Volume Control TEST REPORT

No.23T04Z80421-49

for

TCL Communication Ltd.

GSM/UMTS/LTE/NR Mobile Phone

T614SP

FCC ID: 2ACCJH179

with

Hardware Version: 06
Software Version: 2BSH

Issued Date: 2023-12-29

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.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
23T04Z80421-49	Rev.0	1st edition	2023-12-29

Note: the latest revision of the test report supersedes all previous version.

CONTENTS

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

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

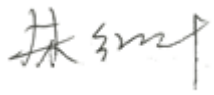
1.3. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature:	-10/+55℃
Relative Humidity:	20-75%
Ambient noise of acoustic chamber	14dB(A) and is compliance with requirement of standards (SEE ANNEX H)

1.4. Project data

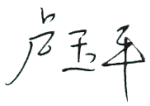
Testing Start Date:	2023-11-07
Testing End Date:	2023-12-28

1.5. Signature



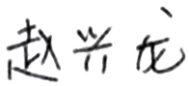
Zhu Hongye

(Prepared this test report)



Lu Yuping

(Reviewed this test report)



Zhao Xinglong

(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
City:	Hong Kong
Postal Code:	/
Country:	P.R. China
Telephone:	+86 755 3661 1621
Fax:	+86 755 3661 2000-81722

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
City:	Hong Kong
Postal Code:	/
Country:	P.R. China
Telephone:	+86 755 3661 1621
Fax:	+86 755 3661 2000-81722

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

3.1. About EUT

General Information:

Description	GSM/UMTS/LTE/NR Mobile Phone
Model name/HVIN	T614SP
Marketing Name/PMN	/
Brand name	TCL
FCC ID	2ACCJH179
Extreme Temperature	-10~55℃
Nominal Voltage	3.85V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.6V

Supported Bands:

UMTS Frequency Band(s)	Band 1/2/4/5/8
GSM Frequency Band(s)	GSM850/900/1800/1900
E-UTRA Frequency Band(s)	Band 01/02/03/04/05/07/12/13/20/28/48/66
WLAN Frequency Band(s)	2.4G/5G
5G Frequency Band(s)	N2/5/48/66/77/78

Supported Codecs:

UMTS Audio Codec(s)	AMR NB/AMR WB
GSM Audio Codec (s)	EFR/AMR NB/AMR WB
E-UTRA Audio Codec(s)	AMR NB/AMR WB/EVS NB/EVS WB/ EVS SWB
WLAN Audio Codec(s)	AMR NB/AMR WB/EVS NB/EVS WB/ EVS SWB
5G Audio Codec(s)	AMR NB/AMR WB/EVS NB/EVS WB/ EVS SWB
OTT	Google Meet

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT

The T614SP is varied from T614D, the changes are declared as ANNEX A. It removes some frequency bands through software and shares the other test results of original sample (the report's number is 23T04Z80421-48).

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
/	/	06	2BSH	/

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

3.3. Internal Identification of AE

AE ID*	Description	SN
/	/	/

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

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters, referring to Annex B for detailed information, is supplied by the client or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

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

Reference	Title	Version
ANSI C63.19	American National Standard Methods of Measurement of Compatibility Between Wireless Communications Devices and Hearing Aids	2019
TIA 5050	Telecommunications Communications Products Receive Volume Control Requirements for Wireless (Mobile) Devices	2018 Edition
285076 D04 Volume Control v02	GUIDANCE FOR PERFORMING VOLUME CONTROL MEASUREMENTS ON MOBILE HANDSETS	2023.09.29
285076 D05 HAC Waiver DA 23-914 v01	HAC COMPLIANCE UNDER WAIVER DA 23-914	2023.09.29

5. Air Interfaces / Bands used for testing

The codec bit rates of the applicant's choosing are EVS-NB 13.2kbps and EVS-WB 13.2kbps.

Air-interface	Band	Tested Codec	Tested Rate(kbps)
GSM	850/1900	EFR	/
WCDMA (UMTS)	Band 1/2/5	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85
VoLTE	Band 1/2/4/7	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85
		EVS-NB	13.2
		EVS-WB	13.2
VoWiFi	802.11b/g	AMR-WB	6.6
		EVS-NB	13.2
		EVS-WB	13.2
VoNR	N2/5/66	AMR-NB	4.75
		AMR-WB	6.6
		EVS-WB	13.2

6. Test Results

6.1. Test summary and Conclusions

The volume control measurement method is in accordance with the TIA 5050-2018.
The EUT was tested in CTTL acoustics laboratory. All the detail results are showed in section 6.3.

I: Under the waiver, only CMRS narrowband and CMRS wideband voice codecs are required to comply with the volume control requirements of the TIA 5050-2018 Volume Control Standard as amended as follows:

a. For the 2N mounting force test, one narrowband and one wideband voice codec embedded with the handset must pass with at least one volume control setting with a conversational gain of ⩾ 6 dB for all voice services, bands of operation and air interfaces over which it operates using one codec bit rate of the applicant's choosing.

b. For the 8N mounting force test, one narrowband and one wideband voice codec embedded with the handset must pass with at least one volume control setting with a conversational gain of ⩾ 6 dB8 for all voice services, bands of operation and air interfaces over which they operate but is not required to meet or exceed the full 18 dB of conversational gain specified in section 5.1.1 of the TIA 5050 Volume Control Standard using one codec bit rate of the applicant's choosing.

II: For all other narrowband and wideband codecs not evaluated in I.a. above, TIA 5050-2018 Receive Distortion and Noise Performance and Receive Acoustic Frequency Response

Performance evaluations are not required; however, these codecs shall be assessed for conversational gain and documented in the test report at the 2N and 8N levels with a gain of ⩾ 6 dB for all voice services, bands of operation and air interfaces over which they operate. The handset volume setting used to comply with I.a. shall be used for these other CMRS codec evaluations.

III. Any other codec for voice services embedded in the handset, not identified in I and II above, is not required to comply or demonstrate in the test reports for conversational gain.

Table 6.1-1: the worst-case test results of the chosen codec of telephony call

Air-interface & Band	Mode	Channel	Modulation	Data Rate [Mbps]	Volume Level	Codec	NB/WB	Bit Rate [kbps]	2N/8N [N]	Conv. Gain (ANNEX D) [dB]	RFR (ANNEX D)	Minimum Distortion (ANNEX D) [Hz]	Minimum Distortion (ANNEX D) [dB]	Verdict
VoWiFi	802.11b	6	DSSS	1	Max-1	EVS	NB	13.2	2N	13.81	PASS	800	22.95	PASS
VoWiFi	802.11b	6	DSSS	1	Max-1	EVS	NB	13.2	8N	17.63	PASS	630	22.55	PASS
VoWiFi	802.11b	6	DSSS	1	Max-1	EVS	WB	13.2	2N	12.17	PASS	250	22.09	PASS
VoWiFi	802.11b	6	DSSS	1	Max-1	EVS	WB	13.2	8N	16.38	PASS	250	21.57	PASS

Table 6.1-2: the worst-case test results of other codecs of telephony call

Air-interface & Band	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Volume Level	Codec	NB/WB	Bit Rate [kbps]	2N/8N [N]	Conv. Gain (ANNEX E) [dB]	RFR	Minimum Distortion [Hz]	Minimum Distortion [dB]	Verdict
VoNR N2	18900	20	QPSK	15	106	Max-1	AMR	NB	4.75	2N	12.26	/	/	/	PASS
VoNR N2	18900	20	QPSK	15	106	Max-1	AMR	NB	4.75	8N	16.75	/	/	/	PASS
VoNR N2	18900	20	QPSK	15	106	Max-1	AMR	WB	6.6	2N	11.23	/	/	/	PASS
VoNR N2	18900	20	QPSK	15	106	Max-1	AMR	WB	6.6	8N	14.72	/	/	/	PASS
GSM 1900	600	/	/	/	/	Max-1	EFR	NB	/	2N	15.16	/	/	/	PASS

GSM 1900	600	/	/	/	/	Max-1	EFR	NB	/	8N	17.95	/	/	/	PASS

6.2. Description of Test Setup

In order to provide the complete information about the measurement environment within this report the setup is described in this chapter. Figure 6.2.1 shows a block diagram of the test arrangement.

