



Volume Control TEST REPORT

No.25T04Z100239-029

for

TCL Communication Ltd.

GSM/UMTS/LTE/NR Mobile phone

T513V

FCC ID:2ACCJH187

with

Hardware Version: 04

Software Version: 9ABJ

Issued Date: 2025-04-14

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.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
25T04Z100239-029	Rev.0	1st edition	2025-04-14

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

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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 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

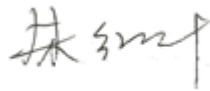
1.3. Testing Environment

Normal Temperature: 18-28℃
Relative Humidity: 0-80%
Ambient noise of 14dB(A) and is compliance with requirement of standards
acoustic chamber (SEE ANNEX H)

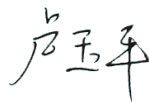
1.4. Project data

Testing Start Date: 2025-02-20
Testing End Date: 2025-03-19

1.5. Signature



Zhu Hongye
(Prepared this test report)



Lu Yuping
(Reviewed this test report)



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(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name	TCL Communication Ltd. 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park,
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2.2. Manufacturer Information

Company Name	TCL Communication Ltd. 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park,
Address	Shatin, NT, Hong Kong
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Email	ting.wang.hz@tcl.com
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Fax	/

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	T513V
Brand name	TCL
FCC ID	2ACCJH187
Extreme Temperature	-10~55℃
Nominal Voltage	3.87V
Extreme High Voltage	4.45V
Extreme Low Voltage	3.6V

Supported Bands:

UMTS Frequency Band(s)	B 1/2/5/8
GSM Frequency Band(s)	GSM 850/900/1800/1900
E-UTRA Frequency Band(s)	B 1/2/3/4/5/7/12/13/20/28/48/66
WLAN Frequency Band(s)	2.4G/5GHz
5G Frequency Band(s)	N 2/5/48/66/77/78

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 T513V is varied from T513SP, the changes are declared as ANNEX A. It shares the test results of original sample (the report's number is 25T04Z100239-009).

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
/	/	04	9ABJ	2025-02-13

*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 24.4kbps and EVS-WB 24.4kbps.

Air-interface	Band	Tested Codec	Tested Rate(kbps)
GSM	850/1900	EFR	/
WCDMA (UMTS)	B2/5	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85
VoLTE	B2/4/5/7/12/13/48/66	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85
		EVS-NB	24.4
		EVS-WB	24.4
VoWiFi	802.11g/ac	AMR-WB	6.6
		EVS-NB	24.4
VoNR	N 2/5/48/66/77/78	AMR-WB	6.6
		EVS-NB	24.4

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 dB 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- interfac e & Band	Chann el	Band width	Modula tion	RB Size	RB Off set	Volum e Level	Codec	NB/ WB	Bit Rate	2N/ 8N	Conv. Gain (ANN EX D)	RFR (AN NEX D)	Min PN-SDNR (ANNEX D)		Verdic t
		[MH z]							[kbp s]	[N]	[dB]		[Hz]	[dB]	
LTE B2	18900	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.25	PASS	800	22.36	PASS
LTE B2	18900	10	QPSK	50	0	Max-1	EVS	NB	24.4	8N	20.24	PASS	400	28.65	PASS
LTE B2	18900	10	QPSK	50	0	Max-1	EVS	WB	24.4	2N	15.32	PASS	1250	24.81	PASS
LTE B2	18900	10	QPSK	50	0	Max-1	EVS	WB	24.4	8N	18.68	PASS	250	28.52	PASS

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

Air- interfa ce & Ban d	Channel	Band dwi dth	Modulat ion	S C S (k H z)	RB	Volu me Level	Codec	NB/ WB	Bit Rate	2N/ 8N	Conv. Gain (ANN EX E)	FR	Min PN-SDNR		Verdic t
		[MH z]							[kbp s]	[N]	[dB]		[Hz]	[dB]	
LTE B5	20525	5	QPSK	1	24	Max-1	AMR	NB	4.75	2N	16.73	/	/	/	PASS
LTE B5	20525	5	QPSK	1	24	Max-1	AMR	NB	4.75	8N	20.44	/	/	/	PASS
LTE B5	20525	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	14.57	/	/	/	PASS
LTE B5	20525	5	QPSK	1	24	Max-1	AMR	WB	6.6	8N	18.81	/	/	/	PASS
GSM 1900	600	/	/	/	/	Max-1	EFR	NB	/	8N	20.46	/	/	/	PASS
GSM 1900	600	/	/	/	/	Max-1	EFR	NB	/	2N	17.20	/	/	/	PASS

Table 6.1-3: the worst conversational gains

Volume Level	Codec	NB/ WB	Force Mounted- HAC ON/OFF	Conv. Gain
				[dB]
Max-1	AMR	WB	8N-HAC OFF	17.89
Max-1	AMR	WB	2N-HAC ON	14.57

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.

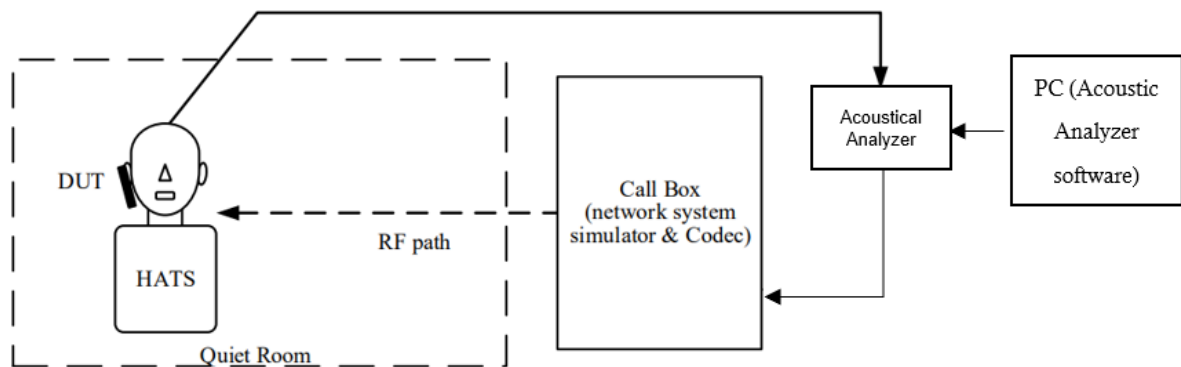


Fig. 6.2.1: Block diagram of the test setup

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

According to TIA 5050, the mobile DUT's frequency response and distortion failures occur at the maximum volume control setting, the max-1 volume is found for which the conversational gain requirement is met without a frequency response or a distortion failure.

