HAC Receive Volume Control Test Report

For

Applicant Name:	**FOXX Development Inc.**
Address:	3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA
EUT Name:	Smart Phone
Brand Name:	FOXXD, FOXX, MIRO
Model Number:	A67L

Issued By

Company Name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Report Number:	BTF241105R00703
Test Standards:	ANSI C63.19:2019 FCC 47 CFR §20.19 TIA-5050:2018
FCC ID:	2AQRM-A67L
Test Conclusion:	Pass
Test Date:	2025-09-15 to 2025-09-29
Date of Issue:	2025-09-30
Tested By:	Kris Li / Tester
Date:	2025-09-30
Prepared By:	Amenda Zhong / Project Engineer
Date:	2025-09-30
Approved By:	Ryan.CJ / EMC Manager
Date:	2025-09-30

Note: All the test results in this report only related to the testing samples. Which can be duplicated completely for the legal use with approval of applicant; it shall not be reproduced except in full without the written approval of BTF Testing Lab (Shenzhen) Co., Ltd., All the objections should be raised within thirty days from the date of issue. To validate the report, you can contact us.

Revision History		
Version	Issue Date	Revisions Content
Rev_V0	2025-09-30	Original
Note:	*Once the revision has been made, then previous versions reports are replaced by the latest version.*	

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

Table of Contents

1. Introduction 4
1.1 Identification of Testing Laboratory 4
1.2 Identification of the Responsible Testing Location 4
1.3 Laboratory Condition 4
1.4 Announcement 4
2. Product Information 5
2.1 Application Information 5
2.2 Manufacturer Information 5
2.3 Factory Information 5
2.4 General Description of Equipment under Test (EUT) 5
2.5 Equipment under Test Ancillary Equipment 5
2.6 Technical Information 6
2.7 Equipment under Test (EUT) Description 6
3. Summary of Test Results 7
3.1 Test Standards 7
3.2 Air Interfaces / Bands Indicating Operating Modes 7
3.3 Statement of Volume Control 8
4. Uncertainty Assessment 9
5. Measurement System 10
5.1 MEASUREMENT SET-UP 10
6. Evaluation of Test 11
6.1 RECEIVE VOLUME CONTROL PERFORMANCE 11
6.2 RECEIVE DISTORTION AND NOISE PERFORMANCE 12
6.3 RECEIVE ACOUSTIC FREQUENCY RESPONSE PERFORMANCE 13
7. Test Equipment List 15
8. Air Interfaces / Bands used for testing 15
9. Test Result 16
9.1 Receive volume control, distortion and noise performance 16
9.2 Receive acoustic frequency response performance 18
ANNEX A Test Data 21
1.1 Receive Distortion and Noise 8N NB 21
1.2 Receive Distortion and Noise 2N NB 23
1.3 Receive Frequency Response 26
2.1 Receive Distortion and Noise 8N NB 27
2.2 Receive Distortion and Noise 2N NB 29
2.3 Receive Frequency Response 32
3.1 Receive Distortion and Noise 8N NB 33
3.2 Receive Distortion and Noise 2N NB 35
3.3 Receive Frequency Response 38
ANNEX B Test Setup Photo 39
ANNEX C CALIBRATION REPORT 39

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

1. Introduction

1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

1.2 Identification of the Responsible Testing Location

Test Location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
Description:	All measurement facilities used to collect the measurement data are located at 101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China
FCC Registration Number	518915
Designation Number	CN1409

1.3 Laboratory Condition

Ambient Temperature:	18℃ to 25℃
Ambient Relative Humidity:	32% to 49%
Ambient Pressure:	100 kPa to 102 kPa

1.4 Announcement

(1) The test report reference to the report template version v0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.

(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

2. Product Information

2.1 Application Information

Company Name:	FOXX Development Inc.
Address:	3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA

2.2 Manufacturer Information

Company Name:	FOXX Development Inc.
Address:	3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA

2.3 Factory Information

Company Name:	FOXX Development Inc.
Address:	3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA

2.4 General Description of Equipment under Test (EUT)

EUT Name	Smart Phone
Under Test Model Name	A67L
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software and Firmware Version	N/A
Dimensions (Approx.)	167*77*9mm
Weight (Approx.)	189g

2.5 Equipment under Test Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	FOXXD, FOXX, MIRO
	Model No.	A67L
	Serial No.	N/A
	Capacity	Typical capacity: 3000mAh
	Rated Voltage	4.35 V

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

2.6 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS/EGPRS 850/1900 3G Network WCDMA/HSDPA/HSUPA Band 2/4/5 4G Network FDD LTE Band 2/4/5/12/17/25/26/66/71 TDD LTE Band 41 2.4G WIFI 802.11b, 802.11g, 802.11n(HT20) BT (EDR+BLE)

2.7 Equipment under Test (EUT) Description

Operating Mode	GSM, WCDMA, LTE, WLAN, Bluetooth	
Frequency Range	GSM 850	TX: 824 ~ 849 MHz
	GSM 1900	TX: 1850 ~ 1910 MHz
	WCDMA Band 2	TX: 1850 ~ 1910 MHz
	WCDMA Band 4	TX: 1710 ~ 1755 MHz
	WCDMA Band 5	TX: 824 ~ 849 MHz
	LTE Band 2	TX: 1850 ~ 1910 MHz
	LTE Band 4	TX: 1710 ~ 1755 MHz
	LTE Band 5	TX: 824 ~ 849 MHz
	LTE Band 12	TX: 698 ~ 716 MHz
	LTE Band 17	TX: 704 ~ 716 MHz
	LTE Band 25	TX: 1850 ~ 1915 MHz
	LTE Band 26 part 90	TX: 814.7 ~ 823.3 MHz
	LTE Band 26 part 22	TX: 824.7 ~ 848.3 MHz
	LTE Band 41	TX: 2535 ~ 2655 MHz
	LTE Band 66	TX: 1710 ~ 1780 MHz
	LTE Band 71	TX: 663 ~ 698 MHz
	802.11b/g/n(HT20)	2412 ~ 2462 MHz
	Bluetooth	2402 ~ 2480 MHz
Modulation Mode	GSM/GPRS: GMSK EDGE: 8PSK WCDMA: QPSK, 16QAM LTE: QPSK, 16QAM, 64QAM 802.11b: DSSS 802.11g: OFDM 802.11n-HT20: OFDM BR+EDR: GFSK, π/4-DQPSK, 8-DPSK Bluetooth BLE: GFSK	

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

3. Summary of Test Results

3.1 Test Standards

No.	Identity	Document Title
1	ANSI C63.19-2019	American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids
2	FCC 47 CFR §20.19	Hearing Aid Compatible Mobile Headsets
3	TIA-5050:2018	Telecommunications Communications Products Receive Volume Control Requirements for Wireless (Mobile) Devices
4	KDB285076 D05v01	HACWaiverDA23-914
5	KDB285076 D04v02	Volume Control
6	KDB285076 D01v06r04	HAC Guidance

3.2 Air Interfaces / Bands Indicating Operating Modes

Air Interface	Band	Type	Simultaneous Transmitter	Name of Service
GSM	850	VO	WLAN & BT	CMRS Voice
	1900	VO	WLAN & BT	CMRS Voice
	GPRS/EGPRS	DT	N/A	N/A
WCDMA	Band II	VO	WLAN & BT	CMRS Voice
	Band IV	VO	WLAN & BT	CMRS Voice
	Band V	VO	WLAN & BT	CMRS Voice
	HSPA	DT	N/A	N/A
LTE	Band 2	VD	WLAN & BT	VoLTE
	Band 4	VD	WLAN & BT	VoLTE
	Band 5	VD	WLAN & BT	VoLTE
	Band 12	VD	WLAN & BT	VoLTE
	Band 17	VD	WLAN & BT	VoLTE
	Band 25	VD	WLAN & BT	VoLTE
	Band 26 part 90	VD	WLAN & BT	VoLTE
	Band 26 part 22	VD	WLAN & BT	VoLTE
	Band 41	VD	WLAN & BT	VoLTE
	Band 66	VD	WLAN & BT	VoLTE
	Band 71	VD	WLAN & BT	VoLTE
WLAN	2.4g	DT	WWAN	N/A
BT	2450	DT	WWAN	N/A

NA: Not Applicable
VO: Voice Only
VD: CMRS and IP Voice Service over Digital Transport
DT: Digital Transport Only

Note:The hearing aid compatibility mode of the prototype was turned on during testing, and all tests were performed in HAC mode.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

3.3 Statement of Volume Control

The lowestconversational gain found during test as bellows:

Mounting Force	Lowest Conversational Gain (dB)
2N	21.54
8N	19.93

Note:
1. This device is in compliance with compliance with HAC requirement specified in FCC 47 CFR Part 20.19 and ANSI C63.19-2019 and tested in accordance with the measurement methods and procedures specified in ANSI/TIA-5050-2018 and FCC KDB publications.
2. The 2N force is used for testing requirements related to use bypersons with hearing devices and the 8N force is used for testing requirements related to use by personswithout hearing devices.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

4. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, howevel evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.
The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances. Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to ie. it is obtained by multiplying the combined standard uncertainty by a coverage factor. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %.
The judgment of confomity in the report is based on the measurement results excluding the measurement uncertainty.
Declaration of Conformity:
The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations.
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Component	Standard Uncertainty (dB)	$U^2(\%^2)$
Generator Accuracy To enable harmonic distortion measurements to 0.1%, the generator distortion must be <0.05%. This is equivalent to a standard uncertainty of 0.043 dB.	0.043	0.25
Ear Simulator Pressure Sensitivity (incl. Measurement Mic.) The uncertainty of the ear simulator as per the standards and quoted on its calibration certificate is 0.3 dB with a coverage factor of k= 2. This is equivalent to a standard uncertainty of 0.3/2 = 0.15 dB	0.15	3.03
Microphone Preamplifer The manufacturer quotes the preamp to be within + 0.02 dB with a 95% probability or 2σ.This is equivalent to a standard uncertainty of 0.0212 =0.01 dB.	0.01	0.01
Analysis System/RMS Detector Typical measurement system detector accuracy is 0.1 dB with a coverage factor of k= 2. This is equivalent to a standard uncertainty of 0.1/2 = 0.05 dB	0.05	0.33
Effect of Positioning on Mid-Band Sensitivity For a handset, with the HATS positioning jig, the typical standard deviation estimated from a statistically significant number of measurements is +2 dB. This is equivalent to a standard uncertainty of 2 dB.	2	670.42
Time Varying Effects of the Mouth Simulator for Send & Sidetone For a receive measurement on a handset, the mouth simulator is not used (its uncertainty is zero), The standard uncertainty of 0 dB	0	0
Total Standard Uncertainty (%)	25.06	
UMAX(k=2)(%)	51.9	
UMAX(k=2)(dB)	3.6	