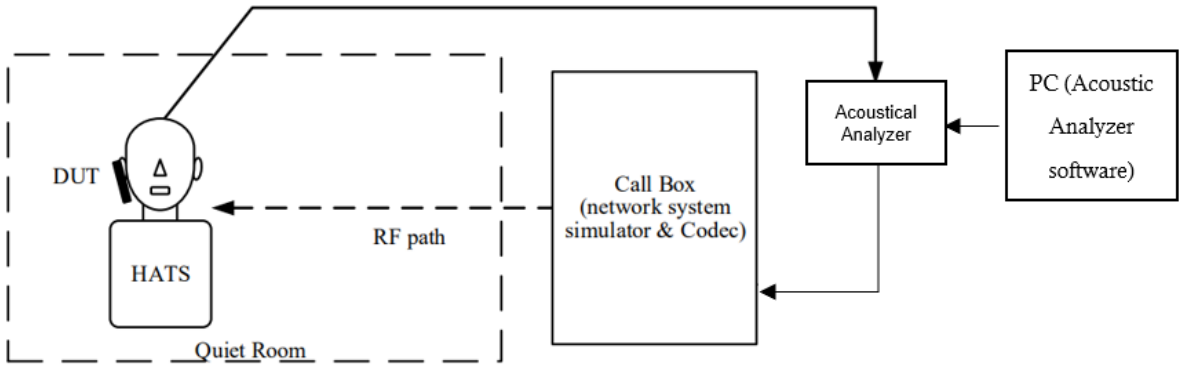


Fig. 6.2.1: Block diagram of the test setup

An artificial head measurement system according to ITU-T Recommendation P.58 equipped with artificial ears (Type3.3 acc. ITU-T Rec. P.57) are used. The artificial head is placed in the center of an anechoic test room. The measurements are implemented in the HEAD acoustics software ACQUA and can be carried out automatically. They allow signal recording at the artificial ears and feeding at the network simulator.

The network simulators (e.g. Rohde & Schwarz CMW500, CMX500) establish the call to the mobile phone via an antenna connection. The EUT was tested using EFR/AMR-NB/AMR-WB/EVS-NB/EVS-WB codecs.

ANNEX C shows the handheld Positioner with mounted EUT. The application force between the phone and the artificial ear is adjusted. A mounting force of 2N or 8 N is adjusted.

6.3. Test Detail Results

6.3.1 VoLTE IMS call investigation

Table 6.3.1-1: the **Codec** and **Bandwidth** investigating results of **VoLTE** IMS call

Band	Channel	Bandwidth	Modulation	RB Size	RB Offset	Volume Level	Codec	NB/WB	Bit Rate	2N/8N	Conv. Gain	FR	Min PN-SDNR

		[MHz]							[kbps]	[N]	[dB]		[Hz]	[dB]
Band 1	18300	10	QPSK	50	0	Max-1	EVS	NB	13.2	2N	14.33	PASS	250	23.09
Band 1	18300	10	QPSK	50	0	Max-1	EVS	NB	13.2	8N	18.66	PASS	800	22.63
Band 1	18300	10	QPSK	50	0	Max-1	EVS	WB	13.2	2N	12.34	PASS	250	22.80
Band 1	18300	10	QPSK	50	0	Max-1	EVS	WB	13.2	8N	15.91	PASS	250	22.59
Band 1	18300	10	QPSK	50	0	Max-1	AMR	NB	4.75	2N	13.93	/	/	/
Band 1	18300	10	QPSK	50	0	Max-1	AMR	NB	12.2	2N	14.85	/	/	/
Band 1	18300	10	QPSK	50	0	Max-1	AMR	NB	4.75	8N	17.27	/	/	/
Band 1	18300	10	QPSK	50	0	Max-1	AMR	WB	6.6	2N	12.58	/	/	/
Band 1	18300	10	QPSK	50	0	Max-1	AMR	WB	23.85	2N	12.85	/	/	/
Band 1	18300	10	QPSK	50	0	Max-1	AMR	WB	6.6	8N	15.39	/	/	/

Table 6.3.1-2: the **Radio Configuration** investigating results of **VoLTE** IMS call

Band	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Volume Level	Codec	NB/WB	Bit Rate [kbps]	2N/8N [N]	Conv. Gain [dB]	FR	Min PN-SDNR [Hz]	Min PN-SDNR [dB]
Band 1	18300	10	QPSK	1	0	Max-1	EVS	WB	13.2	8N	15.82	PASS	250	22.33
Band 1	18300	10	QPSK	1	49	Max-1	EVS	WB	13.2	8N	15.83	PASS	250	22.61
Band 1	18300	10	16QAM	1	0	Max-1	EVS	WB	13.2	8N	15.50	PASS	250	22.64
Band 1	18300	10	16QAM	1	49	Max-1	EVS	WB	13.2	8N	15.95	PASS	250	23.93
Band 1	18300	10	16QAM	50	0	Max-1	EVS	WB	13.2	8N	16.07	PASS	250	23.62
Band 1	18300	20	QPSK	100	0	Max-1	EVS	WB	13.2	8N	15.57	PASS	250	23.43
Band 1	18300	20	QPSK	1	0	Max-1	EVS	WB	13.2	8N	15.83	PASS	250	24.33
Band 1	18300	20	16QAM	1	0	Max-1	EVS	WB	13.2	8N	16.09	PASS	250	24.05
Band 1	18300	15	QPSK	1	0	Max-1	EVS	WB	13.2	8N	15.66	PASS	250	22.79
Band 1	18300	15	16QAM	1	0	Max-1	EVS	WB	13.2	8N	15.93	PASS	250	23.58
Band 1	18300	5	QPSK	1	0	Max-1	EVS	WB	13.2	8N	15.64	PASS	250	23.92

Band 1	18300	5	16QAM	1	0	Max-1	EVS	WB	13.2	8N	15.82	PASS	250	22.59
Band 1	18300	10	QPSK	1	0	Max-1	AMR	WB	6.6	2N	12.28	/	/	/
Band 1	18300	10	QPSK	1	49	Max-1	AMR	WB	6.6	2N	12.67	/	/	/
Band 1	18300	10	16QAM	1	0	Max-1	AMR	WB	6.6	2N	12.10	/	/	/
Band 1	18300	10	16QAM	1	49	Max-1	AMR	WB	6.6	2N	12.63	/	/	/
Band 1	18300	10	16QAM	50	0	Max-1	AMR	WB	6.6	2N	12.35	/	/	/
Band 1	18300	20	QPSK	100	0	Max-1	AMR	WB	6.6	2N	12.20	/	/	/
Band 1	18300	20	QPSK	1	0	Max-1	AMR	WB	6.6	2N	12.05	/	/	/
Band 1	18300	20	16QAM	100	0	Max-1	AMR	WB	6.6	2N	12.44	/	/	/
Band 1	18300	20	16QAM	1	0	Max-1	AMR	WB	6.6	2N	12.20	/	/	/
Band 1	18300	15	QPSK	75	0	Max-1	AMR	WB	6.6	2N	12.24	/	/	/
Band 1	18300	15	QPSK	1	0	Max-1	AMR	WB	6.6	2N	12.36	/	/	/
Band 1	18300	15	16QAM	75	0	Max-1	AMR	WB	6.6	2N	12.34	/	/	/
Band 1	18300	15	16QAM	1	0	Max-1	AMR	WB	6.6	2N	12.36	/	/	/

