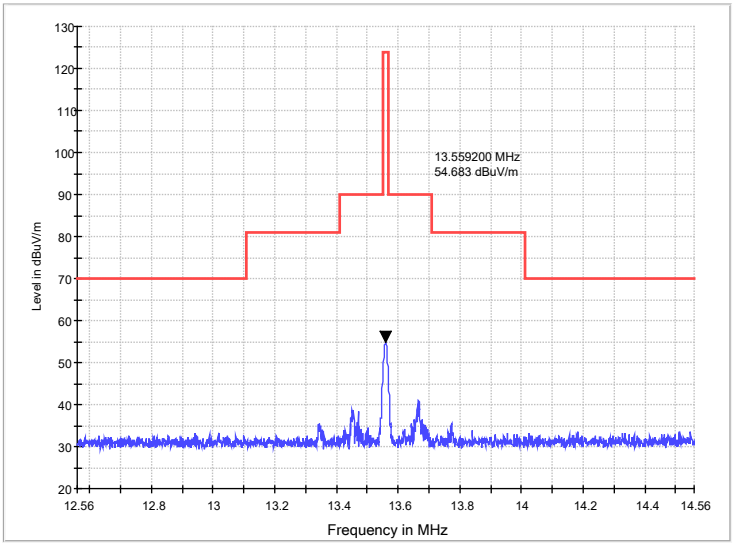

Figure B-2: Measurement results for Electric Field Strength of Fundamental and Outside the Allocated bands

B.2. Electric Field Radiated Emissions (< 30MHz)

B.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.

B.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:

Table B-3: Measurement bandwidth

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)

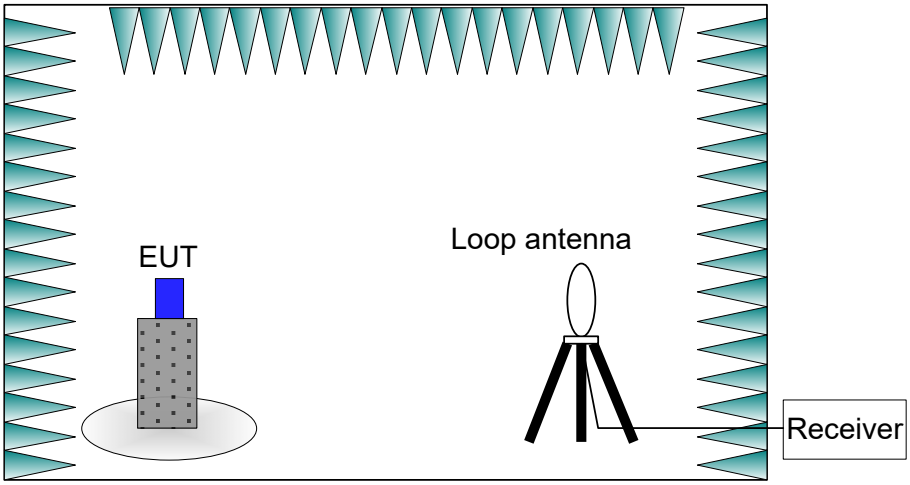

Figure B-3: Measurement Setup

B.2.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC(See 3.4).

The EUT is powered by a travel adapter.

All possible configurations were investigated and only the worst case is reported.

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

B.2.4. Limits

Table B-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: $\text{Extrapolation(dB)} = 40\log_{10}(\text{Measurement Distance}/\text{Specification Distance})$		

B.2.5. Measurement Results

Measurement results of normal conditions see Figure B-4 for different set-ups of EUT. The results displayed take into account applicable antenna factors and cable losses.

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

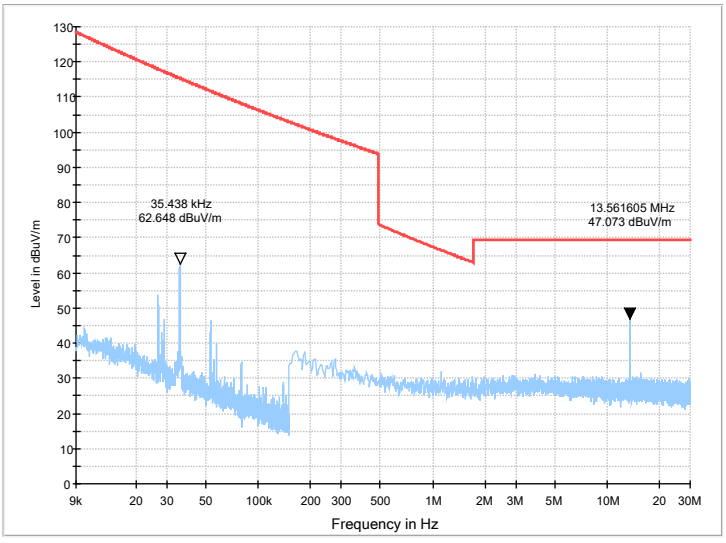

Figure B-4: Measurement results for Electric Field Radiated Emissions (< 30MHz)

B.3. Electric Field Radiated Emissions (≥30MHz)

B.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.