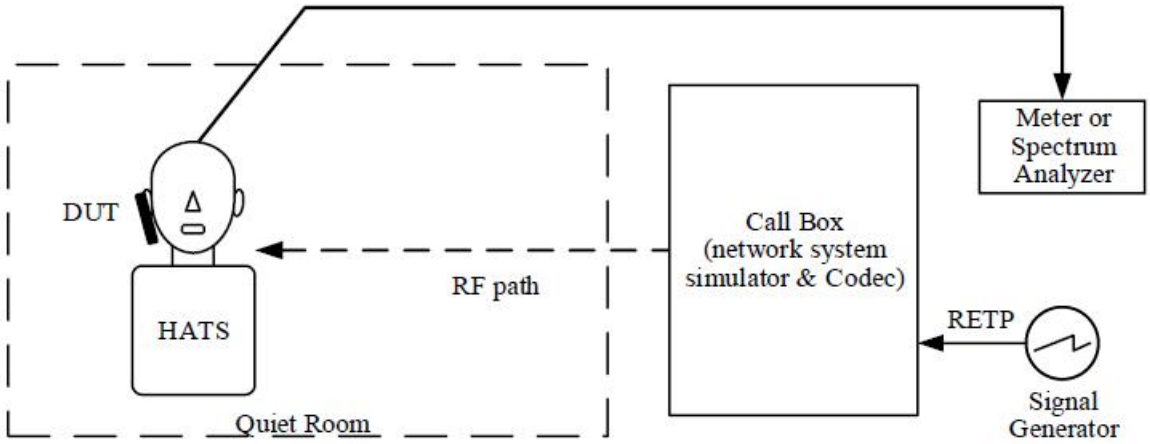
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

5. Measurement System

5.1 MEASUREMENT SET-UP

The general test arrangement is shown in Figure 1. The Call Box passes the voice channel stream to the DUT without modification. There is no gain or loss in the voice channel stream due to the Call Box interface.



NOTES:
1. Additional information related to the air interface for the various RF technologies is specified in several 3GPP documents. A list of these can be found in 3GPP TS 26.132 V14.0.0 clause 4
2. Additional information related to the test setup can be found in 3GPP TS 26.132, V14.0.0 clause 5.1.
3. The RETP (receive electrical test point) is the point in the device test arrangement where signals are applied to the DUT in the receive direction.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

6. Evaluation of Test

6.1 RECEIVE VOLUME CONTROL PERFORMANCE

6.1.1 Requirement

1. With a mounting force of 8N, the DUT shall have at least one volume control setting that will produce a conversational gain of ≥ 18 dB with the output distortion and the frequency response meeting the requirements in clause 5.2.1 & 5.3.1 respectively.
2. With a mounting force of 2N, the DUT shall have at least one volume control setting that will produce a conversational gain of ≥ 6 dB with the output distortion and the frequency response meeting the requirements in clause 5.2.1 & 5.3.1 respectively.

NOTE: Other acoustic receive features may be available such as additional amplification, tone control, automatic gain control, etc. ANSI/TIA-4953-B contains performance requirements for output levels and tone control operation for amplified devices.

6.1.2 Method of Measurement

1. Configure the DUT with a mounting force of 8N and test equipment as shown in Figure 1 in an active call state with the applicable codec for the transmission mode under test.
2. Set the DUT volume control to the maximum setting.
3. If the DUT has an adjustable tone control feature, a tone control setting that meets the frequency response requirements in section 5.3.1 shall be used.
4. Apply the real speech test signal at a level of -20 dBm0 at the RETP and measure the acoustic output at the Drum Reference Point (DRP) over one complete sequence of the test signal.
5. Translate the measurement made at the DRP to the Free Field (FF) using the translation data in Annex B.
6. Over the applicable frequency band, determine the ASL in dBSPL for the resulting sound pressure level in accordance with Method B of ITU-T Recommendation P.56:
   a. Narrowband 100 Hz through 4000 Hz.
   b. Wideband 100 Hz through 7720 Hz.
7. Calculate the Conversational Gain by subtracting 70 dB from the measured dBSPL. [Conversational Gain = (Measured dBSPL Level – 70 dBSPL) dB]
8. Measure the output distortion per clause 5.2. If a distortion failure occurs at the maximum volume control setting, reduce the volume control setting and repeat the measurement to determine if a setting can be found for which the conversational gain requirement is met without a distortion failure.
9. Repeat steps 2-8 with a mounting force of 2N.

6.1.3 Test Result

Refer to test Annex A.

Remark: The report only reflects the test data plots of worst mode (for GSM 850, WCDMA Band 5, LTE Band 5)

6.1.4 Test Conclusion

PASS.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

6.2 RECEIVE DISTORTION AND NOISE PERFORMANCE

6.2.1 Requirement

With a mounting force of 8N and 2N, the ratio of the stimulus signal power to the 100 Hz to 8000 Hz total A-weighted distortion and noise power shall be ≥ 20 dB when tested over the range of 1/3 octave band center frequencies:

1. Narrowband transmission mode: Each 1/3 octave band center frequency from 400 Hz to 3150 Hz.
2. Wide band transmission mode: Each 1/3 octave band center frequency from 250 Hz to 5000 Hz.

6.2.2 Method of Measurement

1. Configure the DUT with a mounting force of 8N and test equipment as shown in Figure 1 in an active call state with the applicable codec for the transmission mode under test with the volume control at the setting determined in 5.1.1.
2. Receive distortion and noise is measured using the PN-SDNR procedure as described in Annex A.
3. To ensure DUT activation, apply the real speech test signal at a level of -20 dBm0 followed immediately by the initial 1/3 octave center frequency PN test signal in Table A.1 based on the narrowband or wide band operating mode. Measure the acoustic output at the DRP over the complete sequence of the PN test signal.
4. Translate the measurement made at the DRP to the FF using the translation data in Annex B.
5. Calculate the acoustic output unweighted total signal power of the stimulus measurement band as described in A.2.
6. Calculate the notched A-weighting distortion and noise components as described in A.3.
7. Calculate the ratio of the signal power to the total A-weighted distortion and noise power using Eq A-1.
8. Repeat for each of the remaining 1/3 octave center frequencies in Table A.1 based on the narrowband or wideband operating mode.
9. Repeat steps 2-8 with a mounting force of 2N.

6.2.3 Test Result

Refer to test Annex A.

Remark: The report only reflects the test data plots of worst mode (for GSM 850, WCDMA Band 5, LTE Band 5)

6.2.4 Test Conclusion

PASS.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

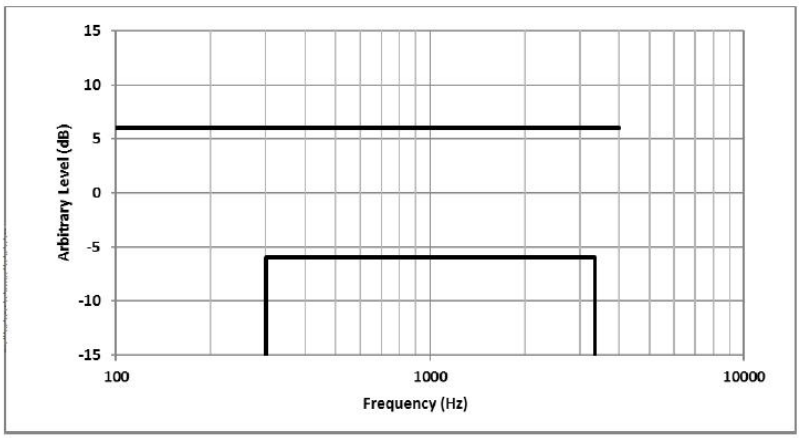
6.3 RECEIVE ACOUSTIC FREQUENCY RESPONSE PERFORMANCE

6.3.1 Requirement

1. Narrowband: The 1/12 octave band frequency response after translation to the FF or DF shall fall between the upper and lower limits given in Table 1 and shown in Figure below.

Table 1 – Narrowband Receive Frequency Response Limits

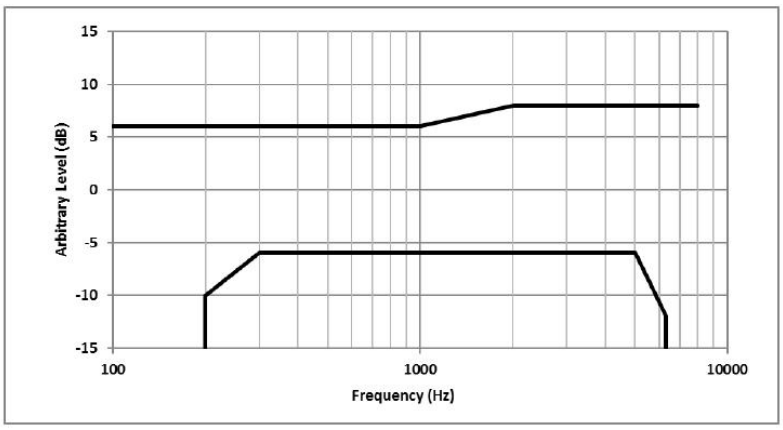
Lower Limit Frequency (Hz)	Lower Limit (dB)	Upper Limit Frequency (Hz)	Upper Limit (dB)
300	-6	100	+6
3400	-6	4000	+6



2. Wideband: The 1/12 octave band frequency response after translation to the FF or DF shall fall between the upper and lower limits given in Table 2 and shown in Figure below.

Table 2 – Wideband Receive Frequency Response Limits

Lower Limit Frequency (Hz)	Lower Limit (dB)	Upper Limit Frequency (Hz)	Upper Limit (dB)
200	-10	100	+6
300	-6	1000	+6
5000	-6	2000	+8
6300	-12	8000	+8



Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

6.3.2 Method of Measurement

1. Configure the DUT with a mounting force of 8N and test equipment as shown in Figure 1 in an active call state with the applicable codec for the transmission mode under test with the volume control at the setting determined in 5.1.1.
2. If the DUT has an adjustable tone control feature the initial measurement is to be performed with the default tone control setting.
3. Apply the real speech test signal with a level of -20 dBm0 at the RETP.
4. Capture the frequency spectrum at the DRP of the HATS using real-time analysis with 1/12 octave bands over the frequency range from 100 Hz to 4000 Hz for narrowband measurements, or over the frequency range from 100 Hz to 8000 Hz for wideband measurements, averaged over the entire duration of the test signal.
5. Transform the DRP frequency spectrum measurement to the FF or DF (see Annex B).
6. Divide the 1/12 octave measurement data by the 1/12 octave frequency spectrum of the test signal at the RETP and present the measurement in terms of dB(Pa/V).
7. Apply the applicable frequency response limits to determine compliance.
8. 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.
9. Repeat with a mounting force of 2N.

6.3.3 Test Result

Refer to test Annex A.