Table 6.3: the **volume** investigating results

Volume Level	Code c	NB/ WB	Bit Rate	2N/ 8N	Conv Gain	FR	Min PN-SDNR		Verdict
			[kbps]	[N]	[dB]		[Hz]	[dB]	
Max	EVS	NB	24.4	2N	18.56	Fail	800	23.37	*Note1
	EVS	NB	24.4	8N	22.9	PASS	800	22.41	
	EVS	WB	24.4	2N	17.5	Fail	250	25.33	
	EVS	WB	24.4	8N	21.24	PASS	315	25.6	
Max-1	EVS	NB	24.4	2N	16.25	PASS	800	22.36	pass
	EVS	NB	24.4	8N	20.24	PASS	400	28.65	
	EVS	WB	24.4	2N	15.32	PASS	1250	24.81	
	EVS	WB	24.4	8N	18.68	PASS	250	28.52	

***Note1:** According to TIA 5050 5.3.2, If the default tone control setting does not meet the requirement, repeat the above steps for other tone control settings to determine a tone control setting that meets the requirements.

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	Code c	NB/ WB	Bit Rate	2N/ 8N	Conv Gain	FR	Min PN-SDNR	
		[MHz]							[kbps]	[N]	[dB]		[Hz]	[dB]
B2	18900	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.25	PASS	800	22.36
B2	18900	10	QPSK	50	0	Max-1	EVS	NB	24.4	8N	20.24	PASS	400	28.65
B2	18900	10	QPSK	50	0	Max-1	EVS	WB	24.4	2N	15.32	PASS	1250	24.81
B2	18900	10	QPSK	50	0	Max-1	EVS	WB	24.4	8N	18.68	PASS	250	28.52
B2	18900	10	QPSK	50	0	Max-1	AMR	NB	4.75	2N	16.26	/	/	/
B2	18900	10	QPSK	50	0	Max-1	AMR	NB	12.2	2N	17.13	/	/	/
B2	18900	10	QPSK	50	0	Max-1	AMR	NB	4.75	8N	19.82	/	/	/
B2	18900	10	QPSK	50	0	Max-1	AMR	WB	6.6	2N	14.83	/	/	/
B2	18900	10	QPSK	50	0	Max-1	AMR	WB	23.85	2N	15.38	/	/	/
B2	18900	10	QPSK	50	0	Max-1	AMR	WB	6.6	8N	18.20	/	/	/

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

Band	Channel	Ban dwi dth	Modul ation	RB Siz e	RB Off set	Volum e Level	Code c	NB/ WB	Bit Rate	2N/ 8N	Conv · Gain	FR	Min PN-SDNR	
		[M Hz]							[kbps]	[N]	[dB]		[Hz]	[dB]
B2	18900	10	QPSK	1	0	Max-1	EVS	NB	24.4	2N	16.71	PASS	250	28.37
B2	18900	10	QPSK	1	49	Max-1	EVS	NB	24.4	2N	16.68	PASS	500	26.22
B2	18900	10	16QAM	1	0	Max-1	EVS	NB	24.4	2N	16.64	PASS	250	28.72
B2	18900	10	16QAM	1	49	Max-1	EVS	NB	24.4	2N	16.71	PASS	250	28.89
B2	18900	10	16QAM	50	0	Max-1	EVS	NB	24.4	2N	16.73	PASS	500	28.46
B2	18900	20	QPSK	100	0	Max-1	EVS	NB	24.4	2N	16.72	PASS	500	28.61
B2	18900	20	QPSK	1	0	Max-1	EVS	NB	24.4	2N	16.76	PASS	500	26.73
B2	18900	20	QPSK	1	99	Max-1	EVS	NB	24.4	2N	16.65	PASS	400	29.00
B2	18900	20	16QAM	1	0	Max-1	EVS	NB	24.4	2N	16.70	PASS	400	28.70
B2	18900	20	16QAM	1	99	Max-1	EVS	NB	24.4	2N	16.77	PASS	400	28.81
B2	18900	20	16QAM	100	0	Max-1	EVS	NB	24.4	2N	16.79	PASS	400	28.36
B2	18900	15	QPSK	75	0	Max-1	EVS	NB	24.4	2N	16.47	PASS	500	26.3
B2	18900	15	QPSK	1	0	Max-1	EVS	NB	24.4	2N	16.55	PASS	400	28.76
B2	18900	15	16QAM	1	0	Max-1	EVS	NB	24.4	2N	16.57	PASS	400	28.71
B2	18900	15	16QAM	75	0	Max-1	EVS	NB	24.4	2N	16.57	PASS	630	27.73
B2	18900	5	QPSK	25	0	Max-1	EVS	NB	24.4	2N	16.61	PASS	400	28.37
B2	18900	5	16QAM	25	0	Max-1	EVS	NB	24.4	2N	16.53	PASS	500	24.94
B2	18900	3	QPSK	15	0	Max-1	EVS	NB	24.4	2N	16.56	PASS	630	26.73
B2	18900	3	16QAM	15	0	Max-1	EVS	NB	24.4	2N	16.6	PASS	630	26.1
B2	18900	1.4	QPSK	6	0	Max-1	EVS	NB	24.4	2N	16.51	PASS	630	27.43
B2	18900	1.4	16QAM	6	0	Max-1	EVS	NB	24.4	2N	16.55	PASS	630	26.24
B2	18900	10	QPSK	1	0	Max-1	AMR	WB	6.6	2N	14.86	/	/	/
B2	18900	10	QPSK	1	49	Max-1	AMR	WB	6.6	2N	14.73	/	/	/
B2	18900	10	16QAM	1	0	Max-1	AMR	WB	6.6	2N	14.87	/	/	/
B2	18900	10	16QAM	1	49	Max-1	AMR	WB	6.6	2N	14.91	/	/	/