Table 6.3.1-3: the **LTE Band** investigating results of **VoLTE** IMS call

Band	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Volume Level	Codec	NB/WB	Bit Rate [kbps]	2N/8N [N]	Conv. Gain [dB]	FR	Min PN-SDNR [Hz]	Min PN-SDNR [dB]
Band B2	18900	10	QPSK	1	0	Max-1	EVS	WB	13.2	8N	15.69	PASS	4000	22.55
Band B4	20175	10	QPSK	1	0	Max-1	EVS	WB	13.2	8N	15.73	PASS	4000	22.55
Band B7	21100	10	QPSK	1	0	Max-1	EVS	WB	13.2	8N	15.86	PASS	250	23.73
Band B2	18900	20	QPSK	1	0	Max-1	AMR	WB	6.6	2N	12.54	/	/	/
Band B4	20175	20	QPSK	1	0	Max-1	AMR	WB	6.6	2N	12.23	/	/	/
Band B7	21100	20	QPSK	1	0	Max-1	AMR	WB	6.6	2N	12.28	/	/	/

6.3.2 VoWiFi IMS call investigation

Table 6.3.2: the investigating results of **VoWiFi** IMS call

Mode	Channel	Modulation	Data Rate	Volume Level	Codec	NB/WB	Bit Rate	2N/8N	Conv. Gain	FR	Min PN-SDNR	
			[Mbps]				[kbps]	[N]	[dB]		[Hz]	[dB]
802.11b	6	DSSS	1	Max-1	EVS	WB	13.2	8N	16.38	PASS	250	21.57
802.11b	6	DSSS	2	Max-1	EVS	WB	13.2	8N	16.01	PASS	250	23.84
802.11b	6	CCK	5.5	Max-1	EVS	WB	13.2	8N	16.02	PASS	250	23.99
802.11b	6	CCK	11	Max-1	EVS	WB	13.2	8N	16.01	PASS	250	22.05
802.11g	6	BPSK	6	Max-1	EVS	WB	13.2	8N	16.01	PASS	250	22.21
802.11g	6	BPSK	9	Max-1	EVS	WB	13.2	8N	16.10	PASS	250	22.26
802.11g	6	QPSK	12	Max-1	EVS	WB	13.2	8N	15.74	PASS	250	23.11
802.11g	6	QPSK	18	Max-1	EVS	WB	13.2	8N	15.85	PASS	250	23.02
802.11g	6	16-QAM	24	Max-1	EVS	WB	13.2	8N	15.98	PASS	250	22.28
802.11g	6	16-QAM	36	Max-1	EVS	WB	13.2	8N	15.99	PASS	250	23.74
802.11g	6	64-QAM	48	Max-1	EVS	WB	13.2	8N	16.11	PASS	250	22.69
802.11g	6	64-QAM	54	Max-1	EVS	WB	13.2	8N	16.12	PASS	250	22.21
802.11b	6	DSSS	1	Max-1	AMR	WB	6.6	2N	13.18	/	/	/
802.11b	6	DSSS	2	Max-1	AMR	WB	6.6	2N	12.57	/	/	/
802.11b	6	CCK	5.5	Max-1	AMR	WB	6.6	2N	13.24	/	/	/
802.11b	6	CCK	11	Max-1	AMR	WB	6.6	2N	12.85	/	/	/
802.11g	6	BPSK	6	Max-1	AMR	WB	6.6	2N	12.71	/	/	/
802.11g	6	BPSK	9	Max-1	AMR	WB	6.6	2N	12.84	/	/	/
802.11g	6	QPSK	12	Max-1	AMR	WB	6.6	2N	12.81	/	/	/
802.11g	6	QPSK	18	Max-1	AMR	WB	6.6	2N	13.03	/	/	/
802.11g	6	16-QAM	24	Max-1	AMR	WB	6.6	2N	13.00	/	/	/
802.11g	6	16-QAM	36	Max-1	AMR	WB	6.6	2N	12.92	/	/	/
802.11g	6	64-QAM	48	Max-1	AMR	WB	6.6	2N	12.96	/	/	/
802.11g	6	64-QAM	54	Max-1	AMR	WB	6.6	2N	12.96	/	/	/

6.3.3 GSM call investigation

Table 6.3.3: the investigating results of **GSM** call

Band	Channel	Volume Level	Codec	Voice bandwidth	Bit Rate	2N/8N	Conv. Gain	FR	Min PN-SDNR	
					[kbps]	[N]	[dB]		[Hz]	[dB]

GSM850	162	Max-1	EFR	NB	/	2N	15.22	/	/	/
GSM850	162	Max-1	EFR	NB	/	8N	17.89	/	/	/
GSM1900	600	Max-1	EFR	NB	/	2N	15.16	/	/	/
GSM1900	600	Max-1	EFR	NB	/	8N	17.95	/	/	/

6.3.4 WCDMA call investigation

Table6.3.4: the investigating results of **WCDMA** call

air interface	Band	Channel	Volume Level	Codec	Voice band width	Bit Rate	2N/8N	Conv. Gain	FR	Min PN-SDNR	
						[kbps]	[N]	[dB]		[Hz]	[dB]
WCDMA	Band1	9613	Max-1	AMR	NB	4.75	2N	14.61	/	/	/
WCDMA	Band1	9613	Max-1	AMR	NB	12.2	2N	15.11	/	/	/
WCDMA	Band1	9613	Max-1	AMR	NB	4.75	8N	17.57	/	/	/
WCDMA	Band1	9613	Max-1	AMR	WB	6.6	2N	13.10	/	/	/
WCDMA	Band1	9613	Max-1	AMR	WB	23.85	2N	13.58	/	/	/
WCDMA	Band1	9613	Max-1	AMR	WB	6.6	8N	15.50	/	/	/
WCDMA	Band2	9800	Max-1	AMR	WB	6.6	2N	13.06	/	/	/
WCDMA	Band5	4132	Max-1	AMR	WB	6.6	2N	13.17	/	/	/

6.3.5 VoNR call investigation

Table6.3.5: the investigating results of **VoNR** call

Band	Channel	Bandwidth [MHz]	Modulation	SCS (kHz)	RB	Volume Level	Codec	NB / WB	Bit Rate	2N/8N	Conv. Gain	FR	Min PN-SDNR	
									[kbps]	[N]	[dB]		[Hz]	[dB]
N66	132322	80	QPSK	15	20	Max-1	EVS	WB	13.2	8N	15.49	PASS	250	24.10
N66	132322	20	16QAM	15	1	Max-1	EVS	WB	13.2	8N	15.48	PASS	250	24.04
N2	18900	20	16QAM	15	1	Max-1	EVS	WB	13.2	8N	15.48	PASS	250	23.09
N5	20525	20	16QAM	15	1	Max-1	EVS	WB	13.2	8N	15.49	PASS	250	23.82
N2	18900	20	16QAM	15	106	Max-1	AMR	WB	6.6	2N	11.33	/	/	/
N2	18900	20	QPSK	15	106	Max-1	AMR	WB	6.6	2N	11.23	/	/	/

N66	132322	20	QPSK	15	1	Max-1	AMR	WB	6.6	2N	11.91	/	/	/
N5	20525	20	QPSK	15	1	Max-1	AMR	WB	6.6	2N	11.85	/	/	/

7. Test Facilities Utilized

No	Name	Type	SN	Manufacturer	Cal.Due Date
1	Measurement Frontend	Labcore	77000136	HEAD acoustics GmbH	2025-11-29
2	HEAD measurement system	HMS II.3	12306194 (torso137 40182)	HEAD acoustics GmbH	2024-10-25
3	Universal communication tester	CMW500	170430	Rohde&Schwarz	2024-08-03
4	Universal communication tester	CMX500	101626	Rohde&Schwarz	2024-08-05
5	Acoustic chamber	4.70 m×4.30 m×2.10 m	None	Ruisen	2026-10-26
Software					
Name		**Version**			
ACQUA		V 5.1.200			

END OF REPORT BODY

ANNEX A: EUT Declaration

TCT Mobile

5F, C building, NO. 232, Liang Jing Road
ZhangJiang High-Tech Park, Pudong Area
Shanghai, P.R. China. 201203
TEL: +86(0)21 61460666
FAX: +86(0)21 61460602