Remark: The report only reflects the test data plots of worst mode (for GSM 850, WCDMA Band 5, LTE Band 5)

6.3.4 Test Conclusion

PASS.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

7. Test Equipment List

Description	Manufacturer	Model	Internal number	Cal. Date	Cal. Due
WIDEBAND RADIO COMMU NICATION TESTER	ROHDE&SCHWARZ	CMW500	BTF-EM-023	2024/10/25	2025/10/24
Conditioning Amplifier	Brule&Kjaer	Type -2690--030	BTF-EM-146	2025/2/11	2026/2/10
Head and Torso Simulator	Brule&Kjaer	Type 4128C	BTF-EM-148	2025/2/11	2026/2/10
Sound Calibration	Brule&Kjaer	Type 4231	BTF-EM-149	2025/2/08	2026/2/07
Anechoic Test Chamber	MEC	Type 115	BTF-EM-150	N/A	N/A

8. Air Interfaces / Bands used for testing

Air-interface	Band	Tested Codec	Tested Rate(kbps)
GSM	850/1900	EFR	/
WCDMA(UMTS)	Band 2/4/5	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85
		EVS-NB	5.9/24.4
		EVS-WB	5.9/24.4
VoLTE	Band 2/4/5/12/17/25/26/41/66/71	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85
		EVS-NB	5.9/24.4
		EVS-WB	5.9/24.4
Note:We only select one codec type for the test, narrowband and wideband.			

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

9. Test Result

9.1 Receive volume control, distortion and noise performance

Plot No.	Mode	Channel/Freq.	BW	Codec Bitrate	Volume Level	Codec Type	Codec Bandwidth	Mounting Force (N)	Frequency(HZ)	Min PN-SDNR(dB)	PN-SDNR Limb (dB)	Signal Quality (dB)	Conversational Gain	FCC CG Limit (dB)	Verdict
1	GSM850	251/848.8MHz	/	/	Max	EFR	NB	8N	3150	**20.14**	20.00	92.63	**22.63**	18.00	Pass
			/	/	Max	EFR	NB	2N	3150	**20.24**	20.00	92.81	**22.81**	6.00	
2	PCS1900	512/1850.2MHz	/	/	Max	EFR	NB	8N	3150	20.52	20.00	92.82	22.82	18.00	Pass
			/	/	Max	EFR	NB	2N	3150	20.66	20.00	92.95	22.95	6.00	
3	WCDMA Band II	9262/1852.4MHz	/	12.20	Max	AMR	NB	8N	3150	22.39	20.00	92.93	22.93	18.00	Pass
			/	12.20	Max	AMR	NB	2N	3150	22.52	20.00	92.78	22.78	6.00	
			/	23.85	Max	AMR	WB	8N	3150	22.56	20.00	92.26	22.26	18.00	
			/	23.85	Max	AMR	WB	2N	3150	22.71	20.00	92.03	22.03	6.00	
4	WCDMA Band IV	1312/1712.4MHz	/	12.20	Max	AMR	NB	8N	3150	22.21	20.00	92.85	22.85	18.00	Pass
			/	12.20	Max	AMR	NB	2N	3150	22.39	20.00	92.62	22.62	6.00	
			/	23.85	Max	AMR	WB	8N	3150	22.45	20.00	92.35	22.35	18.00	
			/	23.85	Max	AMR	WB	2N	3150	22.59	20.00	92.18	22.18	6.00	
5	WCDMA Band V	4183/836.6MHz	/	12.20	Max	AMR	NB	8N	3150	**22.09**	20.00	92.71	**22.71**	18.00	Pass
			/	12.20	Max	AMR	NB	2N	3150	**22.22**	20.00	92.43	**22.43**	6.00	
			/	23.85	Max	AMR	WB	8N	3150	22.34	20.00	92.00	22.00	18.00	
			/	23.85	Max	AMR	WB	2N	3150	22.47	20.00	91.94	21.94	6.00	
6	LTE FDD Band 2	18700/1860.0MHz	20MHz_QPSK_1_0	12.20	Max	AMR	NB	8N	3150	22.89	20.00	95.18	25.18	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.95	20.00	94.46	24.46	6.00	
				23.85	Max	AMR	WB	8N	3150	23.04	20.00	90.43	20.43	18.00	
				23.85	Max	AMR	WB	2N	3150	23.19	20.00	91.89	21.89	6.00	
7	LTE FDD Band 4	20300/1745.0MHz	20MHz_QPSK_1_50	12.20	Max	AMR	NB	8N	3150	22.70	20.00	95.61	25.61	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.82	20.00	94.52	24.52	6.00	
				23.85	Max	AMR	WB	8N	3150	22.98	20.00	90.33	20.33	18.00	
				23.85	Max	AMR	WB	2N	3150	23.08	20.00	91.87	21.87	6.00	
8	LTE FDD Band 5	20525/836.5MHz	10MHz_QPSK_1_25	12.20	Max	AMR	NB	8N	3150	**22.39**	20.00	95.41	25.41	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	**22.47**	20.00	94.38	24.38	6.00	
				23.85	Max	AMR	WB	8N	3150	22.52	20.00	89.93	**19.93**	18.00	
				23.85	Max	AMR	WB	2N	3150	22.68	20.00	91.54	**21.54**	6.00	
9	LTE FDD Band 12	23060/704.0MHz	10MHz_QPSK_1_25	12.20	Max	AMR	NB	8N	3150	22.48	20.00	95.21	25.21	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.56	20.00	94.26	24.26	6.00	
				23.85	Max	AMR	WB	8N	3150	22.69	20.00	90.03	20.03	18.00	
				23.85	Max	AMR	WB	2N	3150	22.77	20.00	91.66	21.66	6.00	
10	LTE FDD Band 17	23800/711.0MHz	10MHz_QPSK_1_0	12.20	Max	AMR	NB	8N	3150	22.53	20.00	95.39	25.39	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.62	20.00	94.49	24.49	6.00	
				23.85	Max	AMR	WB	8N	3150	22.87	20.00	90.16	20.16	18.00	
				23.85	Max	AMR	WB	2N	3150	22.95	20.00	91.70	21.70	6.00	
11	LTE FDD Band 25	26140/1860.0MHz	20MHz_QPSK_1_50	12.20	Max	AMR	NB	8N	3150	22.80	20.00	95.73	25.73	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.91	20.00	94.75	24.75	6.00	
				23.85	Max	AMR	WB	8N	3150	22.86	20.00	90.56	20.56	18.00	
				23.85	Max	AMR	WB	2N	3150	23.05	20.00	91.98	21.98	6.00	

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

Plot No.	Mode	Channel/Freq.	BW	Codec Bitrate	Volume Level	Codec Type	Codec Bandwidth	Mounting Force (N)	Frequency(HZ)	Min PN-SDNR(dB)	PN-SDNR Limb (dB)	Signal Quality (dB)	Conversational Gain	FCC CG Limit (dB)	Verdict
12	LTE FDD Band 26 Part 90	26740/819.0MHz	10MHz_QPSK_1_0	12.20	Max	AMR	NB	8N	3150	22.58	20.00	95.46	25.46	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.66	20.00	94.49	24.49	6.00	
				23.85	Max	AMR	WB	8N	3150	22.84	20.00	90.25	20.25	18.00	
				23.85	Max	AMR	WB	2N	3150	22.90	20.00	91.67	21.67	6.00	
13	LTE FDD Band 26 Part 22	26915/836.5MHz	15MHz_QPSK_1_38	12.20	Max	AMR	NB	8N	3150	22.61	20.00	95.57	25.57	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.73	20.00	94.48	24.48	6.00	
				23.85	Max	AMR	WB	8N	3150	22.69	20.00	90.36	20.36	18.00	
				23.85	Max	AMR	WB	2N	3150	22.82	20.00	91.71	21.71	6.00	
14	LTE TDD Band 41	39750/2506.0MHz	20MHz_QPSK_1_0	12.20	Max	AMR	NB	8N	3150	22.45	20.00	95.31	25.31	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.58	20.00	94.50	24.50	6.00	
				23.85	Max	AMR	WB	8N	3150	22.57	20.00	90.02	20.02	18.00	
				23.85	Max	AMR	WB	2N	3150	22.69	20.00	91.63	21.63	6.00	
15	LTE FDD Band 66	132072/1720.0MHz	20MHz_QPSK_1_0	12.20	Max	AMR	NB	8N	3150	22.74	20.00	95.78	25.78	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.88	20.00	94.75	24.75	6.00	
				23.85	Max	AMR	WB	8N	3150	22.95	20.00	90.64	20.64	18.00	
				23.85	Max	AMR	WB	2N	3150	23.16	20.00	91.98	21.98	6.00	
16	LTE FDD Band 71	133222/673.0MHz	20MHz_QPSK_1_0	12.20	Max	AMR	NB	8N	3150	22.62	20.00	95.72	25.72	18.00	Pass
				12.20	Max	AMR	NB	2N	3150	22.78	20.00	94.65	24.65	6.00	
				23.85	Max	AMR	WB	8N	3150	22.85	20.00	90.58	20.58	18.00	
				23.85	Max	AMR	WB	2N	3150	22.97	20.00	91.90	21.90	6.00	

Note:
1.This device does not support VoWIFI, so VoWIFI is not tested and evaluated.
2.With a mounting force of 8N, the DUT shall have at least one volume control setting that will produce a conversational gain of ≥ 18 dB with the output distortion and the frequency response.
3.With a mounting force of 2N, the DUT shall have at least one volume control setting that will produce a conversational gain of ≥ 6 dB with the output distortion and the frequency response.
4.With a mounting force of 8N and 2N, the ratio of the stimulus signal power to the 100 Hz to 8000 Hz total A-weighted distortion and noise power shall be ≥ 20 dB.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

9.2 Receive acoustic frequency response performance

Plot No.	Mode	Channel/Freq.	BW	Volume Level	Codec Type	Codec Bandwidth	Mounting Force (N)	RFR Test Result
1	GSM850	251/848.8MHz	/	Max	EFR	NB	2N	Pass
				Max	EFR	NB	8N	
2	PCS1900	512/1850.2MHz	/	Max	EFR	NB	2N	Pass
				Max	EFR	NB	8N	
3	WCDMA Band II	9262/1852.4MHz	/	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
4	WCDMA Band IV	1312/1712.4MHz	/	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
5	WCDMA Band V	4183/836.6MHz	/	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
6	LTE FDD Band 2	18700/1860.0MHz	20MHz_QPSK_1_0	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
7	LTE FDD Band 4	20300/1745.0MHz	20MHz_QPSK_1_50	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
8	LTE FDD Band 5	20525/836.5MHz	10MHz_QPSK_1_25	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
9	LTE FDD Band 12	23060/704.0MHz	10MHz_QPSK_1_25	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
10	LTE FDD Band 17	23800/711.0MHz	10MHz_QPSK_1_0	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
11	LTE FDD Band 25	26140/1860.0MHz	20MHz_QPSK_1_50	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
12	LTE FDD Band 26 Part 90	26740/819.0MHz	10MHz_QPSK_1_0	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
13	LTE FDD Band 26 Part 22	26915/836.5MHz	15MHz_QPSK_1_38	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

Plot No.	Mode	Channel/Freq.	BW	Volume Level	Codec Type	Codec Bandwidth	Mounting Force (N)	RFR
								Test Result
14	LTE TDD Band 41	39750/2506.0MHz	20MHz_QPSK_1_0	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
15	LTE FDD Band 66	132072/1720.0MHz	20MHz_QPSK_1_0	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
16	LTE FDD Band 71	133222/673.0MHz	20MHz_QPSK_1_0	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