B2	18900	10	16QAM	50	0	Max-1	AMR	WB	6.6	2N	14.79	/	/	/
B2	18900	20	QPSK	100	0	Max-1	AMR	WB	6.6	2N	14.87	/	/	/
B2	18900	20	QPSK	1	0	Max-1	AMR	WB	6.6	2N	15.11	/	/	/
B2	18900	20	QPSK	1	99	Max-1	AMR	WB	6.6	2N	14.82	/	/	/
B2	18900	20	16QAM	1	0	Max-1	AMR	WB	6.6	2N	14.69	/	/	/
B2	18900	20	16QAM	1	99	Max-1	AMR	WB	6.6	2N	14.81	/	/	/
B2	18900	20	16QAM	100	0	Max-1	AMR	WB	6.6	2N	14.87	/	/	/
B2	18900	15	QPSK	75	0	Max-1	AMR	WB	6.6	2N	14.98	/	/	/
B2	18900	15	QPSK	1	74	Max-1	AMR	WB	6.6	2N	14.68	/	/	/
B2	18900	15	16QAM	1	0	Max-1	AMR	WB	6.6	2N	15.21	/	/	/
B2	18900	15	16QAM	75	0	Max-1	AMR	WB	6.6	2N	15.06	/	/	/
B2	18900	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	14.68	/	/	/
B2	18900	5	16QAM	25	0	Max-1	AMR	WB	6.6	2N	15.11	/	/	/
B2	18900	3	QPSK	1	14	Max-1	AMR	WB	6.6	2N	15.08	/	/	/
B2	18900	3	16QAM	15	0	Max-1	AMR	WB	6.6	2N	14.82	/	/	/
B2	18900	1.4	QPSK	1	5	Max-1	AMR	WB	6.6	2N	14.99	/	/	/
B2	18900	1.4	16QAM	6	0	Max-1	AMR	WB	6.6	2N	14.93	/	/	/

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

Band	Channel	Bandwidth	Modulation	RB Size	RB Offset	Volume Level	Code c	NB/WB	Bit Rate	2N/8N	Conv. Gain	FR	Min PN-SDNR	
		[MHz]							[kbps]	[N]			[Hz]	[dB]
B4	20175	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.68	PASS	400	28.24
B5	20525	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.59	PASS	630	26.46
B7	21100	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.54	PASS	500	28.46
B12	23095	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.52	PASS	400	28.54
B13	23230	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.61	PASS	400	28.13
B48	55990	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.65	PASS	400	28.93
B66	132322	10	QPSK	50	0	Max-1	EVS	NB	24.4	2N	16.64	PASS	400	28.39
B4	20175	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	14.77	/	/	/

B5	20525	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	14.57	/	/	/
B7	21100	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	15.04	/	/	/
B12	23095	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	14.96	/	/	/
B13	23230	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	14.71	/	/	/
B48	55990	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	14.7	/	/	/
B66	132322	5	QPSK	1	24	Max-1	AMR	WB	6.6	2N	15.05	/	/	/

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	Code c	NB/ WB	Bit Rate	2N/8 N	Conv. Gain	FR	Min PN-SDNR	
			[Mbps]				[kbps]				[Hz]	[dB]
802.11g	6	DSSS	1	Max-1	EVS	NB	24.4	2N	16.73	PASS	1000	27.3
802.11g	6	DSSS	2	Max-1	EVS	NB	24.4	2N	16.8	PASS	500	28.49
802.11g	6	CCK	5.5	Max-1	EVS	NB	24.4	2N	16.72	PASS	400	28.53
802.11g	6	CCK	11	Max-1	EVS	NB	24.4	2N	16.68	PASS	1250	27.37
802.11ac	44	BPSK	6	Max-1	EVS	NB	24.4	2N	16.94	PASS	630	25.33
802.11ac	44	BPSK	9	Max-1	EVS	NB	24.4	2N	16.86	PASS	400	28.62
802.11ac	44	QPSK	12	Max-1	EVS	NB	24.4	2N	16.7	PASS	500	25.53
802.11ac	44	QPSK	18	Max-1	EVS	NB	24.4	2N	16.69	PASS	400	28.98
802.11ac	44	16-QAM	24	Max-1	EVS	NB	24.4	2N	16.71	PASS	630	26.64
802.11ac	44	16-QAM	36	Max-1	EVS	NB	24.4	2N	16.7	PASS	630	28.54
802.11ac	44	64-QAM	48	Max-1	EVS	NB	24.4	2N	16.69	PASS	630	28.52
802.11ac	44	64-QAM	54	Max-1	EVS	NB	24.4	2N	16.8	PASS	400	27.77
802.11g	6	DSSS	1	Max-1	AMR	WB	6.6	2N	14.68	/	/	/
802.11g	6	DSSS	2	Max-1	AMR	WB	6.6	2N	14.71	/	/	/
802.11g	6	CCK	5.5	Max-1	AMR	WB	6.6	2N	14.99	/	/	/
802.11g	6	CCK	11	Max-1	AMR	WB	6.6	2N	14.77	/	/	/
802.11ac	44	BPSK	6	Max-1	AMR	WB	6.6	2N	14.9	/	/	/
802.11ac	44	BPSK	9	Max-1	AMR	WB	6.6	2N	14.82	/	/	/
802.11ac	44	QPSK	12	Max-1	AMR	WB	6.6	2N	15.12	/	/	/
802.11ac	44	QPSK	18	Max-1	AMR	WB	6.6	2N	15.17	/	/	/
802.11ac	44	16-QAM	24	Max-1	AMR	WB	6.6	2N	14.78	/	/	/
802.11ac	44	16-QAM	36	Max-1	AMR	WB	6.6	2N	14.77	/	/	/
802.11ac	44	64-QAM	48	Max-1	AMR	WB	6.6	2N	14.98	/	/	/
802.11ac	44	64-QAM	54	Max-1	AMR	WB	6.6	2N	14.71	/	/	/