Declaration of changes from Initial T614D to Variant 614SP

- **SOFTWARE MODIFICATIONS:**
  - OS update (e.g. from Android 12 to 13) / change (e.g. from Android to other OS) : NO
  - Protocol Stack changes: **NO**
  - MMS/STK/USAT/USIM changes: **NO**
  - DM/SUPL/VT/FUMO/SWP/HCI: **FUMO changed, T614D doesn't support FUMO,T614SP support FUMO**
  - Other changes detail:
    1. **T614D use Google Dialer, T614SP use GcsDialer**
    2. **Disable some bands by software**
    3. **SW version changed as to different carrier**

- **HARDWARE MODIFICATIONS:**
  - Baseband changes: **NO**
  - Band changes: **YES** Main bands for conformance testing changes (Yes/No): **NO**

Product	GSM	UMTS	LTE	LTE CA	5G NR SA	5G NR NSA
T614D	GSM50/900/1800/1900	WCDMA B1/2/4/5/8	B1/B2/B3/B4/B5/B7/B12/B13/B20/B25/B26/B28/B29/B38/B40/B41/B48/B66/B71	ULCA/DL CA	n2/n5/n25(40MHz)/n41(HPUE)/n48/n66(40MHz)/n71/n77(only support 3450-3550MHz+3700-3980MHz for FCC)/n78 roaming	1LTE+1NR/2LTE+1NR
T614SP	GSM50/900/1800/1900	WCDMA B1/2/4/5/8	B1/B2/B3/B4/B5/B7/B12/B13/B20//B28/B48/B66	ULCA/DL CA	n2/n5/n48/n66(40MHz)//n77(only support 3450-3550MHz+3700-3980MHz for FCC)/n78 roaming	1LTE+1NR/2LTE+1NR

Band change details for LTE CA/5G NR SA/NSA: (if applicable)

Technology	T614D	T614SP
LTE CA	"LTE 2CA for LTE ULCA"	"LTE 2CA for LTE UL
	CA_2A-4A	CA_2A-4A
	CA_2A-5A	CA_2A-5A
	CA_2A-13A	CA_2A-13A
	CA_2A-66A	CA_2A-66A
	CA_4A-4A	
	CA_4A-13A	CA_4A-13A
	CA_12A-66A	
	CA_13A-66A	CA_13A-66A
	CA_41C	
	CA_4A-12A	
	CA_5A-66A	CA_5A-66A
	CA_4A-5A	CA_4A-5A
	CA_5A-48A	
	CA_48B	
	CA_48C	
	CA_66B	CA_66B
	CA_66C	CA_66C
	"LTE 2CA for LTE DL CA"	"LTE 2CA for LTE DLCA"
	CA_2A-2A	CA_2A-2A

	CA_2A-4A CA_2A-5A CA_2A-12A CA_2A-13A CA_2A-29A CA_2A-48A CA_2C CA_2A-66A CA_2A-71A CA_4A-4A CA_4A-5A CA_4A-12A CA_4A-13A CA_4A-29A CA_4A-48A CA_4A-71A CA_5A-41A CA_5A-48A CA_5A-66A CA_12A-48A CA_12A-66A CA_13A-48A CA_13A-66A CA_29A-66A CA_25A-25A CA_41A-41A CA_41A-48A CA_41C CA_48A-48A CA_48B CA_48C CA_66A-48A CA_66A-66A CA_66B CA_66C CA_66A-71A CA_7C CA_7A-7A CA_2A-7A CA_7A-13A CA_7A-66A CA_48A-48A CA_48B CA_48C CA_66A-48A CA_66A-66A CA_66B CA_66C CA_66A-71A CA_7C CA_7A-7A CA_2A-7A CA_7A-13A CA_7A-66A	CA_2A-4A CA_2A-5A CA_2A-13A CA_2A-48A CA_2A-66A CA_4A-4A CA_4A-5A CA_4A-13A CA_4A-48A CA_5A-48A CA_5A-66A CA_13A-48A CA_13A-66A CA_48C CA_66A-66A CA_66B CA_66C CA_7C CA_7A-7A CA_2A-7A CA_7A-13A CA_7A-66A
5G EN-DC	DC_2A[4]_n2A[4] DC_5A_n2A[4] DC_12A_n2A[4] DC_13A_n2A[4] DC_66A[4]_n2A[4] DC_2A[4]_n5A DC_66A[4]_n5A DC_2A_n41A[4] DC_66A[4]_n41A DC_66A_n41A[4] DC_2A[4]_n66A[4]	 DC_5A_n2A[4] DC_13A_n2A[4] DC_66A[4]_n2A[4] DC_2A[4]_n5A DC_66A[4]_n5A DC_2A[4]_n66A[4]

	DC_5A_n66A[4] DC_7A_n66A DC_12A_n66A[4] DC_13A_n66A[4] DC_66A[4]_n66A[4] DC_2A[4]_n71A DC_66A[4]_n71A DC_2A[4]_n77A[4] DC_5A_n77A[4] DC_7A_n77A DC_12A_n77A[4] DC_13A_n77A[4] DC_66A[4]_n77A[4] DC_5A_n78A DC_7A_n78A 2LTE+1NR DC_2A-5A_n2A[4] DC_2A-12A_n2A[4] DC_2A-13A_n2A[4] DC_2A-29A_n2A[4] DC_2A-66A_n2A[4] DC_5A-66A_n2A[4] DC_12A-66A_n2A[4] DC_13A-48A_n2A[4]（B48 only for SCC) DC_13A-66A_n2A[4] DC_29A-66A_n2A[4] DC_48A-66A_n2A[4]（B48 only for SCC) DC_66A-66A_n2A[4] DC_2A-2A_n5A DC_2A-5A_n5A(partial,B5 only SCC) DC_2A-48A_n5A（B48 only for SCC) DC_2A-66A_n5A "DC_5A-66A_n5A B5 only SCC" DC_48A-66A_n5A（B48 only for SCC) DC_66A-66A_n5A DC_2A-66A_n41A[2] DC_2A-2A_n66A[4] DC_2A-5A_n66A[4] DC_2A-7A_n66A DC_2A-12A_n66A[4] DC_2A-13A_n66A[4] DC_2A-29A_n66A[4] DC_2A-48A_n66A[4]（B48 only for SCC) "DC_2A-66A_n66A[4] DC_2A-(n)66AA" DC_5A-66A_n66A[4] DC_7A-7A_n66A DC_7C_n66A DC_7A-13A_n66A DC_7A-66A_n66A DC_12A-66A_n66A[4] DC_13A-48A_n66A[4]（B48 only for SCC) DC_13A-66A_n66A[4] DC_29A-66A_n66A[4] DC_48A-66A_n66A[4]（B48 only for SCC） DC_2A-2A_n71A DC_2C_n71A DC_2A-66A_n71A	DC_5A_n66A[4] DC_7A_n66A DC_13A_n66A[4] DC_2A[4]_n77A[4] DC_5A_n77A[4] DC_7A_n77A DC_13A_n77A[4] DC_66A[4]_n77A[4] DC_5A_n78A DC_7A_n78A 2LTE+1NR DC_2A-5A_n2A[4] DC_2A-13A_n2A[4] DC_2A-66A_n2A[4] DC_5A-66A_n2A[4] DC_13A-48A_n2A DC_13A-66A_n2A[4] DC_48A-66A_n2A DC_66A-66A_n2A[4] DC_2A-2A_n5A DC_2A-48A_n5A DC_2A-66A_n5A DC_48A-66A_n5A DC_66A-66A_n5A DC_2A-2A_n66A[4] DC_2A-5A_n66A[4] DC_2A-7A_n66A DC_2A-13A_n66A[4] DC_2A-48A_n66A DC_2A-66A_n66A[4] DC_5A-66A_n66A[4] DC_7A-7A_n66A DC_7C_n66A DC_7A-13A_n66A DC_7A-66A_n66A DC_13A-48A_n66A DC_13A-66A_n66A[4] DC_2A-2A_n77A[4]