Volume Control Verification Test Results

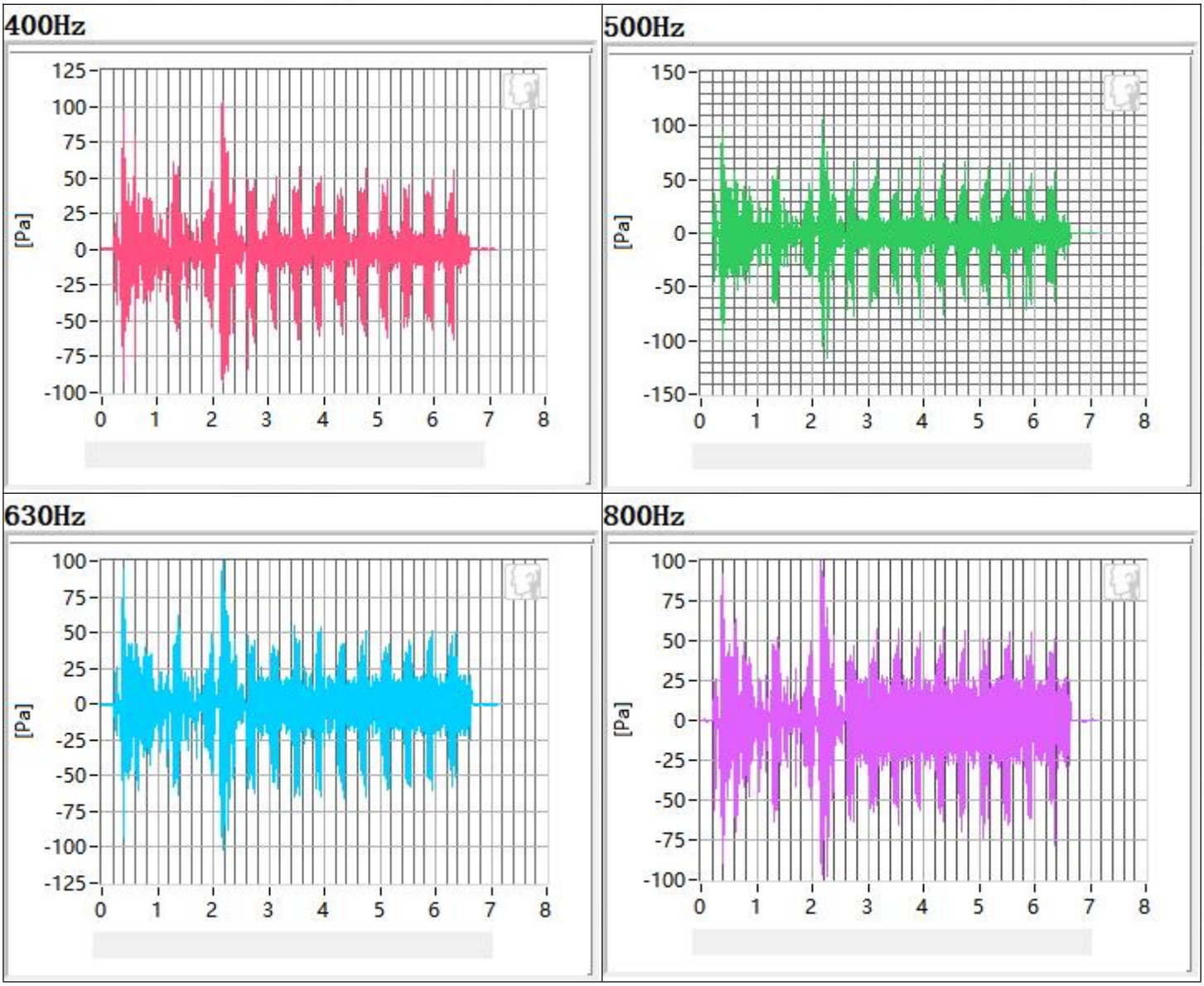
Date of Testing	Test Location	Air Interface Equipment	Acoustical Calibrator	HATS Sens.(dB)	Ambient Noise(dBA)
15/9/2025	JB HATS R	CMW 500	B&K 4231 & UA1546	97.13	32.66
18/9/2025	JB HATS R	CMW 500	B&K 4231 & UA1546	97.16	33.37
20/9/2025	JB HATS R	CMW 500	B&K 4231 & UA1546	97.12	32.54
25/9/2025	JB HATS R	CMW 500	B&K 4231 & UA1546	97.15	32.61
29/9/2025	JB HATS R	CMW 500	B&K 4231 & UA1546	97.10	35.28
Note: A room with background noise no greater than 40 dBA.					

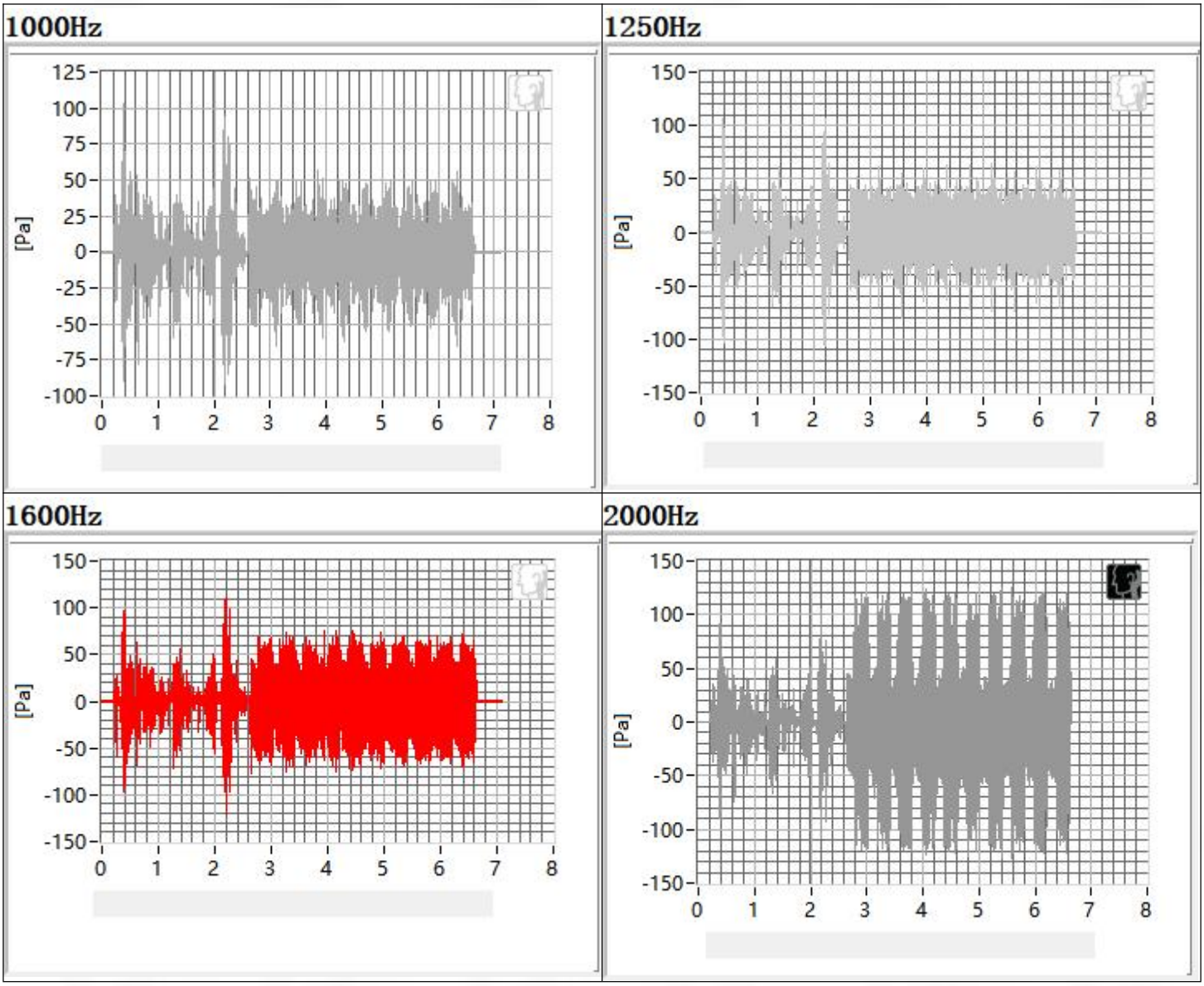
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

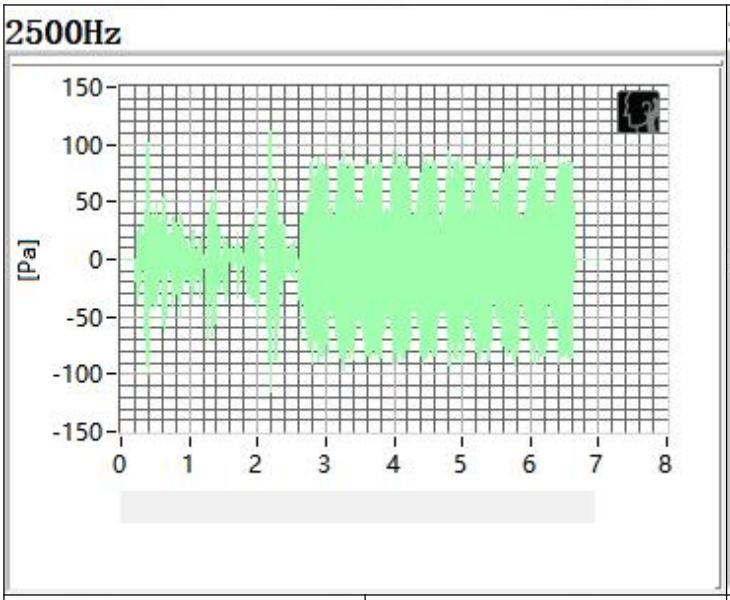
BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

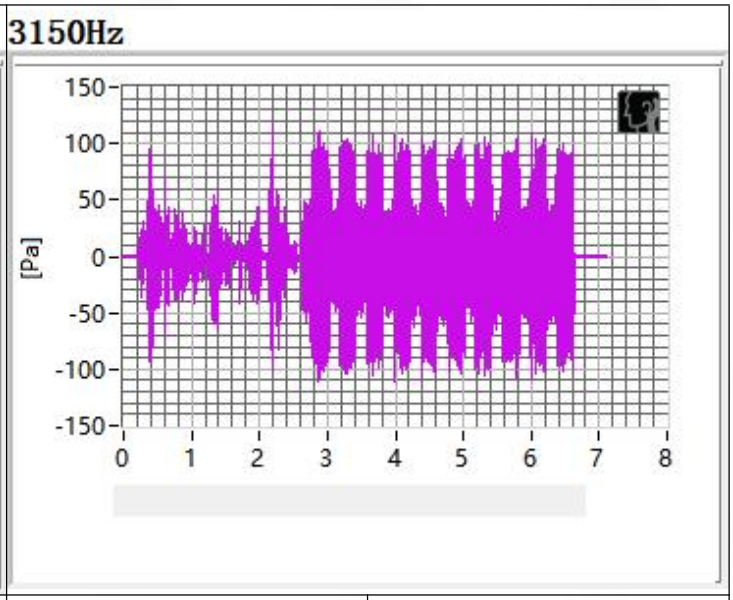
ANNEX A Test Data
1. GSM 850 in channel 251