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]		[dB]		[Hz]	[dB]
GSM850	162	Max-1	EFR	NB	/	2N	17.29	/	/	/
GSM850	162	Max-1	EFR	NB	/	8N	20.64	/	/	/
GSM1900	600	Max-1	EFR	NB	/	2N	17.20	/	/	/
GSM1900	600	Max-1	EFR	NB	/	8N	20.46	/	/	/

6.3.4 WCDMA call investigation

Table 6.3.4: the investigating results of **WCDMA** call

air interface	Band	Channel	Volume Level	Codec	Voice bandwidth	Bit Rate	2N/8N	Conv. Gain	FR	Min PN-SDNR	
						[kbps]		[dB]		[Hz]	[dB]
WCDMA	Band2	9800	Max-1	AMR	NB	4.75	2N	16.80	/	/	/
WCDMA	Band2	9800	Max-1	AMR	NB	12.2	2N	17.5	/	/	/
WCDMA	Band2	9800	Max-1	AMR	NB	4.75	8N	19.73	/	/	/
WCDMA	Band2	9800	Max-1	AMR	WB	6.6	2N	14.22	/	/	/
WCDMA	Band2	9800	Max-1	AMR	WB	23.85	2N	14.45	/	/	/
WCDMA	Band2	9800	Max-1	AMR	WB	6.6	8N	17.89	/	/	/
WCDMA	Band5	4132	Max-1	AMR	WB	6.6	2N	14.82	/	/	/

6.3.5 VoNR call investigation

Table 6.3.5: the investigating results of **VoNR** call

Band	Band width [MHz]	Modulation	SCS (kHz)	RB	Volume Level	Code c	NB/ WB	Bit Rate	2N/ 8N	Conv . Gain [dB]	FR	Min PN-SDNR	
								[kbps]				[Hz]	[dB]
N78	100	QPSK	30	273	Max-1	EVS	NB	24.4	2N	16.25	PASS	1000	25.98
N78	100	QPSK	30	137	Max-1	EVS	NB	24.4	2N	16.4	PASS	1000	25.93
N78	100	16QAM	30	273	Max-1	EVS	NB	24.4	2N	16.49	PASS	1000	25.79

N78	100	16QAM	30	1	Max-1	EVS	NB	24.4	2N	16.46	PASS	1000	25.89
N78	100	64QAM	30	273	Max-1	EVS	NB	24.4	2N	16.46	PASS	1000	25.91
N78	100	64QAM	30	1	Max-1	EVS	NB	24.4	2N	16.52	PASS	1000	25.92
N78	100	256QAM	30	273	Max-1	EVS	NB	24.4	2N	16.5	PASS	1000	25.92
N78	100	256QAM	30	1	Max-1	EVS	NB	24.4	2N	16.51	PASS	1000	25.78
N78	80	QPSK	30	217	Max-1	EVS	NB	24.4	2N	16.52	PASS	1000	25.96
N78	80	16QAM	30	217	Max-1	EVS	NB	24.4	2N	16.52	PASS	1000	25.92
N78	80	64QAM	30	217	Max-1	EVS	NB	24.4	2N	16.48	PASS	1000	25.93
N78	80	256QAM	30	1	Max-1	EVS	NB	24.4	2N	16.75	PASS	1000	25.9
N78	50	16QAM	30	133	Max-1	EVS	NB	24.4	2N	16.73	PASS	1000	26.13
N78	50	64QAM	30	133	Max-1	EVS	NB	24.4	2N	16.81	PASS	1000	25.92
N78	50	256QAM	30	1	Max-1	EVS	NB	24.4	2N	16.85	PASS	1000	25.91
N78	20	64QAM	30	51	Max-1	EVS	NB	24.4	2N	16.91	PASS	1000	25.88
N78	20	256QAM	30	1	Max-1	EVS	NB	24.4	2N	16.84	PASS	1000	25.86
N78	10	64QAM	30	24	Max-1	EVS	NB	24.4	2N	16.83	PASS	1000	25.88
N78	10	256QAM	30	1	Max-1	EVS	NB	24.4	2N	16.79	PASS	1000	25.87
N2	20	256QAM	15	1	Max-1	EVS	NB	24.4	2N	16.85	PASS	1000	25.87
N5	20	256QAM	15	1	Max-1	EVS	NB	24.4	2N	17.04	PASS	1000	25.8
N48	100	256QAM	30	1	Max-1	EVS	NB	24.4	2N	16.98	PASS	1000	25.85
N66	20	256QAM	15	1	Max-1	EVS	NB	24.4	2N	16.96	PASS	1000	25.8
N77	100	256QAM	30	1	Max-1	EVS	NB	24.4	2N	16.69	PASS	1000	25.96
N78	100	QPSK	30	273	Max-1	AMR	WB	6.6	2N	14.83	/	/	/
N78	100	QPSK	30	137	Max-1	AMR	WB	6.6	2N	14.96	/	/	/
N78	100	16QAM	30	273	Max-1	AMR	WB	6.6	2N	15.18	/	/	/
N78	100	16QAM	30	1	Max-1	AMR	WB	6.6	2N	15.08	/	/	/
N78	100	64QAM	30	273	Max-1	AMR	WB	6.6	2N	15.2	/	/	/
N78	100	64QAM	30	1	Max-1	AMR	WB	6.6	2N	15.1	/	/	/
N78	100	256QAM	30	273	Max-1	AMR	WB	6.6	2N	15.13	/	/	/
N78	100	256QAM	30	1	Max-1	AMR	WB	6.6	2N	15.07	/	/	/