	DC_2A-2A_n77A[4] "DC_2A-5A_n77A[4] for UL 5A_n77A[4] DC_2A-5A_n77A[4] for UL 2A_n77A[4]" DC_2A-12A_n77A[4] DC_2A-13A_n77A[4] DC_2A-29A_n77A[4] DC_2A-48A_n77A[4]（B48 only for SCC) DC_2A-66A_n77A[4] DC_5A-48A_n77A[4]（B48 only for SCC) "DC_5A-66A_n77A[4] for UL DC_5A_n77A[4] DC_5A-66A_n77A[4] for UL DC_66A_n77A[4]" DC_12A-66A_n77A[4] DC_13A-48A_n77A[4]（B48 only for SCC) DC_13A-66A_n77A[4] DC_29A-66A_n77A[4] DC_48A-66A_n77A[4]（B48 only for SCC) DC_66A-66A_n77A[4]	"DC_2A-5A_n77A[4] for UL 5A_n77A[4] DC_2A-5A_n77A[4] for UL 2A_n77A[4]" DC_2A-13A_n77A[4] DC_2A-48A_n77A DC_2A-66A_n77A[4] DC_5A-48A_n77A "DC_5A-66A_n77A[4] for UL DC_5A_n77A[4] DC_5A-66A_n77A[4] for UL DC_66A_n77A[4]" DC_13A-48A_n77A DC_13A-66A_n77A[4] DC_48A-66A_n77A DC_66A-66A_n77A[4]
5G NR-CA	CA_n2(2A)[4] CA_n2A[4]-n5A CA_n2A-n48A CA_n2A[4]-n66A[4] CA_n2A[4]-n77A[4] CA_n5(2A) CA_n5B CA_n5A-n48A CA_n5A-n66A[4] CA_n5A-n77A[4] CA_n25(2A)[4] CA_n25A[4]-n41A[4] CA_n25A[4]-n66A[4] CA_n48A-n66A CA_n25A[4]-n71A CA_n25A[4]-n77A[4] CA_n41(2A)[4] CA_n41A[4]-n66A[2] CA_n41A[4]-n71A CA_n41A[4]-n77A[4] CA_n41C[4] CA_n48A-n66A CA_n48A-n77A CA_n48B CA_n48C CA_n48(2A) CA_n66(2A)[4] CA_n66A[4]-n71A CA_n66A[4]_n77A[4] CA_n66B[4] CA_n71B CA_n71(2A) CA_n71A-n77A[4] CA_n77(2A)[4] CA_n77C	CA_n2(2A) CA_n2A-n5A CA_n2A-n48A CA_n2A-n66A CA_n2A-n77A CA_n5(2A) CA_n5B CA_n5A-n48A CA_n5A-n66A CA_n5A-n77A CA_n48A-n66A CA_n48A-n77A CA_n48B CA_n48C CA_n48(2A) CA_n66(2A) CA_n66A-n77A CA_n66B CA_n77C

- PCB layout/material changes: NO
- Main components changes: (备注：如下的频段列表是variant model 的频段，后面的器件是与原型机的器件对比结果：如果是新增的频段，那么器件变化的部分是new；如果是相同band的器件变化了，就是填写new)

GSM	Base Band	Antenna	Transceiver	ASM	Power Amplifier	Tx SAW Filter	Rx SAW Filter (SAW Duplexer)
GSM 850	NO	NO	NO	NO	NO	NO	NO
GSM 900	NO	NO	NO	NO	NO	NO	NO
GSM 1800	NO	NO	NO	NO	NO	NO	NO
GSM 1900	NO	NO	NO	NO	NO	NO	NO

UMTS	Base Band	Antenna	Transceiver	ASM	Power Amplifier	Tx SAW Filter	Rx SAW Filter (SAW Duplexer)
UMTS FDD I	NO	NO	NO	NO	NO	NO	NO
UMTS FDD II	NO	NO	NO	NO	NO	NO	NO
UMTS FDD IV	NO	NO	NO	NO	NO	NO	NO

UMTS FDD V	NO	NO	NO	NO	NO	NO	NO
UMTS FDD VIII	NO	NO	NO	NO	NO	NO	NO

LTE	Base Band	Antenna	Transceiver	ASM	Power Amplifier	Tx SAW Filter	Rx SAW Filter (SAW Duplexer)
LTE B1	NO	NO	NO	NO	NO	NO	NO
LTE B2	NO	NO	NO	NO	NO	NO	NO
LTE B3	NO	NO	NO	NO	NO	NO	NO
LTE B4	NO	NO	NO	NO	NO	NO	NO
LTE B5	NO	NO	NO	NO	NO	NO	NO
LTE B7	NO	NO	NO	NO	NO	NO	NO
LTE B12	NO	NO	NO	NO	NO	NO	NO
LTE B13	NO	NO	NO	NO	NO	NO	NO
LTE B14	NO	NO	NO	NO	NO	NO	NO
LTE B17	NO	NO	NO	NO	NO	NO	NO
LTE B20	NO	NO	NO	NO	NO	NO	NO
LTE B25	NO	NO	NO	NO	NO	NO	NO
LTE B26	NO	NO	NO	NO	NO	NO	NO
LTE B28	NO	NO	NO	NO	NO	NO	NO
LTE B29	NO	NO	NO	NO	NO	NO	NO
LTE B38	NO	NO	NO	NO	NO	NO	NO
LTE B40	NO	NO	NO	NO	NO	NO	NO
LTE B41	NO	NO	NO	NO	NO	NO	NO
LTE B42	NO	NO	NO	NO	NO	NO	NO
LTE B48	NO	NO	NO	NO	NO	NO	NO
LTE B66	NO	NO	NO	NO	NO	NO	NO
LTE B71	NO	NO	NO	NO	NO	NO	NO

NR	Base Band	Antenna	Transceiver	ASM	Power Amplifier	Tx SAW Filter	Rx SAW Filter (SAW Duplexer)
NR n1	NO	NO	NO	NO	NO	NO	NO
NR n2	NO	NO	NO	NO	NO	NO	NO
NR n3	NO	NO	NO	NO	NO	NO	NO
NR n5	NO	NO	NO	NO	NO	NO	NO
NR n7	NO	NO	NO	NO	NO	NO	NO
NR n8	NO	NO	NO	NO	NO	NO	NO
NR n12	NO	NO	NO	NO	NO	NO	NO
NR n14	NO	NO	NO	NO	NO	NO	NO
NR n20	NO	NO	NO	NO	NO	NO	NO
NR n25	NO	NO	NO	NO	NO	NO	NO
NR n26	NO	NO	NO	NO	NO	NO	NO
NR n28	NO	NO	NO	NO	NO	NO	NO
NR n30	NO	NO	NO	NO	NO	NO	NO
NR n38	NO	NO	NO	NO	NO	NO	NO
NR n40	NO	NO	NO	NO	NO	NO	NO
NR n41	NO	NO	NO	NO	NO	NO	NO
NR n48	NO	NO	NO	NO	NO	NO	NO
NR n66	NO	NO	NO	NO	NO	NO	NO
NR n70	NO	NO	NO	NO	NO	NO	NO
NR n71	NO	NO	NO	NO	NO	NO	NO
NR n77	NO	NO	NO	NO	NO	NO	NO
NR n78	NO	NO	NO	NO	NO	NO	NO

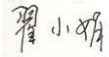
Other Radio	Antenna	AP	MODEM	Transceiver	Balun	Band pass filter	Triplexer
Bluetooth	NO	NO	NO	NO	NO	NO	NO
Wi-Fi	NO	NO	NO	NO	NO	NO	NO

- FM changes: NO
- GPS changes: NO (e.g. Saw is different)
- Memory/TP/LCD/ Camera/SIM changes: NO
- Other changes detailed: NO

- **MECHANICAL MODIFICATIONS:**
  - Use new metal front/back cover or keypad: NO
  - Mechanical shell changes: NO
    Whole size of EUT: NO
    Distance of Ear reference point to bottom of handset: NO
    Other trinkets to change the surface of handset: NO
  - Other changes detailed: NO (e.g. new mechanical design)