1.1 Receive Distortion and Noise 8N NB



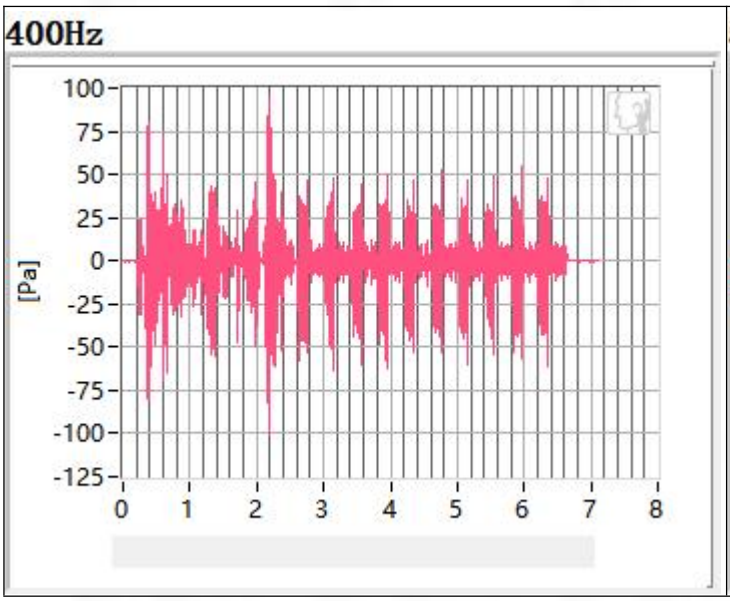

1000Hz
1250Hz
1600Hz
2000Hz
[Pa]

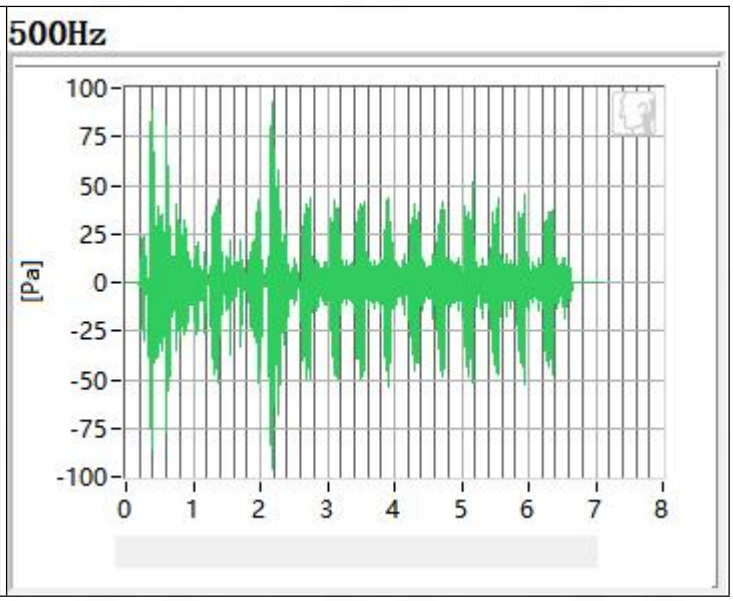




Frequency	SDNR	Frequency	SDNR
400Hz	27.04 dB	1250Hz	25.49 dB
500Hz	23.75 dB	1600Hz	23.73 dB
630Hz	23.09 dB	2000Hz	25.21 dB
800Hz	21.38 dB	2500Hz	20.71 dB
1000Hz	23.77 dB	3150Hz	20.14 dB
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 20.14dB at 3150Hz.			

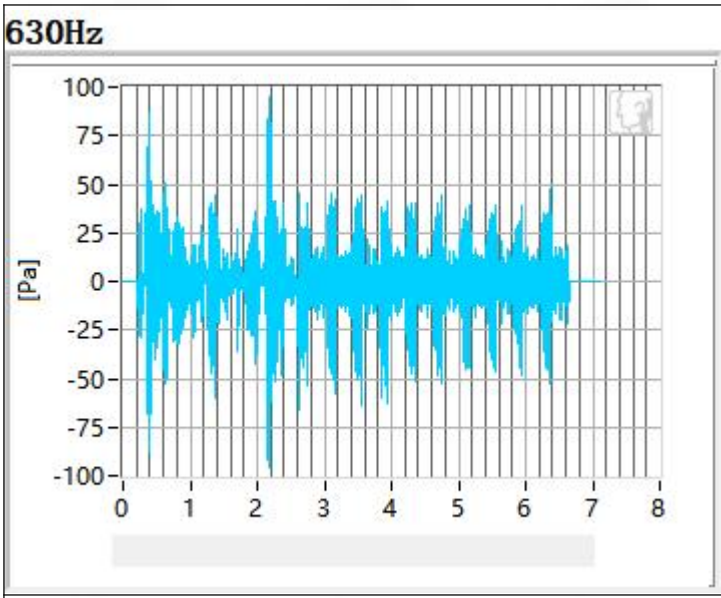
1.2 Receive Distortion and Noise 2N NB

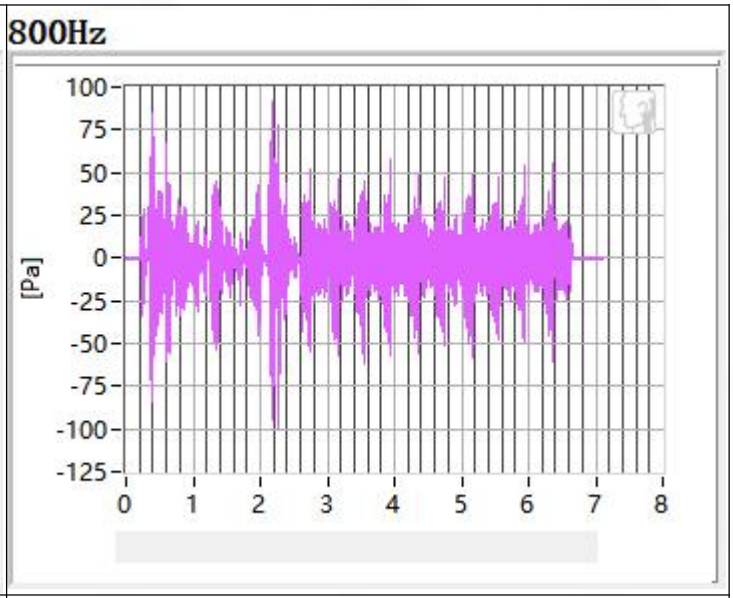


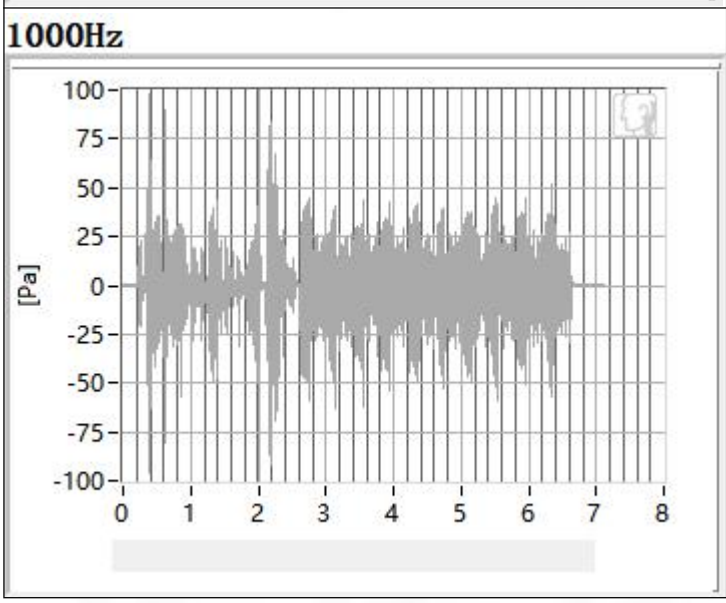


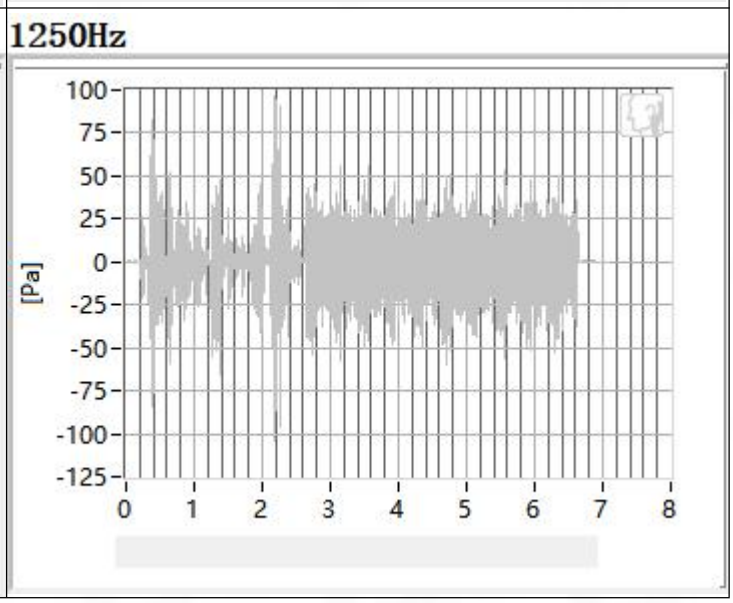
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China