N78	80	QPSK	30	217	Max-1	AMR	WB	6.6	2N	15.4	/	/	/
N78	80	16QAM	30	1	Max-1	AMR	WB	6.6	2N	14.94	/	/	/
N78	80	64QAM	30	1	Max-1	AMR	WB	6.6	2N	15.08	/	/	/
N78	80	256QAM	30	1	Max-1	AMR	WB	6.6	2N	15.06	/	/	/
N78	50	QPSK	30	133	Max-1	AMR	WB	6.6	2N	14.99	/	/	/
N78	50	16QAM	30	1	Max-1	AMR	WB	6.6	2N	14.99	/	/	/
N78	50	256QAM	30	1	Max-1	AMR	WB	6.6	2N	15.11	/	/	/
N78	20	QPSK	30	51	Max-1	AMR	WB	6.6	2N	15.04	/	/	/
N78	20	16QAM	30	1	Max-1	AMR	WB	6.6	2N	14.93	/	/	/
N78	10	QPSK	30	24	Max-1	AMR	WB	6.6	2N	15.45	/	/	/
N78	10	16QAM	30	1	Max-1	AMR	WB	6.6	2N	15.42	/	/	/
N2	20	QPSK	15	106	Max-1	AMR	WB	6.6	2N	15.39	/	/	/
N5	20	QPSK	15	106	Max-1	AMR	WB	6.6	2N	15.77	/	/	/
N48	100	QPSK	30	273	Max-1	AMR	WB	6.6	2N	15.38	/	/	/
N66	20	QPSK	15	106	Max-1	AMR	WB	6.6	2N	15.49	/	/	/
N77	100	QPSK	30	273	Max-1	AMR	WB	6.6	2N	14.72	/	/	/

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	2026-09-25
3	Universal communication tester	CMW500	170430	Rohde&Schwarz	2026-08-03
4	Universal communication tester	CMX500	101626	Rohde&Schwarz	2026-08-05
5	Acoustic chamber	4.70 m×4.30 m×2.10 m	None	Ruisen	2026-10-26
Software					
Name		Version			
ACQUA		V 6.0.200			

END OF REPORT BODY

ANNEX A: EUT Declaration



TCL Communicat
5/F, Building 22E, 22 Science Park East
Avenue, Hong Kong Science Park, Shatin,
NT, Hong Kong

Declaration of changes from Initial Beryl VZW(T513SP) to Variant Beryl TF(T513V)

General: Beryl TF (T513V) is a variant product of Beryl VZW(T513SP):

● 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: No
- Other changes detail: No,software number will change, add some customized requirement

● HARDWARE MODIFICATIONS:

- Baseband changes: **NO**

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

Product	GSM	UMTS	LTE	LTE 2CA for LTE	5G NR 5A	5G NR NSA
T513SP	GSM 900 GSM 1800 GSM1900 GSM850	B1 B2 B4 (Remove) B5 B8	B1 roaming B2 B3 roaming B4 B5 B7 B12(MFBI) roaming B13 B20 roaming B28 roaming B48 B66	UL CA CA_2A-4A CA_2A-5A CA_2A-13A CA_2A-48A CA_2A-66A CA_4A-5A CA_4A-13A CA_5A-66A CA_13A-66A CA_48A-66A CA_48C LTE 2CA for LTE DL CA CA_2A-2A CA_2A-4A CA_2A-5A CA_2A-7A 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_7B CA_7C CA_7A-7A CA_7A-13A CA_7A-66A CA_13A-48A CA_13A-66A CA_48A-66A CA_48A-48A CA_48B CA_48C CA_66A-66A	N2 N5 N48 N66 N77 (PC2) N78 (PC3)	N2 N5 N66 N77 (PC2) N78 (PC3)
T513V	GSM 900 GSM 1800 GSM1900 GSM850	B1 B2 B4 (Remove) B5	B1 roaming B2 B3 roaming B4 B5 B7	LTE 2CA for LTE UL CA CA_2A-4A CA_2A-5A CA_2A-13A CA_2A-48A	N2 N5 N48 N66 N77 (PC2) N78 (PC3)	N2 N5 N66 N77 (PC2) N78 (PC3)

		B8	B12(MFBI) roaming B13 B20 roaming B28 roaming B48 B66	CA_2A-66A CA_4A-5A CA_4A-13A CA_5A-66A CA_13A-66A CA_48A-66A CA_48C LTE 2CA for LTE DL CA CA_2A-2A CA_2A-4A CA_2A-5A CA_2A-7A 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_7B CA_7C CA_7A-7A CA_7A-13A CA_7A-66A CA_13A-48A CA_13A-66A CA_48A-66A CA_48A-48A CA_48B CA_48C CA_66A-66A		
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Band change details for LTE CA/5G NR SA/NSA: (if applicable)

Technology	TS135P	TS13V
LTE CA	LTE 2CA for LTE UL CA CA_2A-4A CA_2A-5A CA_2A-13A CA_2A-48A CA_2A-66A CA_4A-5A CA_4A-13A CA_5A-66A CA_13A-66A CA_48A-66A CA_48C LTE 2CA for LTE DL CA CA_2A-2A CA_2A-4A CA_2A-5A CA_2A-7A 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_7B CA_7C CA_7A-7A CA_7A-13A CA_7A-66A CA_13A-48A	LTE 2CA for LTE UL CA CA_2A-4A CA_2A-5A CA_2A-13A CA_2A-48A CA_2A-66A CA_4A-5A CA_4A-13A CA_5A-66A CA_13A-66A CA_48A-66A CA_48C LTE 2CA for LTE DL CA CA_2A-2A CA_2A-4A CA_2A-5A CA_2A-7A 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_7B CA_7C CA_7A-7A CA_7A-13A CA_7A-66A CA_13A-48A