- **Accessory changes:**
  - Use new charger/battery/headset/USB cable: NO

- **Update of standards:** NO

APPROVED BY:
Project Manager: 翟小娟
Signature: 
Date: 2023.09.22

ANNEX B: EUT Parameters

Disclaimer: The bands and codecs of EUT provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

General Information:

Description	GSM/UMTS/LTE/NR Mobile Phone
Model name/HVIN	T614SP
Marketing Name/PMN	/
Brand name	TCL
FCC ID	2ACCJH179
Extreme Temperature	-10~55℃
Nominal Voltage	3.85V
Extreme High Voltage	4.4V
Extreme Low Voltage	3.6V

Supported Bands:

UMTS Frequency Band(s)	Band 1/2/4/5/8
GSM Frequency Band(s)	GSM850/900/1800/1900
E-UTRA Frequency Band(s)	Band 01/02/03/04/05/07/12/13/20/28/48/66
WLAN Frequency Band(s)	2.4G/5G
5G Frequency Band(s)	N2/5/48/66/77/78

Supported Codecs:

UMTS Audio Codec(s)	AMR NB/AMR WB
GSM Audio Codec (s)	EFR/AMR NB/AMR WB
E-UTRA Audio Codec(s)	AMR NB/AMR WB/EVS NB/EVS WB/ EVS SWB
WLAN Audio Codec(s)	AMR NB/AMR WB/EVS NB/EVS WB/ EVS SWB
5G Audio Codec(s)	AMR NB/AMR WB/EVS NB/EVS WB/ EVS SWB
OTT	Google Meet

ANNEX C: Test Layout

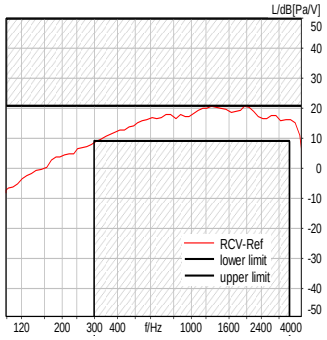
Artificial Ear Type		3.3
Mounting Force [N]		2 and 8
Center Fork Offset [°]		0
Volume Level		7/ (1-7)
Angle settings		
Xe [°]	Ye [°]	Ze[°]
0	0	5

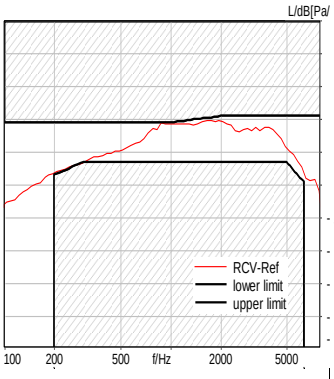
NOTE: The handset shall be placed in either the standard test position as specified in IEEE Std 269 or a recommended test position specified by the manufacturer that complies with the recommended test position requirements in IEEE Std 269.

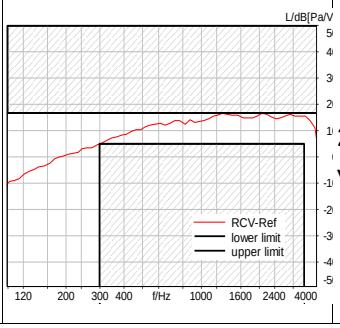
No phone's photos for Confidentiality requirements according to the client.

ANNEX D: The Worst-case Measurement Data of The Chosen Codec of Telephony Call

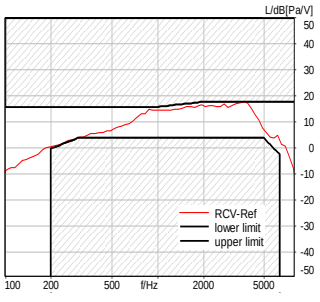
SMD	Status	Single Value Description	Single Value	Object
5.1 Receive Volume Control Performance 8N Table-8	Done	Speech Level [dB[SPL]]	87.63	23T04Z80421 VoWifi EVS
5.1.1 -1 Conversation Gain 8N Table-8	Ok	Calculated Value [dB]	17.63	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 400Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	24.72	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 500Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	24.71	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 630Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	23.50	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 800Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	22.55	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1000Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	26.21	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1250Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	30.70	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1600Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	35.07	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 2000Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	35.26	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 2500Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	31.19	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 3150Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	27.98	23T04Z80421 VoWifi EVS

5.2 Receive path – distortion and noise Table-8	Done			23T04Z80421 VoWifi EVS
5.3 Receive Acoustic Frequency response Performance Table-8	Ok	Min. dist. to tolerance scheme [dB], 305.9 Hz	 0.02 dB at 305.9 Hz	23T04Z80421 VoWifi EVS
5.1 Receive Volume Control Performance 8N DSSS;1Mbps; Table-8	Done	Speech Level [dB[SPL]]	86.38	23T04Z80421 VoWifi EVS
5.1.1 -1 Conversation Gain 8N DSSS;1Mbps; Table-8	Ok	Calculated Value [dB]	16.38	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 250 WBonly DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	21.57	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 315Hz WBonly DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	25.76	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 400Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	29.27	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 500Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	30.76	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 630Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	33.44	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 800Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	33.32	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1000Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	33.29	23T04Z80421 VoWifi EVS

Receive path - distortion and noise 1250Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	31.52	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1600Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	37.24	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 2000Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	38.14	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 2500Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	33.30	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 3150Hz WB&NB DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	32.73	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 4000Hz WBonly DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	30.80	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 5000Hz WBonly DSSS;1Mbps; Table-8	Done	Distortion (Noise) [dB], 0.0 dB	33.22	23T04Z80421 VoWifi EVS
5.2 Receive path – distortion and noise DSSS;1Mbps; Table-8	Ok			23T04Z80421 VoWifi EVS
5.3 Receive Acoustic Frequency response Performance DSSS;1Mbps; Table-8	Ok	Min. dist. to tolerance scheme [dB], 288.4 Hz	 0.08 dB at 288.4 Hz	23T04Z80421 VoWifi EVS
5.1 Receive Volume Control Performance 2N Table-8	Done	Speech Level [dB[SPL]]	83.81	23T04Z80421 VoWifi EVS
5.1.1 -1 Conversation Gain 2N Table-8	Ok	Calculated Value [dB]	13.81	23T04Z80421 VoWifi EVS

Receive path - distortion and noise 400Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	24.17	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 500Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	25.23	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 630Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	24.66	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 800Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	22.95	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1000Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	32.59	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1250Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	30.31	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1600Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	34.54	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 2000Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	35.70	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 2500Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	32.42	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 3150Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	26.59	23T04Z80421 VoWifi EVS
5.2 Receive path – distortion and noise Table-8	Done			23T04Z80421 VoWifi EVS
5.3 Receive Acoustic Frequency response Performance Table-8	Ok	Min. dist. to tolerance scheme [dB], 305.9 Hz		23T04Z80421 VoWifi EVS

			0.50 dB at 305.9 Hz	
5.1 Receive Volume Control Performance 2N Table-8	Done	Speech Level [dB[SPL]]	82.17	23T04Z80421 VoWifi EVS
5.1.1 -1 Conversation Gain 2N Table-8	Ok	Calculated Value [dB]	12.17	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 250 WBonly Table-8	Done	Distortion (Noise) [dB], 0.0 dB	22.09	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 315Hz WBonly Table-8	Done	Distortion (Noise) [dB], 0.0 dB	27.68	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 4000Hz WBonly Table-8	Done	Distortion (Noise) [dB], 0.0 dB	29.53	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 400Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	32.52	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 500Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	33.43	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 630Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	34.95	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 800Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	35.15	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1000Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	30.60	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1250Hz WB&NB	Done	Distortion (Noise) [dB], 0.0 dB	30.32	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 1600Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	37.50	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 2000Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	36.91	23T04Z80421 VoWifi EVS