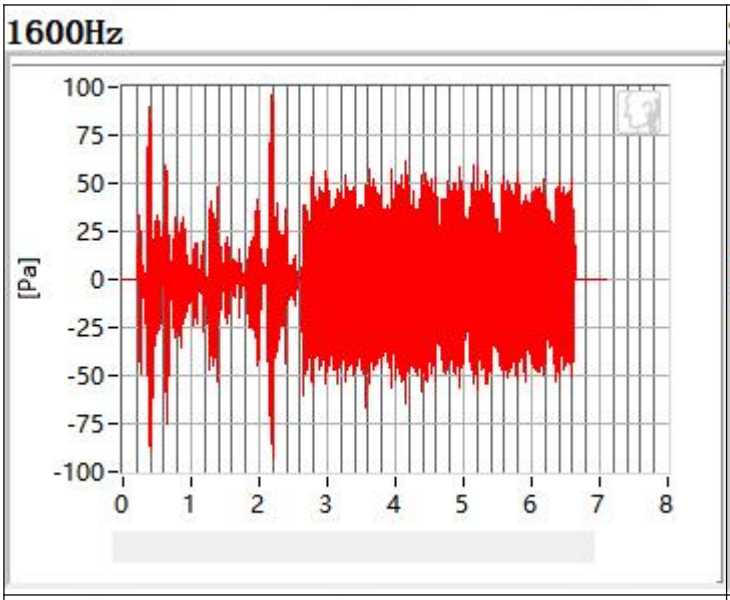


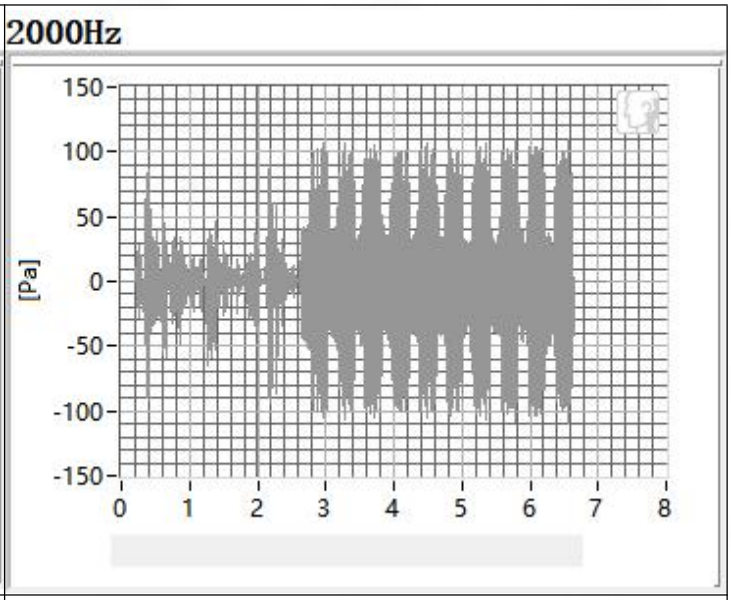


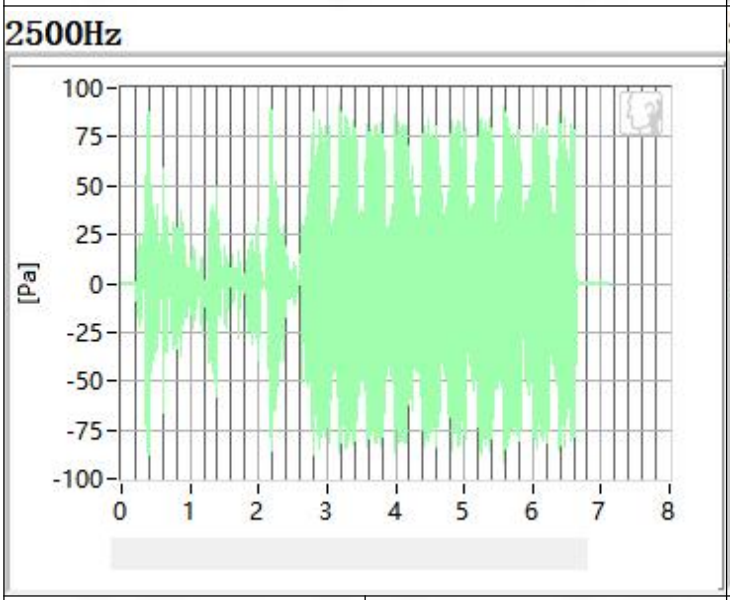


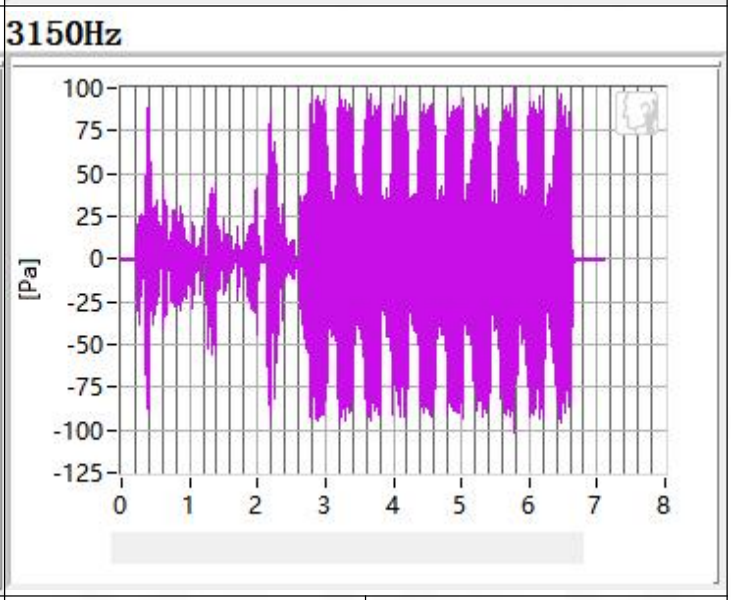
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China







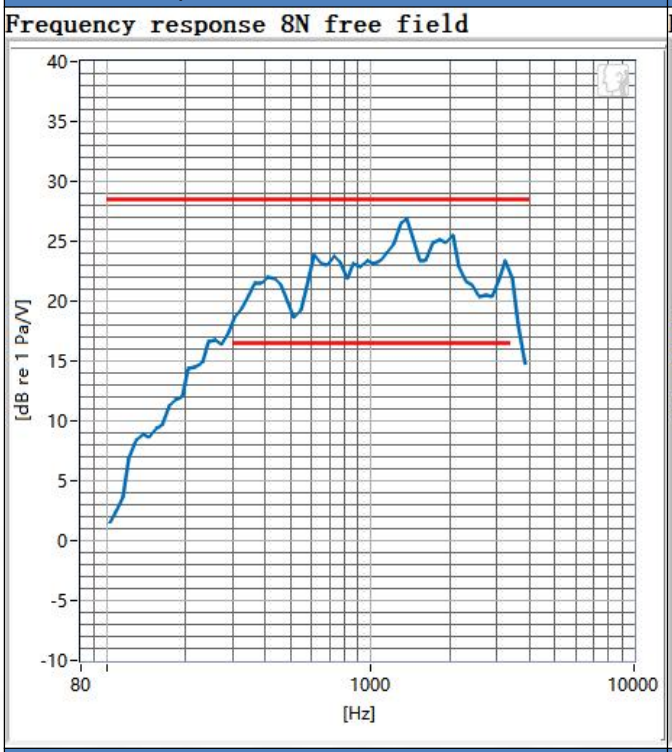
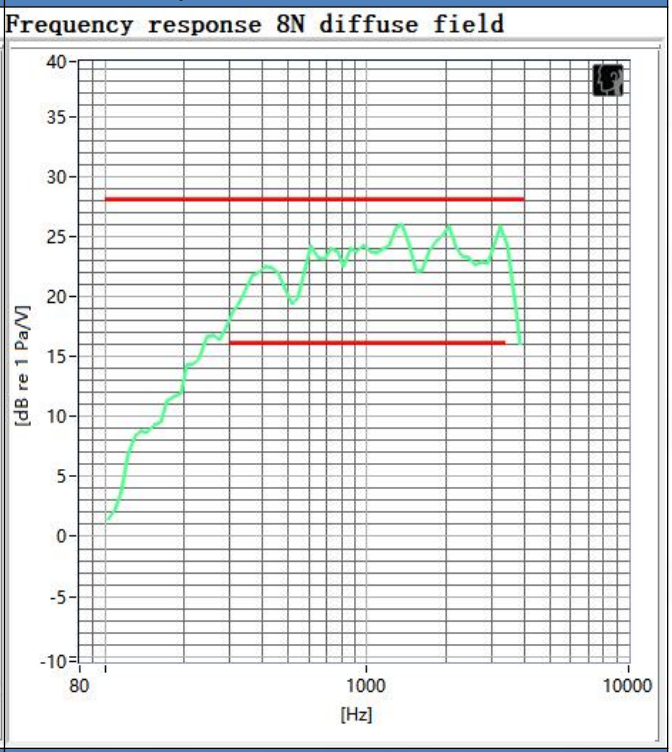


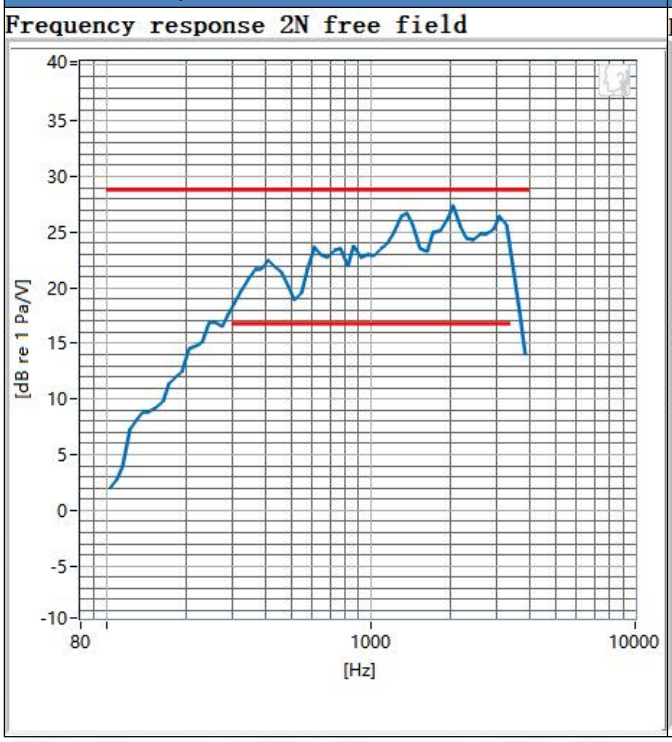
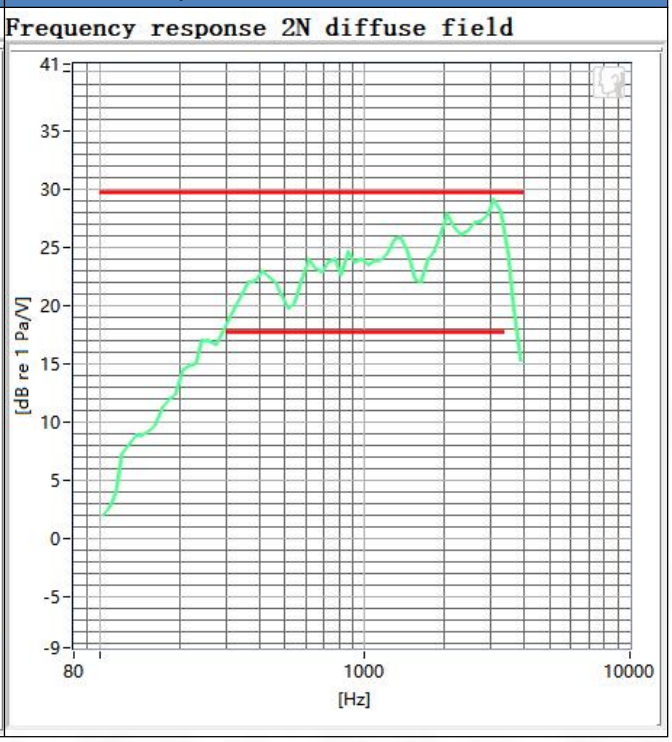
Frequency	SDNR	Frequency	SDNR
400Hz	27.34 dB	1250Hz	27.43 dB
500Hz	23.30 dB	1600Hz	22.35 dB
630Hz	23.03 dB	2000Hz	27.47 dB
800Hz	21.85 dB	2500Hz	22.25 dB
1000Hz	23.62 dB	3150Hz	20.24 dB
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 20.24dB at 3150Hz.			