	CA_13A-66A CA_48A-66A CA_48A-66A CA_48C CA_66A-66A	CA_13A-66A CA_48A-66A CA_48A-66A CA_48C CA_66A-66A
5G EN-DC	DC_2A_n5A DC_48A_n2A DC_2A_n66A DC_48A_n66A DC_2A_n77A DC_3A_n2A DC_5A_n2A DC_5A_n66A DC_5A_n77A DC_13A_n2A DC_13A_n66A DC_13A_n77A DC_48A_n5A DC_66A_n2A DC_66A_n5A DC_66A_n66A DC_66A_n77A DC_1A_n77A DC_1A_n78A DC_3A_n77A DC_3A_n78A DC_5A_n78A DC_7A_n66A DC_7A_n77A DC_7A_n78A DC_13A-48A_n2A DC_13A-48A_n66A DC_13A-48A_n77A(B48 is SCC only) DC_13A-66A_n2A DC_13A-66A_n66A DC_13A-66A_n77A DC_2A-13A_n2A DC_2A-13A_n66A DC_2A-13A_n77A DC_2A-2A_n5A DC_2A-2A_n66A DC_2A-2A_n77A DC_2A-48A_n5A DC_2A-48A_n66A DC_2A-48A_n77A(B48 is SCC only) DC_2A-5A_n2A DC_2A-5A_n66A DC_2A-5A_n77A DC_2A-66A_n2A DC_2A-66A_n5A DC_2A-66A_n66A DC_2A-66A_n77A DC_48A-66A_n2A DC_48A-66A_n5A DC_48A-66A_n77A(B48 is SCC Only) DC_48C_n5A DC_5A-48A_n77A(B48 SCC only) DC_5A-66A_n2A DC_5A-66A_n66A DC_5A-66A_n77A DC_66A-66A_n2A DC_66A-66A_n5A DC_66A-66A_n77A DC_7A-7A_n66A DC_7C_n66A DC_2A-7A_n66A DC_2A-13A_n66A DC_2A-66A_n66A	DC_2A_n5A DC_48A_n2A DC_2A_n66A DC_48A_n66A DC_2A_n77A DC_3A_n2A DC_5A_n2A DC_5A_n66A DC_5A_n77A DC_13A_n2A DC_13A_n66A DC_13A_n77A DC_48A_n5A DC_66A_n2A DC_66A_n5A DC_66A_n66A DC_66A_n77A DC_1A_n77A DC_1A_n78A DC_3A_n77A DC_3A_n78A DC_5A_n78A DC_7A_n66A DC_7A_n77A DC_7A_n78A DC_13A-48A_n2A DC_13A-48A_n66A DC_13A-48A_n77A(B48 is SCC only) DC_13A-66A_n2A DC_13A-66A_n66A DC_13A-66A_n77A DC_2A-13A_n2A DC_2A-13A_n66A DC_2A-13A_n77A DC_2A-2A_n5A DC_2A-2A_n66A DC_2A-2A_n77A DC_2A-48A_n5A DC_2A-48A_n66A DC_2A-48A_n77A(B48 is SCC only) DC_2A-5A_n2A DC_2A-5A_n66A DC_2A-5A_n77A DC_2A-66A_n2A DC_2A-66A_n5A DC_2A-66A_n66A DC_2A-66A_n77A DC_48A-66A_n2A DC_48A-66A_n5A DC_48A-66A_n77A(B48 is SCC Only) DC_48C_n5A DC_5A-48A_n77A(B48 SCC only) DC_5A-66A_n2A DC_5A-66A_n66A DC_5A-66A_n77A DC_66A-66A_n2A DC_66A-66A_n5A DC_66A-66A_n77A DC_7A-7A_n66A DC_7C_n66A DC_2A-7A_n66A DC_2A-13A_n66A DC_2A-66A_n66A

	DC_7A-13A_n66A DC_7A-66A_n66A	DC_7A-13A_n66A DC_7A-66A_n66A
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_n5B CA_n5A-n48A CA_n5A-n66A[4] CA_n5A-n77A[4] CA_n48A-n66A CA_n48A-n77A CA_n48B CA_n48(2A) CA_n66(2A) CA_n66A[4]-n77A[4] CA_n66B CA_n77C	CA_n2[2A][4] CA_n2A[4]-n5A CA_n2A-n48A CA_n2A[4]-n66A[4] CA_n2A[4]-n77A[4] CA_n5B CA_n5A-n48A CA_n5A-n66A[4] CA_n5A-n77A[4] CA_n48A-n66A CA_n48A-n77A CA_n48B CA_n48(2A) CA_n66(2A) CA_n66A[4]-n77A[4] 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 B20	NO	NO	NO	NO	NO	NO	NO
LTE B28	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

NR	Base Band	Antenna	Transceiver	ASM	Power Amplifier	Tx SAW Filter	Rx SAW Filter (SAW Duplexer)
NR n2	NO	NO	NO	NO	NO	NO	NO
NR n5	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 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

APPROVED BY:

Project Manager: lirui

Signature:

Date: 2024.12.10

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	T513V
Brand name	TCL
FCC ID	2ACCJH187
Extreme Temperature	-10~55℃
Nominal Voltage	3.87V
Extreme High Voltage	4.45V
Extreme Low Voltage	3.6V

Supported Bands:

UMTS Frequency Band(s)	B 1/2/5/8
GSM Frequency Band(s)	GSM 850/900/1800/1900
E-UTRA Frequency Band(s)	B 1/2/3/4/5/7/12/13/20/28/48/66
WLAN Frequency Band(s)	2.4G/5GHz
5G Frequency Band(s)	N 2/5/48/66/77/78

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

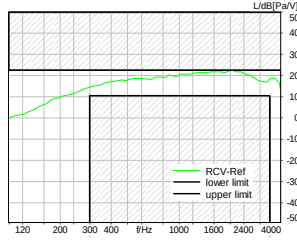
Artificial Ear Type		3.3
Mounting Force [N]		2 and 8
Center Fork Offset [°]		0
Volume Level		8/8 (1-8)
Angle settings		
Xe [°]	Ye [°]	Ze[°]
0	0	5

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.

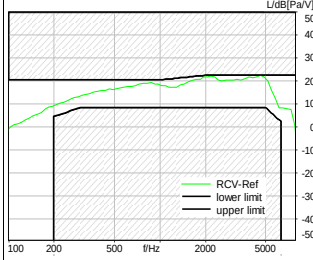
ANNEX D: The Worst-case Measurement Data of The Chosen Codec of Telephony Call

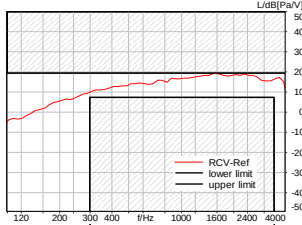
SMD	Status	Single Value Description	Single Value	Object
5.1 Receive Volume Control Performance 8N vol max-1; Table-1; Table-2	Done	Speech Level [dB[SPL]]	90.24	25T04Z100239 VoLTE EVS
5.1.1 -1 Conversation Gain 8N vol max-1; Table-1; Table-2	Ok	Calculated Value [dB]	20.24	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 400Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	28.65	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 500Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	28.75	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 630Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	31.00	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 800Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	33.91	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 1000Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	35.34	25T04Z100239 VoLTE EVS