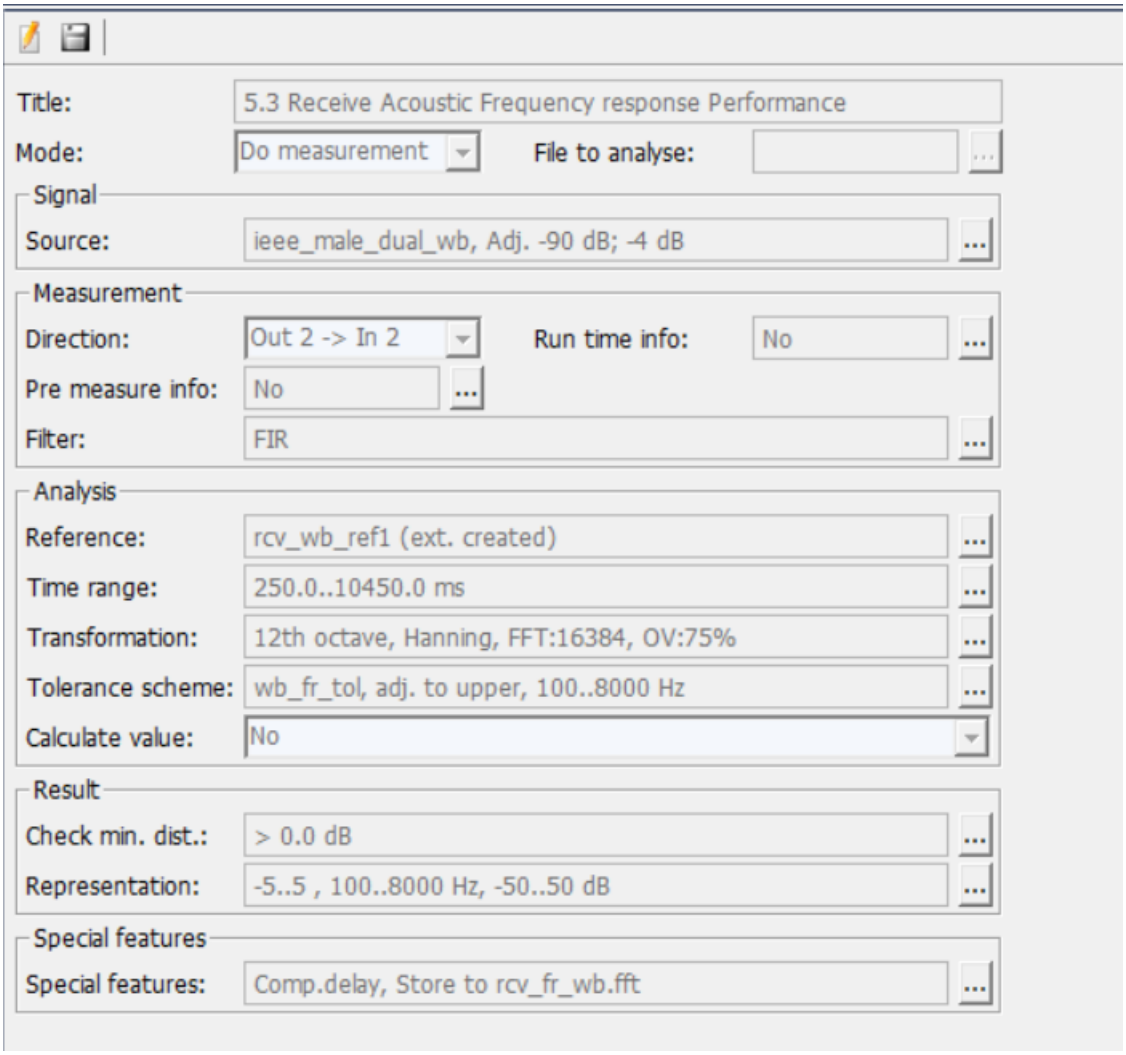
Receive path - distortion and noise 2500Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	34.05	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 3150Hz WB&NB Table-8	Done	Distortion (Noise) [dB], 0.0 dB	33.27	23T04Z80421 VoWifi EVS
Receive path - distortion and noise 5000Hz WBonly Table-8	Done	Distortion (Noise) [dB], 0.0 dB	30.45	23T04Z80421 VoWifi EVS
5.2 Receive path – distortion and noise Table-8	Ok			23T04Z80421 VoWifi EVS
5.3 Receive Acoustic Frequency response Performance Table-8	Ok	Min. dist. to tolerance scheme [dB], 288.4 Hz	 0.10 dB at 288.4 Hz	23T04Z80421 VoWifi EVS

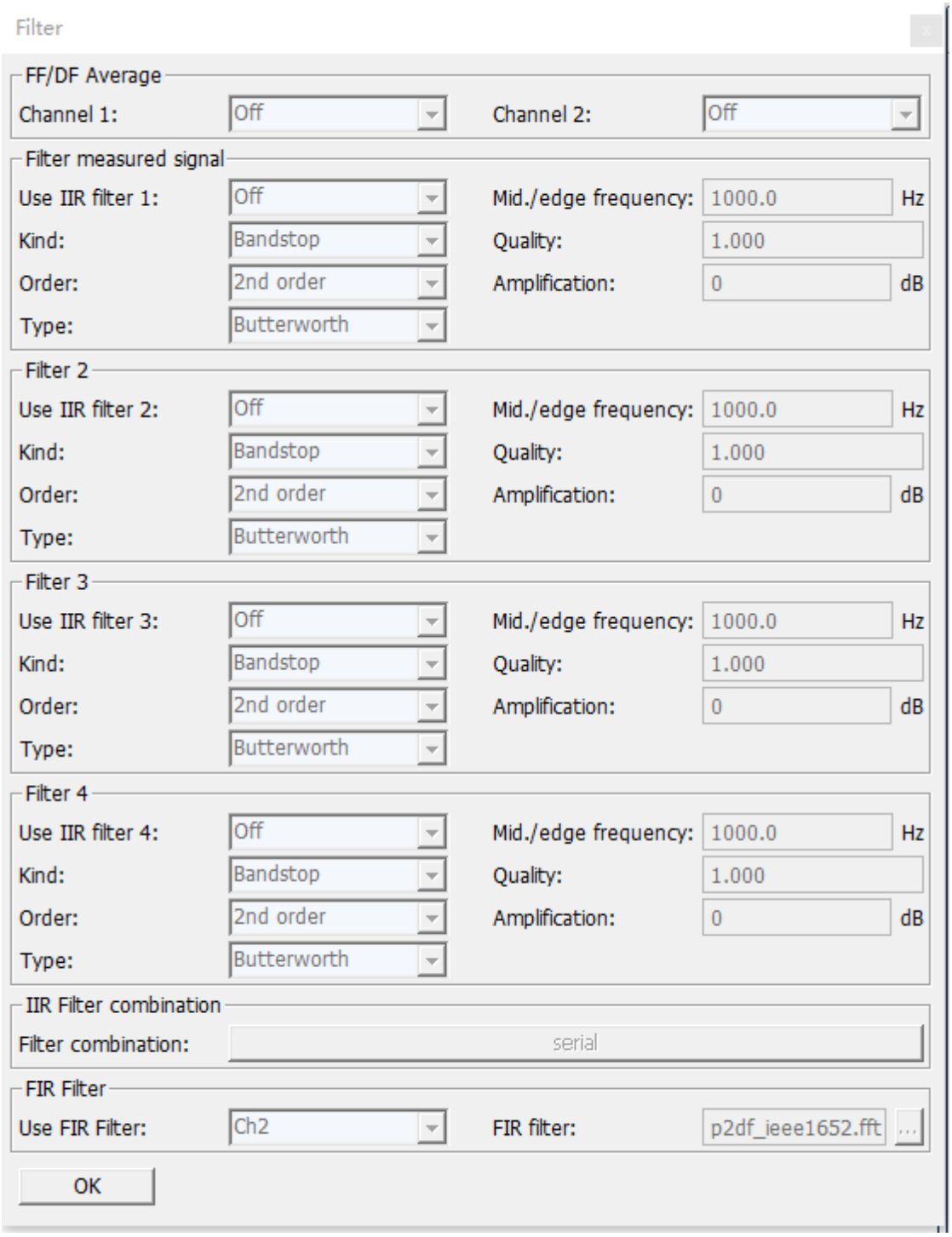
ANNEX E: The Worst-case Measurement Data of Other Codecs of Telephony Call