B.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. 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:

Table B-5: Measurement bandwidth

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

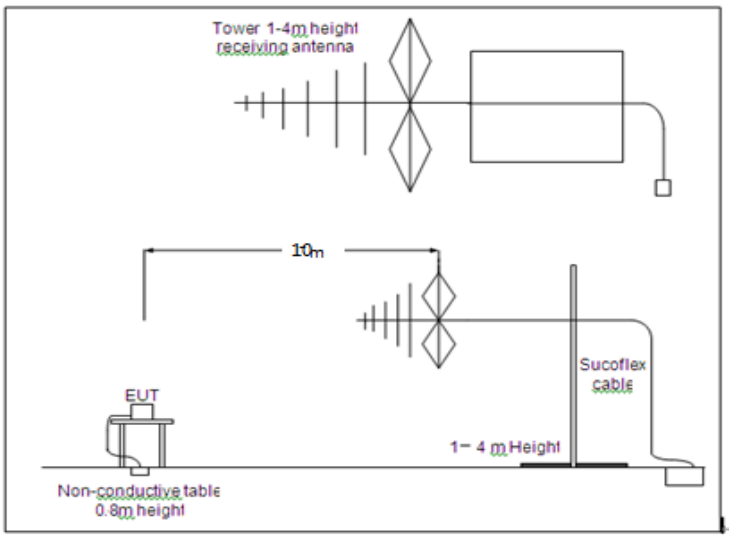

Figure B-5: Measurement Setup

B.3.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC(See 3.4).

The EUT had been connected to a travel adapter.

All possible configurations were investigated and only the worst case is reported.

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

B.3.4. Limits

Table B-6: 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

B.3.5. Measurement Results

Measurement results of normal conditions see Figure B-6 for different set-ups of EUT. The results displayed take into account applicable antenna factors and cable losses.

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

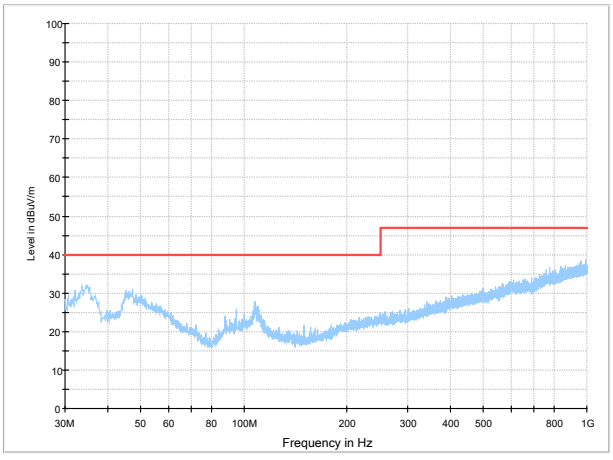

Figure B-6: Measurement results for Electric Field Radiated Emissions (≥30MHz)

B.4. Frequency Tolerance

B.4.1. Reference

See Clause 6.8 of ANSI C63.10-2013 specifically.

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

B.4.2. Measurement Methods

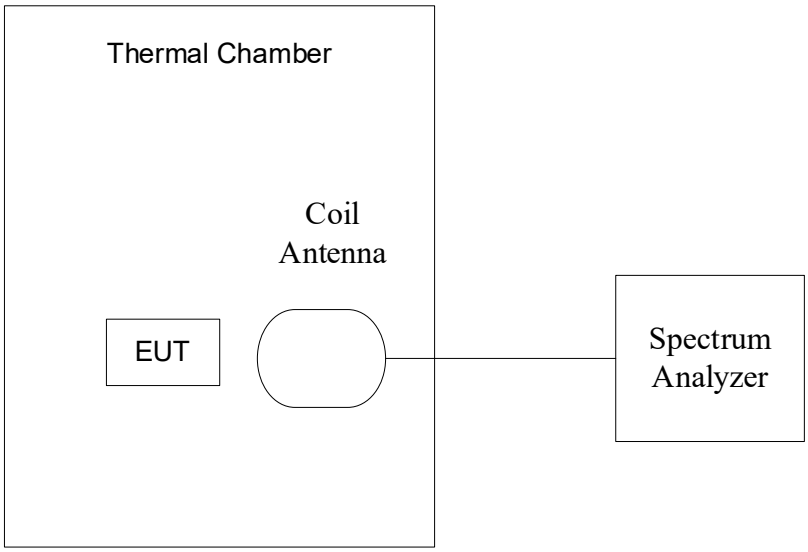

Figure B-7: Measurement Setup

The transmitter output signal was picked up by coil antenna connected to the spectrum analyzer. 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.