Receive path - distortion and noise 1250Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	33.13	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 1600Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	41.85	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 2000Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	43.79	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 2500Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	43.44	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 3150Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	42.25	25T04Z100239 VoLTE EVS
5.2 Receive path – distortion and noise vol max-1; Table-1; Table-2	Ok			25T04Z100239 VoLTE EVS
5.3 Receive Acoustic Frequency response Performance vol max-1; Table-1; Table-2	Ok	Min. dist. to tolerance scheme [dB], 305.9 Hz		25T04Z100239 VoLTE EVS
5.1 Receive Volume Control Performance 8N vol max-1; Table-1; Table-2	Done	Speech Level [dB[SPL]]	88.68	25T04Z100239 VoLTE EVS

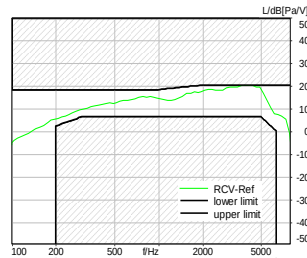
5.1.1 -1 Conversation Gain 8N vol max-1; Table-1; Table-2	Ok	Calculated Value [dB]	18.68	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 250 WBonly vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	28.52	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 315Hz WBonly vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	29.45	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 400Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	29.64	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 500Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	29.57	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 630Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	31.91	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 800Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	35.26	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 1000Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	36.61	25T04Z100239 VoLTE EVS
Receive path - distortion and noise	Done	Distortion (Noise) [dB], 0.0 dB	31.50	25T04Z100239 VoLTE EVS

1250Hz WB&NB vol max-1; Table-1; Table-2				
Receive path - distortion and noise 1600Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	44.03	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 2000Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	44.29	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 2500Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	36.82	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 3150Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	43.60	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 4000Hz WBonly vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	41.41	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 5000Hz WBonly vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	39.79	25T04Z100239 VoLTE EVS
5.2 Receive path – distortion and noise vol max-1; Table-1; Table-2	Ok			25T04Z100239 VoLTE EVS

5.3 Receive Acoustic Frequency response vol max-1; Table-1; Table-2	Ok	Min. dist. to tolerance scheme [dB], 230.2 Hz	 4.77	25T04Z100239 VoLTE EVS
5.1 Receive Volume Control Performance 2N vol max-1; Table-1; Table-2	Done	Speech Level [dB[SPL]]	86.25	25T04Z100239 VoLTE EVS
5.1.1 -1 Conversation Gain 2N vol max-1; Table-1; Table-2	Ok	Calculated Value [dB]	16.25	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 400Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	25.99	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 500Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	25.42	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 630Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	24.68	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 800Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	22.36	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 1000Hz WB&NB	Done	Distortion (Noise) [dB], 0.0 dB	30.76	25T04Z100239 VoLTE EVS

vol max-1; Table-1; Table-2				
Receive path - distortion and noise 1250Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	30.29	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 1600Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	34.80	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 2000Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	33.79	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 2500Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	32.25	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 3150Hz WB&NB vol max-1; Table-1; Table-2	Done	Distortion (Noise) [dB], 0.0 dB	24.06	25T04Z100239 VoLTE EVS
5.2 Receive path – distortion and noise vol max-1; Table-1; Table-2	Ok			25T04Z100239 VoLTE EVS
5.3 Receive Acoustic Frequency response Performance vol max-1; Table-1; Table-2	Ok	Min. dist. to tolerance scheme [dB], 305.9 Hz		25T04Z100239 VoLTE EVS
5.1 Receive Volume Control Performance 2N vol max-1; Table-1	Done	Speech Level [dB[SPL]]	85.32	25T04Z100239 VoLTE EVS

5.1.1 -1 Conversation Gain 2N vol max-1; Table-1	Ok	Calculated Value [dB]	15.32	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 250 WBonly vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	27.97	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 315Hz WBonly vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	29.98	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 4000Hz WBonly vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	28.36	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 400Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	29.75	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 500Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	29.98	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 630Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	32.42	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 800Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	34.46	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 1000Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	38.80	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 1250Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	24.81	25T04Z100239 VoLTE EVS
Receive path - distortion and noise	Done	Distortion (Noise) [dB], 0.0 dB	41.88	25T04Z100239 VoLTE EVS

1600Hz WB&NB vol max-1; Table-1				
Receive path - distortion and noise 2000Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	32.84	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 2500Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	42.86	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 3150Hz WB&NB vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	29.33	25T04Z100239 VoLTE EVS
Receive path - distortion and noise 5000Hz WBonly vol max-1; Table-1	Done	Distortion (Noise) [dB], 0.0 dB	39.09	25T04Z100239 VoLTE EVS
5.2 Receive path – distortion and noise vol max-1; Table-1	Ok			25T04Z100239 VoLTE EVS
5.3 Receive Acoustic Frequency response Performance vol max-1; Table-1	Ok	Min. dist. to tolerance scheme [dB], 230.2 Hz		25T04Z100239 VoLTE EVS
			2.98	

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

SMD	Status	Single Value Description	Single Value	Object
#1, 5.1 Receive Volume Control Performance 8N	Done	Speech Level [dB[SPL]]	90.44	25T04Z100239 VoLTE AMR
#2, 5.1.1 -1 Conversation Gain 8N	Ok	Calculated Value [dB]	20.44	25T04Z100239 VoLTE AMR
#46, 5.1 Receive Volume Control Performance 8N	Done	Speech Level [dB[SPL]]	88.81	25T04Z100239 VoLTE AMR
#47, 5.1.1 -1 Conversation Gain 8N	Ok	Calculated Value [dB]	18.81	25T04Z100239 VoLTE AMR
#141, 5.1 Receive Volume Control Performance 2N	Done	Speech Level [dB[SPL]]	86.73	25T04Z100239 VoLTE AMR
#142, 5.1.1 -1 Conversation Gain 2N	Ok	Calculated Value [dB]	16.73	25T04Z100239 VoLTE AMR
#157, 5.1 Receive Volume Control Performance 2N B5;Table-4	Done	Speech Level [dB[SPL]]	84.57	25T04Z100239 VoLTE AMR
#158, 5.1.1 -1 Conversation Gain 2N B5;Table-4	Ok	Calculated Value [dB]	14.57	25T04Z100239 VoLTE AMR
#1, 5.1 Receive Volume Control Performance 8N GSM1900	Done	Speech Level [dB[SPL]]	90.46	25T04Z100239 GSM
#2, 5.1.1 -1 Conversation Gain 8N GSM1900	Ok	Calculated Value [dB]	20.46	25T04Z100239 GSM
#141, 5.1 Receive Volume Control Performance 2N GSM1900	Done	Speech Level [dB[SPL]]	87.20	25T04Z100239 GSM
#142, 5.1.1 -1 Conversation Gain 2N GSM1900	Ok	Calculated Value [dB]	17.20	25T04Z100239 GSM