SMD	Status	Single Value Description	Single Value	Object
5.1 Receive Volume Control Performance 8N Table-9	Done	Speech Level [dB[SPL]]	86.75	23T04Z80421 VoNR AMR
5.1.1 -1 Conversation Gain 8N Table-9	Ok	Calculated Value [dB]	16.75	23T04Z80421 VoNR AMR
5.1 Receive Volume Control Performance 8N Table-9	Done	Speech Level [dB[SPL]]	84.72	23T04Z80421 VoNR AMR
5.1.1 -1 Conversation Gain 8N Table-9	Ok	Calculated Value [dB]	14.72	23T04Z80421 VoNR AMR
5.1 Receive Volume Control Performance 2N Table-9	Done	Speech Level [dB[SPL]]	82.26	23T04Z80421 VoNR AMR
5.1.1 -1 Conversation Gain 2N Table-9	Ok	Calculated Value [dB]	12.26	23T04Z80421 VoNR AMR
5.1 Receive Volume Control Performance 2N N2,20MHz,QPSK,SCS=15,RB=106; Table-4; Table-9	Done	Speech Level [dB[SPL]]	81.23	23T04Z80421 VoNR AMR
5.1.1 -1 Conversation Gain 2N N2,20MHz,QPSK,SCS=15,RB=106; Table-4; Table-9	Ok	Calculated Value [dB]	11.23	23T04Z80421 VoNR AMR
5.1 Receive Volume Control Performance 8N GSM 850	Done	Speech Level [dB[SPL]]	90.02	23T04Z80421 GSM
5.1 Receive Volume Control Performance 8N GSM 1900	Done	Speech Level [dB[SPL]]	89.96	23T04Z80421 GSM
5.1.1 -1 Conversation Gain 8N GSM 850	Ok	Calculated Value [dB]	20.02	23T04Z80421 GSM
5.1.1 -1 Conversation Gain 8N GSM 1900	Ok	Calculated Value [dB]	19.96	23T04Z80421 GSM
5.1 Receive Volume Control Performance 2N GSM 850	Done	Speech Level [dB[SPL]]	86.79	23T04Z80421 GSM

5.1 Receive Volume Control Performance 2N GSM 1900	Done	Speech Level [dB[SPL]]	86.94	23T04Z80421 GSM
5.1.1 -1 Conversation Gain 2N GSM 850	Ok	Calculated Value [dB]	16.79	23T04Z80421 GSM
5.1.1 -1 Conversation Gain 2N GSM 1900	Ok	Calculated Value [dB]	16.94	23T04Z80421 GSM

ANNEX F: FREQUENCY RESPONSE USED DF and 1/12 OCTAVE





ANNEX G: HATS CERTIFICATE

中 国 计 量 科 学 研 究 院

证书编号 LSsx2022-08382

校 准 结 果

表 2 HATS 右耳校准结果

频率/Hz	31.5	63	125	250
REF/dB	92.45	92.40	92.39	92.46
(REF+10)/dB	102.45	102.40	102.38	102.47
差值/dB	10.00	10.00	9.99	10.01
频率/Hz	500	1000	2000	16000
REF/dB	92.83	94.00	98.20	94.12
(REF+10)/dB	102.83	104.00	108.19	103.81
差值/dB	10.00	10.00	9.99	9.69

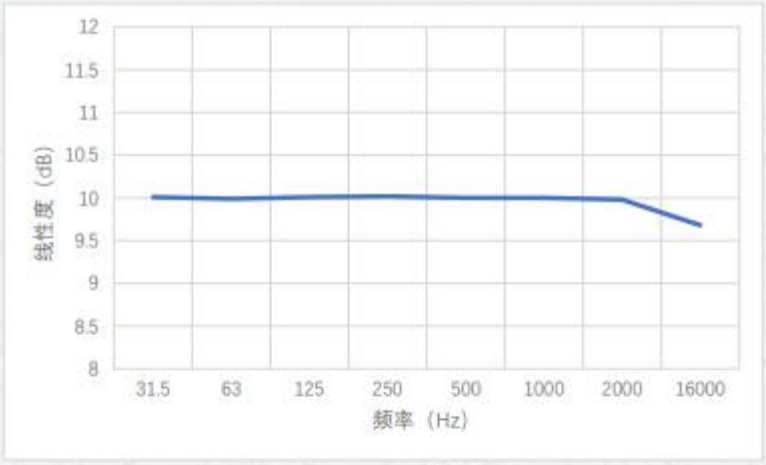


图 2 HATS 右耳线性度图

输出部分

2、频率响应

校准时用 B&K 4938 型压力场传声器在 HATS 嘴正前方，在其参考点处进行校准，测得其嘴（配 PA50 型功率放大器）的频谱如图 3 所示，100 Hz 至 20 kHz 范围内 1/3 倍频程中心频率频谱数据见表 3。

2019-jz-R0520

ANNEX H: ACOUSTIC CHAMBER CERTIFICATE

中 国 计 量 科 学 研 究 院

证书编号 LSsx2021-19386

校 准 结 果

二、背景噪声校准结果

正常情况下，消声室的 A 计权背景噪声为 14 dB，其 1/3 倍频频谱见图 2。

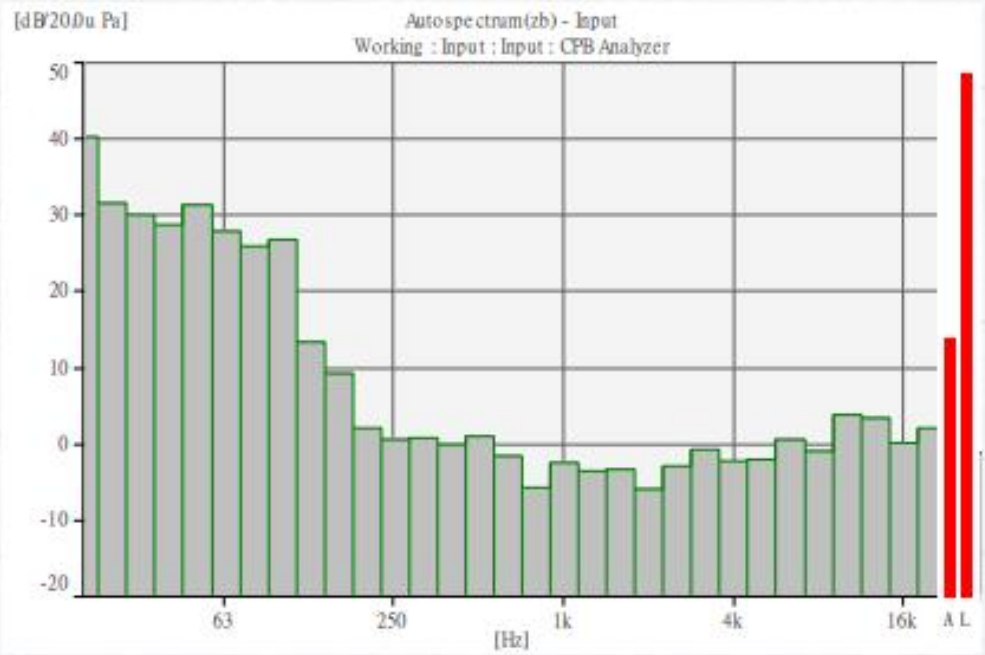


图 2 背景噪声频谱图

声压级校准结果不确定度：U=0.6 dB (k=2)

----------以下空白----------

说明：

根据校准规范 JJF 1147-2006 的规定，通常情况下 60 个月校准一次。

声明：

1. 我院仅对加盖“中国计量科学研究院校准专用章”的完整证书负责。
2. 本证书的校准结果仅对本次所校准的计量器具有效。

校 准 员：郑云山　　核 验 员：牛津

2019-jz-R0520

第15页共15页

ANNEX I: Accreditation Certificate

Accredited Laboratory

A2LA has accredited

TELECOMMUNICATION TECHNOLOGY LABS, CAICT

Beijing, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 26th day of June 2023.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2024

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

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