B.4.3. EUT Operating Mode and Test Conditions

The measurement of EUT was carried out under the transmit state of without modulation(See 3.4).

EUT had not been connected to a travel adapter. The frequency stability was measured with the different voltage and temperature combinations:

a) The nominal voltage 3.8V(See 3.1)was used and the temperature was varied from -20℃ to +50℃ in 10℃ increments using an environmental chamber.

b) The 20℃ was used and the voltages were 3.5V, 3.8V and 4.4V (The extreme low voltage ,the nominal voltage and the extreme high voltage defined in section 3.1).

The details were as following:

Table B-7: Combinations of Voltage andTemperature

Test items	Voltage	Temperature
Frequency stability with respect to ambient temperature	3.8V	-20℃
		-10℃
		0℃
		10℃
		20℃
		30℃
		40℃
		50℃
Frequency stability when varying supply voltage	3.5V	20℃
	3.8V	
	4.4V	

B.4.4. Test Layouts

See B.4.2.

B.4.5. Limits

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

B.4.6. Measurement Results

Measurement results see Table B-8 for different test conditions.

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

Table B-8: Measurement results for Frequency Tolerance

Temperature	Voltage	Frequency (MHz)			
		Startup	2 Min Later	5 Min Later	10 Min Later
-20℃	3.8V	13.559748125	13.559750625	13.559755625	13.559759375
-10℃	3.8V	13.559774375	13.559776875	13.559778125	13.559779375
0℃	3.8V	13.559789375	13.559790625	13.559791875	13.559793125
10℃	3.8V	13.559784375	13.559781875	13.559779375	13.559778375
20℃	3.8V	13.559763125	13.559758125	13.559755625	13.559747125
30℃	3.8V	13.559723125	13.559721875	13.559719375	13.559718125
40℃	3.8V	13.559708125	13.559696875	13.559691875	13.559685625
50℃	3.8V	13.559676875	13.559666875	13.559663125	13.559659375
20℃	3.5V	13.559736875	13.559741875	13.559745625	13.559748125
20℃	4.4 V	13.559745625	13.559746875	13.559748125	13.559749375

Temperature	Voltage	Frequency Error (%)			
		Startup	2 Min Later	5 Min Later	10 Min Later
-20℃	3.8V	-0.002	-0.002	-0.002	-0.002
-10℃	3.8V	-0.002	-0.002	-0.002	-0.002
0℃	3.8V	-0.002	-0.002	-0.002	-0.002
10℃	3.8V	-0.002	-0.002	-0.002	-0.002
20℃	3.8V	-0.002	-0.002	-0.002	-0.002
30℃	3.8V	-0.002	-0.002	-0.002	-0.002
40℃	3.8V	-0.002	-0.002	-0.002	-0.002
50℃	3.8V	-0.002	-0.002	-0.002	-0.003
20℃	3.5V	-0.002	-0.002	-0.002	-0.002
20℃	4.4V	-0.002	-0.002	-0.002	-0.002

B.4.7. Measurement Uncertainty

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

B.5. 20dB Bandwidth

B.5.1. Reference

See Clause 6.9 of ANSI C63.10-2013 specifically.

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

B.5.2. Measurement Methods

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.

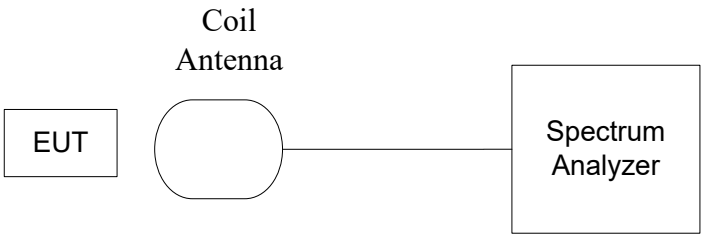

Figure B-8: Measurement Setup

B.5.3. EUT Operating Mode and Test Conditions

The measurement of EUT was carried out under the transmit state of NFC (See 3.4).

EUT had not been connected to a travel adapter.

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

B.5.4. Test Layouts

See B.5.2.

B.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.

B.5.6. Measurement Results

Measurement results see Figure B-9.