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

Title:	5.3 Receive Acoustic Frequency response Performance		
Mode:	Do measurement	File to analyse:	
Source			
Use source file:	Yes	Source file:	ale_dual_nb.dat
Source level adj.:	Ch.1: -90.00 dB; Ch.2: -4.00 dB		
Delayed channels:	Off		
Filter (out):	Off		
Sink			
Number of channels:	2		
Record length:	10616.02	ms	Sampling freq.: 48000 Hz
Filter (in):	FIR: Ch.2, File:drp2df_ieee1652.fft		
Measurement			
Pre measure info:	No	Run time info:	No
Analysis			
Channels to analyse:	2		
Reference:	rcv_nb_ref1.fft (ext. created)		
Time range:	250.0..10450.0 ms		
Transformation:	12th octave, Hann, FFT:16384, OV:75%		
Tolerance scheme:	nb_fr_tol.tol, adj. to upper, 100..4000 Hz		
Calculate value:	No		
Result			
Check min. dist.:	> 0.0 dB, (Req.)		
Representation:	-5..5 , 100..4000 Hz, -50..50 dB		
Special features			
Special features:	Comp.delay, Store to rcv_fr.fft		

ANNEX G: HATS CERTIFICATE

中国计量科学研究院



证书编号 LSsx2024-14143

校准结果

表 2 HATS 右耳校准结果

频率/Hz	31.5	63	125	250	500	1000
REF/dB	92.42	92.45	92.47	92.55	92.92	94.02
(REF+10)/dB	102.45	102.46	102.49	102.56	102.92	104.02
差值/dB	10.03	10.01	10.02	10.01	10.00	10.00
频率/Hz	2000	4000	8000	12500	16000	/
REF/dB	98.07	103.39	116.24	115.61	94.06	/
(REF+10)/dB	108.07	113.38	126.08	125.42	103.83	/
差值/dB	10.00	9.99	9.84	9.81	9.77	/

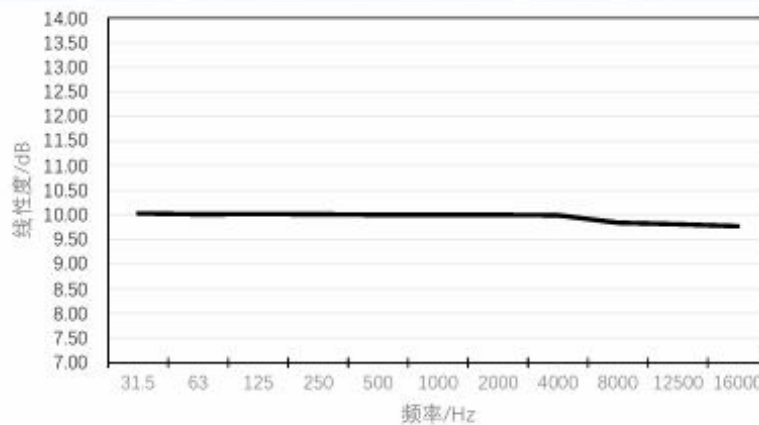


图 2 HATS 右耳线性度图

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 10 kHz 范围内 1/3 倍频程中心频率频谱数据见表 3。

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ANNEX H: ACOUSTIC CHAMBER CERTIFICATE



中国计量科学研究院

证书编号 LSsx2021-19386

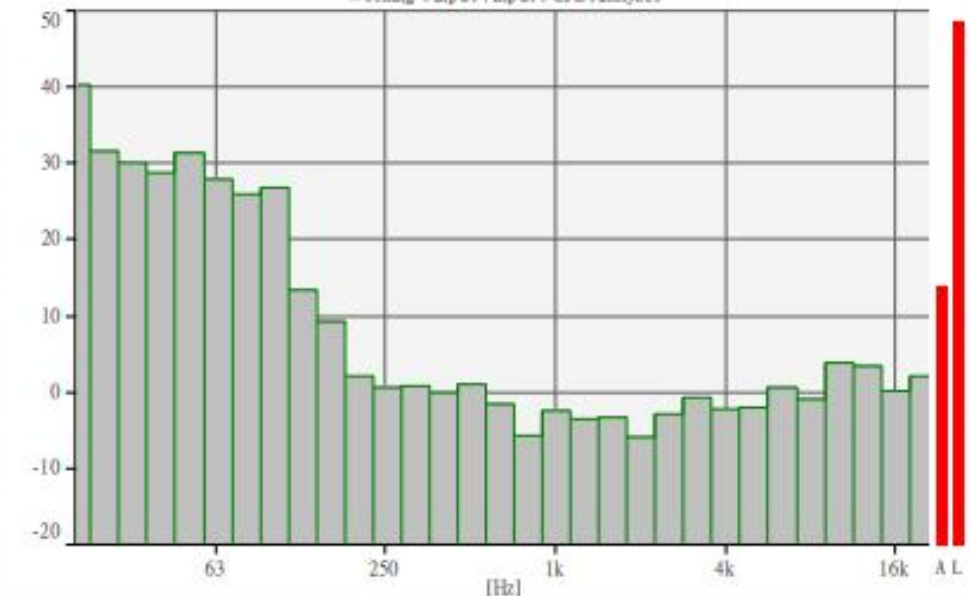
校准结果

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。

[dB/20.0u Pa]

Autospectrum(zb) - Input
Working : Input ; Input : CFB Analyzer



[Hz]

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： 牛辉

2019-jz-R0520

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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 23rd day of July 2024.



Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 7049.01
Valid to July 31, 2026

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

END OF REPORT