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

1.3 Receive Frequency Response

Receive Resp FF 8N	Receive Resp DF 8N
	

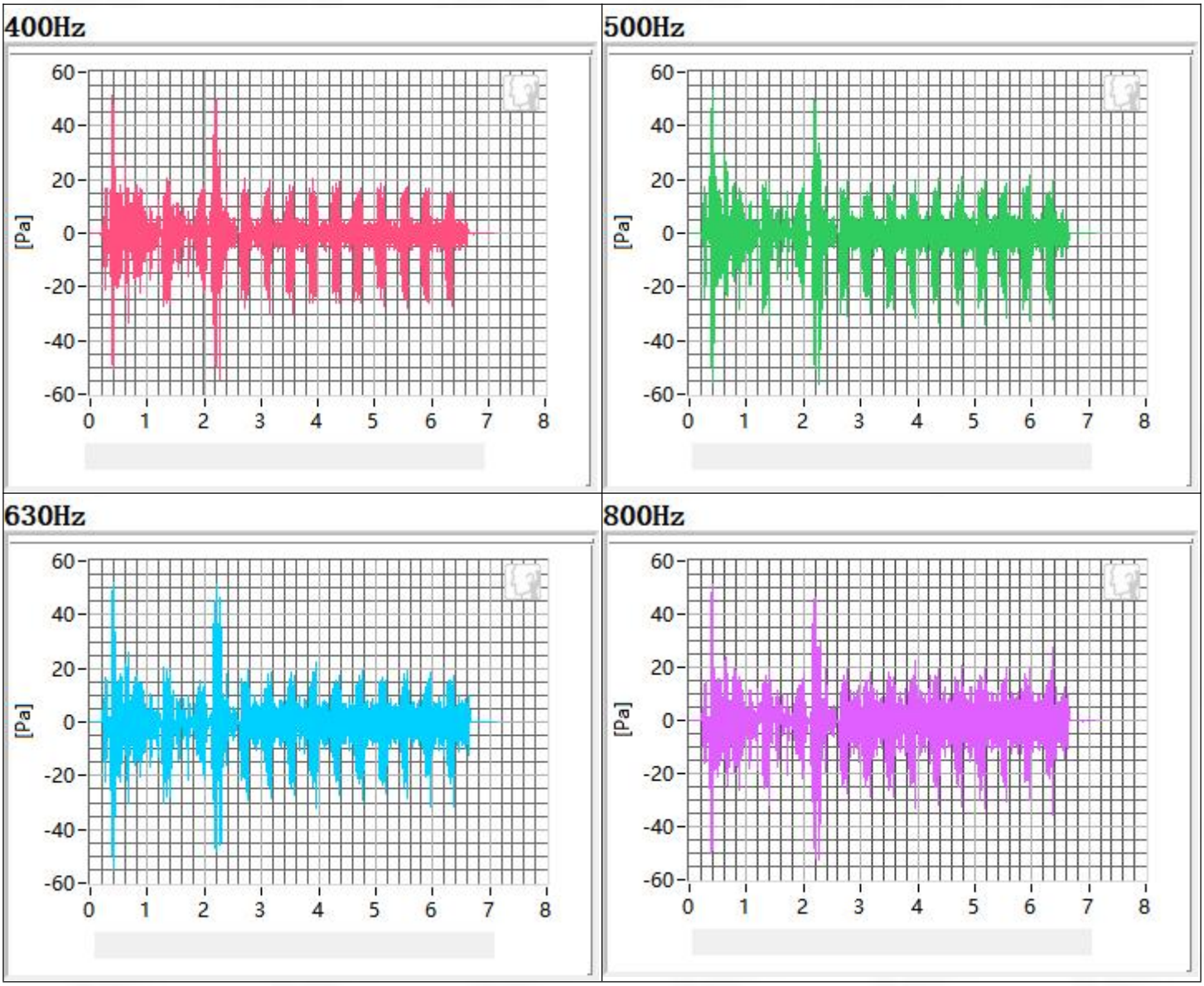
Receive Resp FF 2N	Receive Resp DF 2N
	

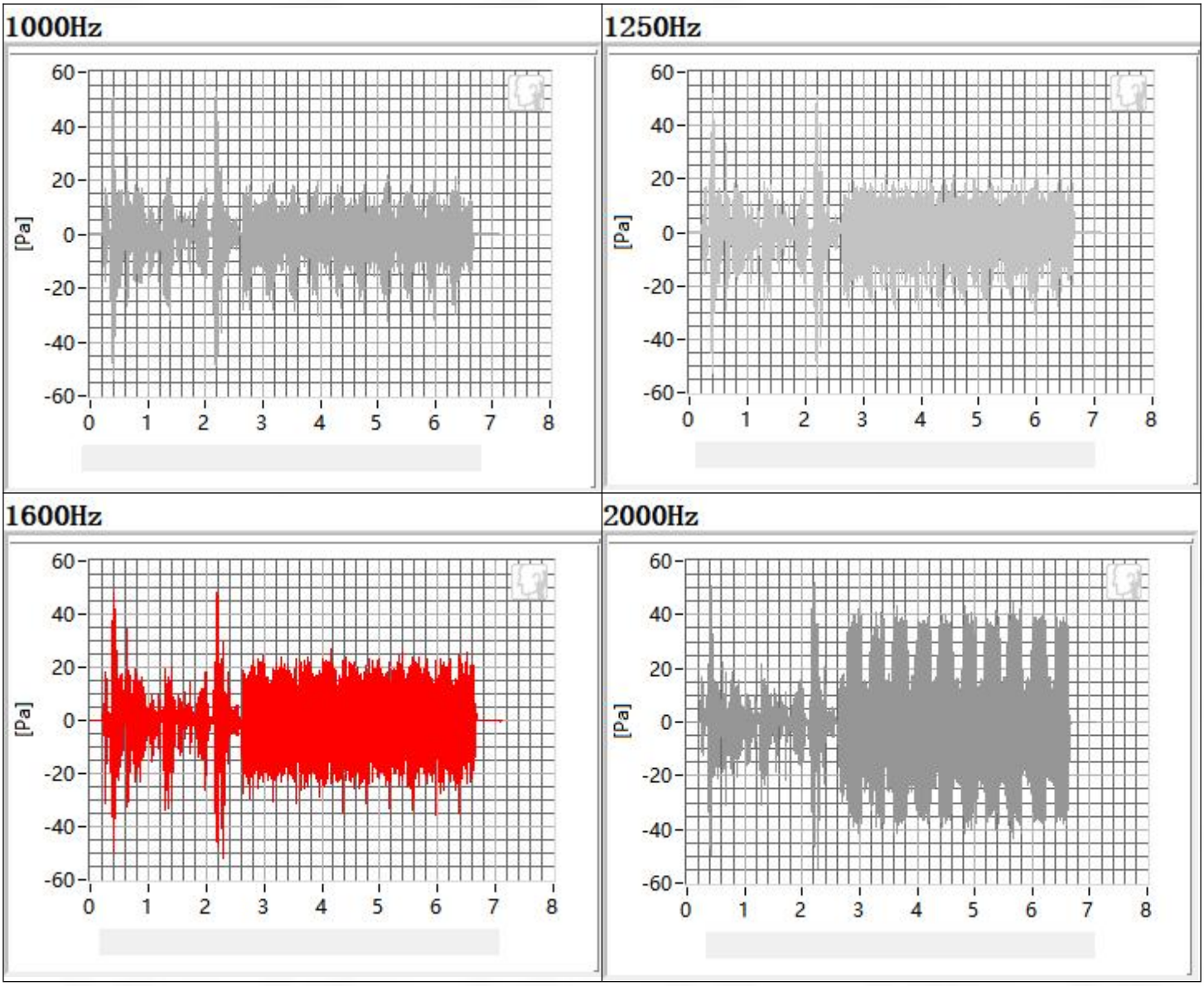
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

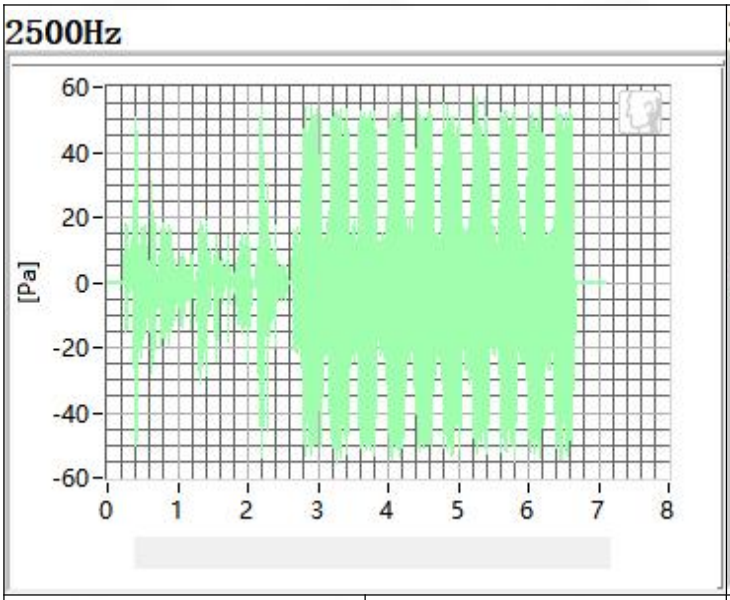
BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