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

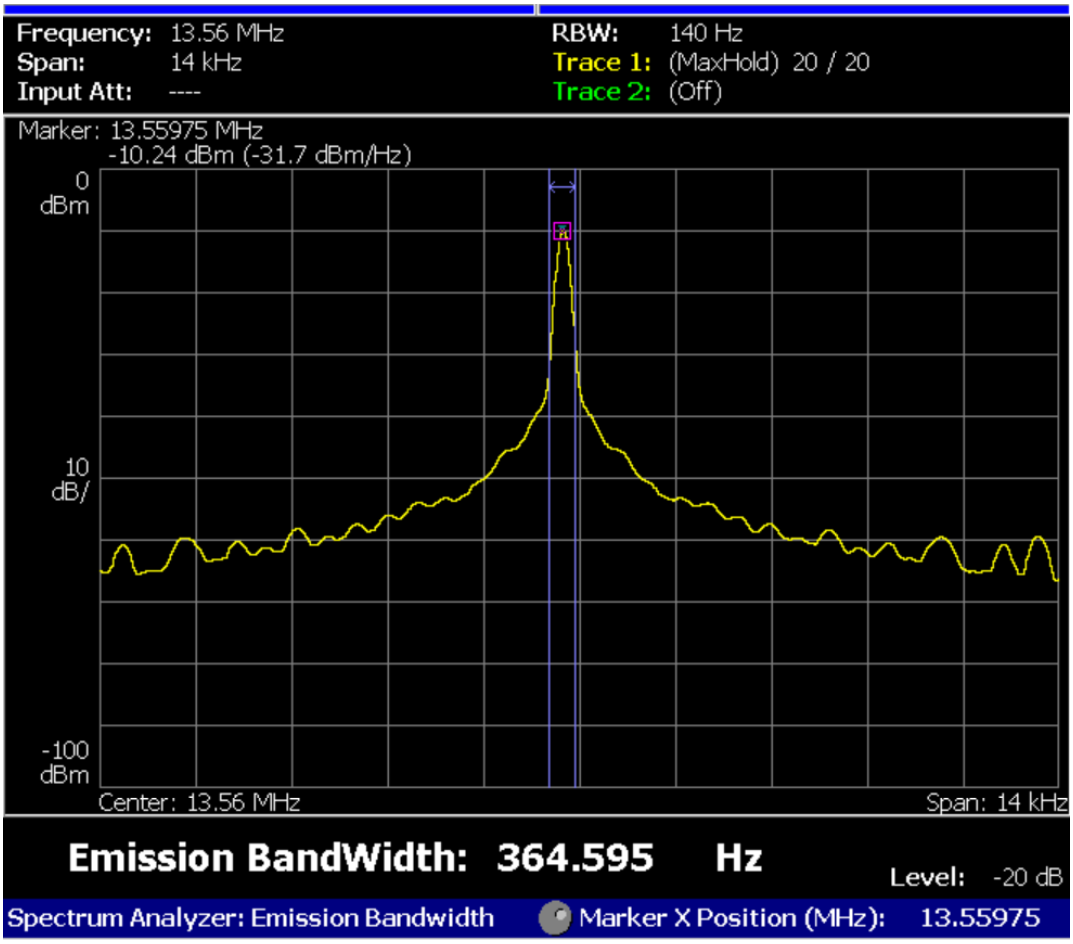

Figure B-9: Measurement results for 20dB Bandwidth

B.5.7. Measurement Uncertainty

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

B.6. Conducted emission

B.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.

B.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:

Table B-9: Measurement Bandwidth

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

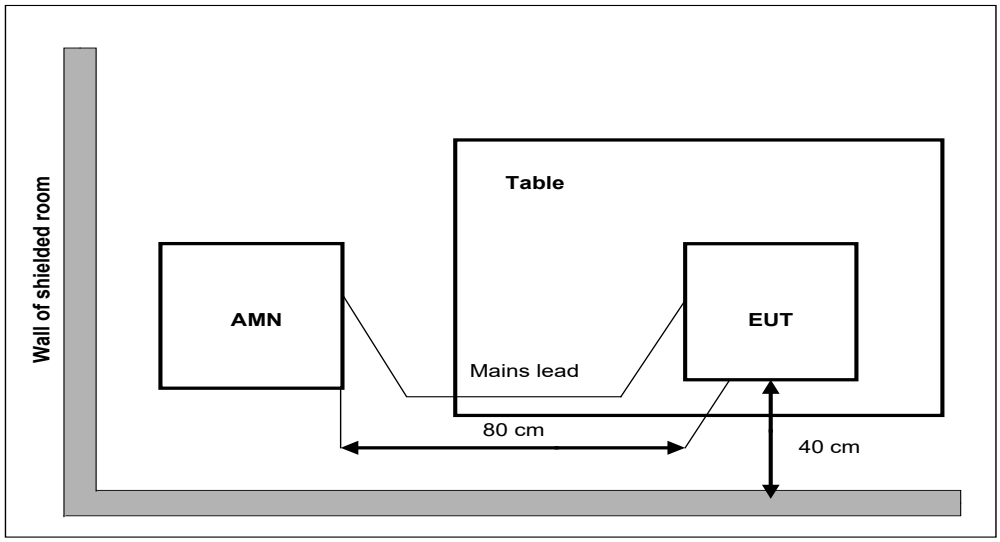

Figure B-10: Measurement Setup

B.6.3. EUT Operating Mode and Test Conditions

The measurement of EUT is carried out under the transmit state of NFC(See 3.4).

The EUT is powered by a travel adapter.

All possible configurations were investigated and only the worst case is reported.

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

B.6.4. Limits

Table B-10: 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

B.6.5. Measurement Results

Measurement results see Figure B-11.

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

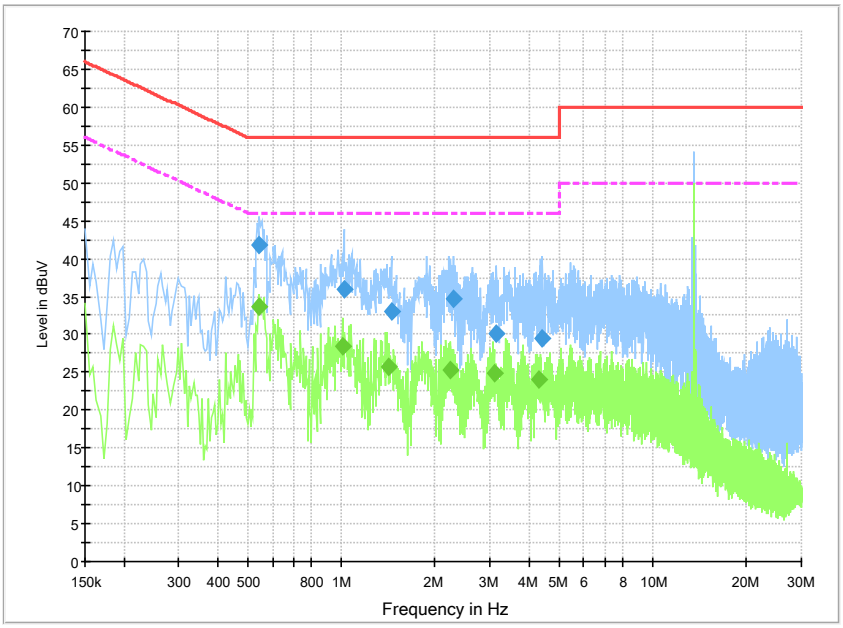

Figure B-11: Measurement results for Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.546000	41.8	1000.0	9.000	On	L1	19.8	14.2
1.018500	36.0	1000.0	9.000	On	L1	19.6	20.0
1.446000	33.0	1000.0	9.000	On	L1	19.6	23.0
2.287500	34.6	1000.0	9.000	On	N	19.6	21.4
3.156000	30.1	1000.0	9.000	On	L1	19.7	25.9
4.429500	29.5	1000.0	9.000	On	L1	19.6	26.5

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.541500	33.7	1000.0	9.000	On	L1	19.8	12.3
1.005000	28.5	1000.0	9.000	On	L1	19.7	17.5
1.423500	25.7	1000.0	9.000	On	L1	19.6	20.3
2.247000	25.2	1000.0	9.000	On	L1	19.6	20.8
3.088500	24.8	1000.0	9.000	On	L1	19.7	21.2
4.281000	24.1	1000.0	9.000	On	L1	19.6	21.9

ANNEX C: Persons involved in this testing

Table C-1: Persons involved

Test Item	Tester
20dB Bandwidth	Zhou Bin
Frequency Tolerance	Zhou Bin
Electric Field Strength of Fundamental and Outside the Allocated bands	Li Zongliang
Electric Field Radiated Emissions (< 30MHz)	Li Zongliang
Electric Field Radiated Emissions (≥30MHz)	Li Zongliang
Conducted Emissions	Guo Qian

ANNEX D: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

ilac-MRA

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

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 17025:2017. 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).

2020-09-29 through 2021-09-30
Effective Dates

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA

For the National Voluntary Laboratory Accreditation Program

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