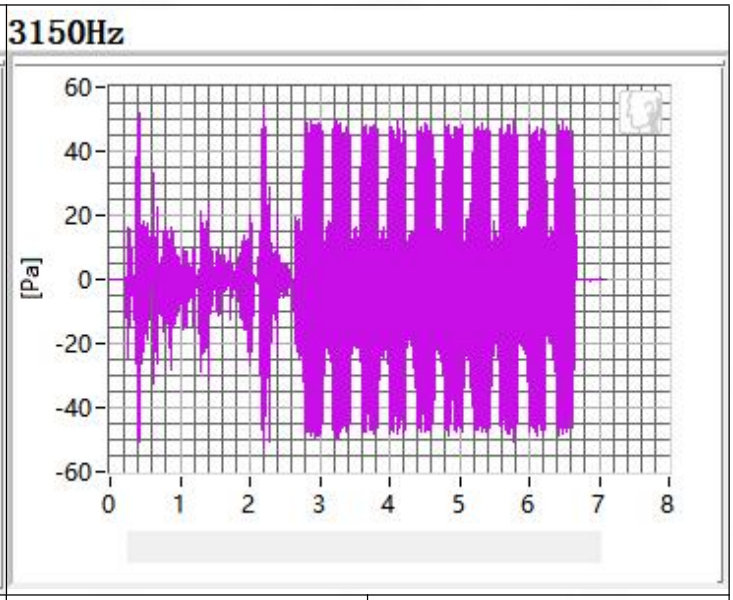
2. WCDMA band 5 in channel 4183

2.1 Receive Distortion and Noise 8N NB



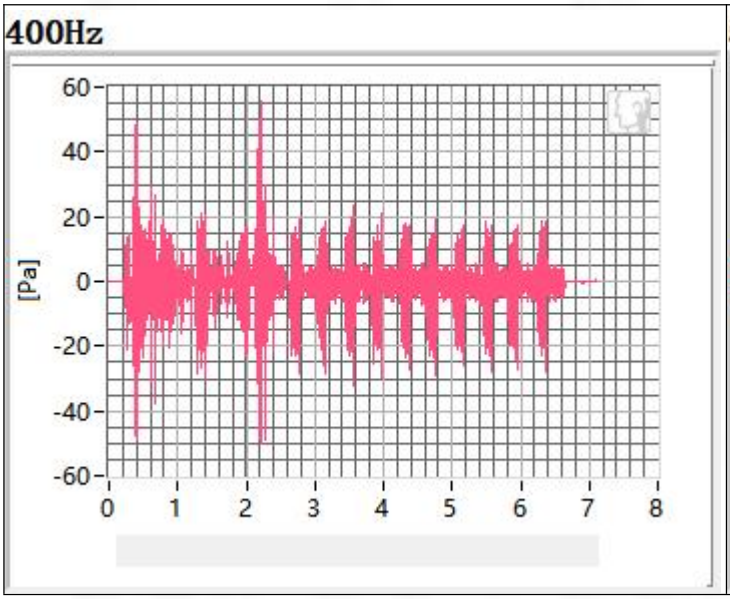

1000Hz
1250Hz
1600Hz
2000Hz
[Pa]
60
40
20
0
-20
-40
-60
0 1 2 3 4 5 6 7 8

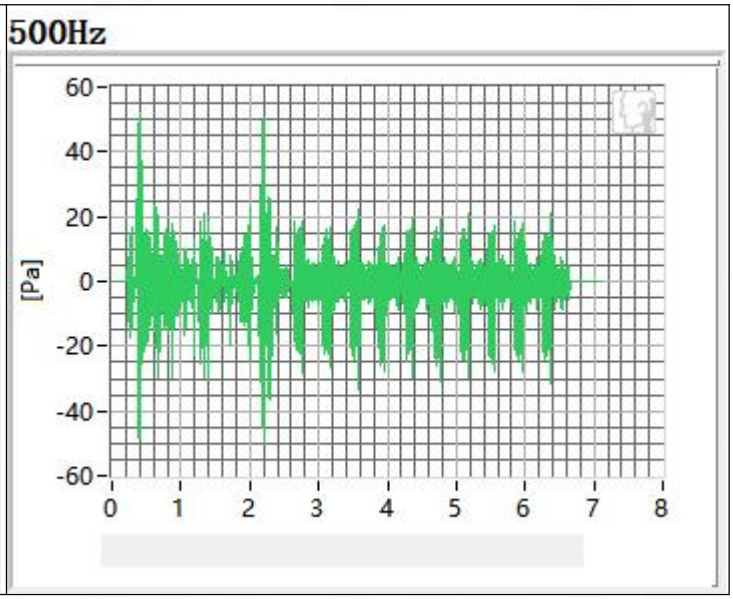




Frequency	SDNR	Frequency	SDNR
400Hz	27.84 dB	1250Hz	29.93 dB
500Hz	25.22 dB	1600Hz	27.13 dB
630Hz	24.10 dB	2000Hz	29.97 dB
800Hz	26.68 dB	2500Hz	23.99 dB
1000Hz	26.38 dB	3150Hz	22.09 dB
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 22.09 dB at 3150Hz.			

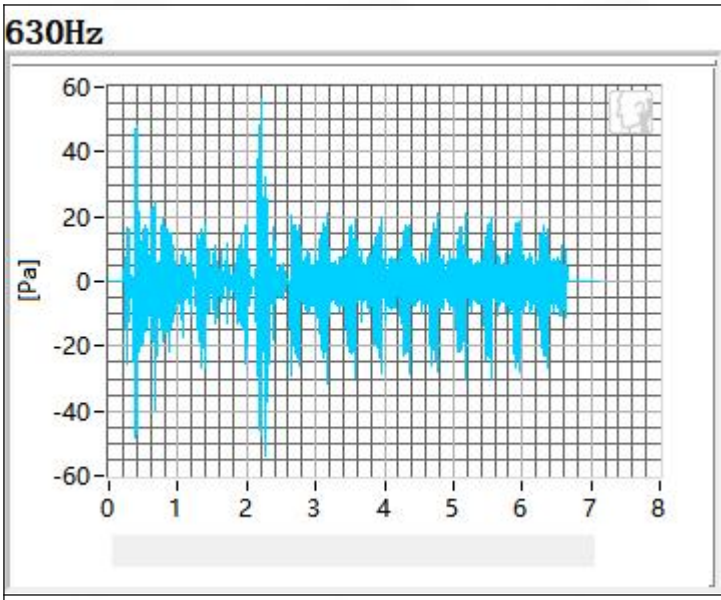
2.2 Receive Distortion and Noise 2N NB

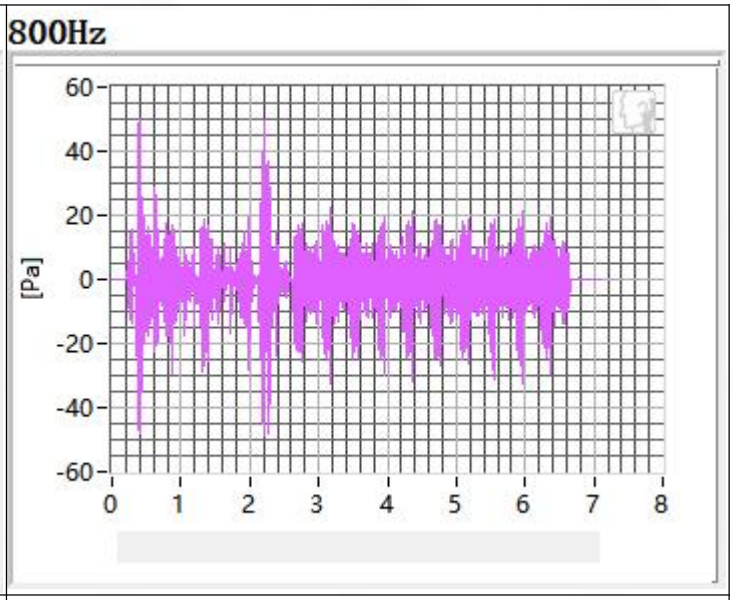


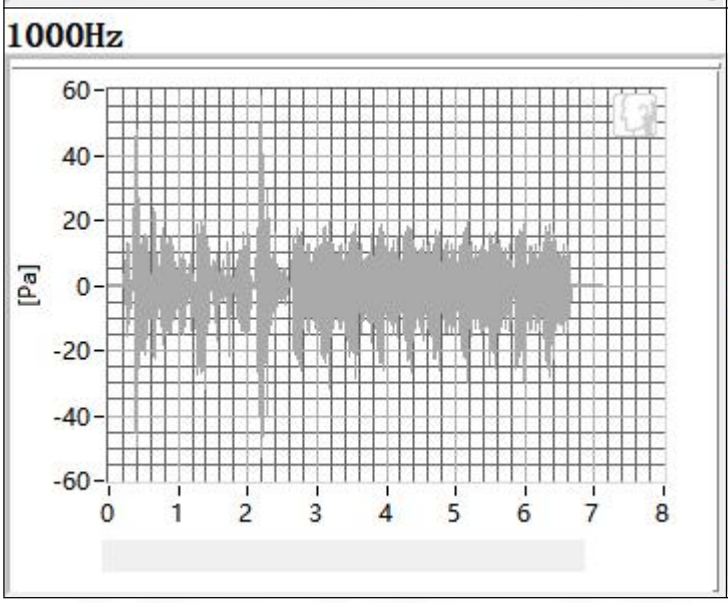


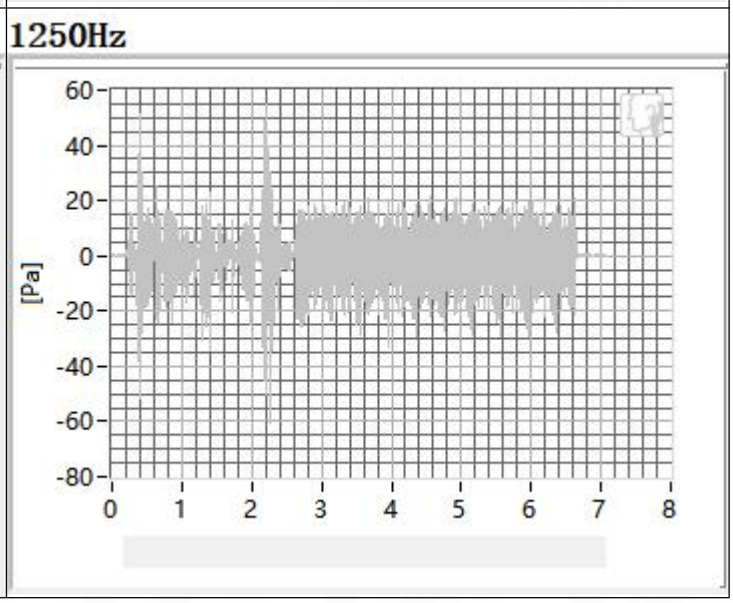
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China





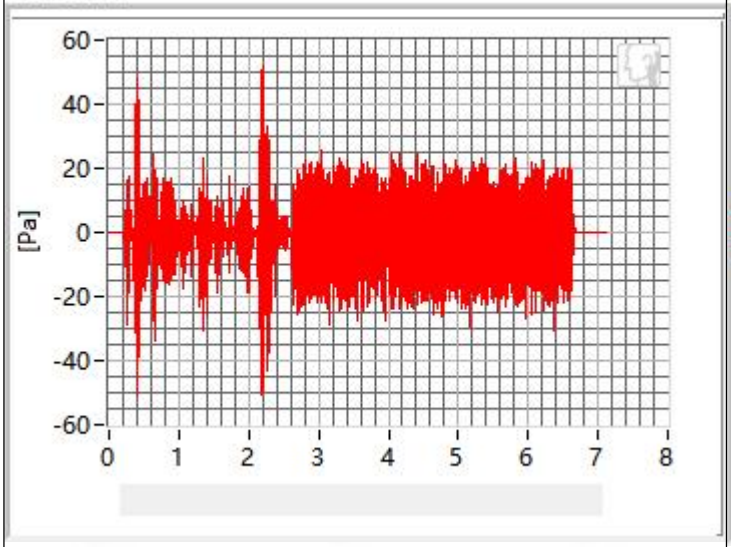




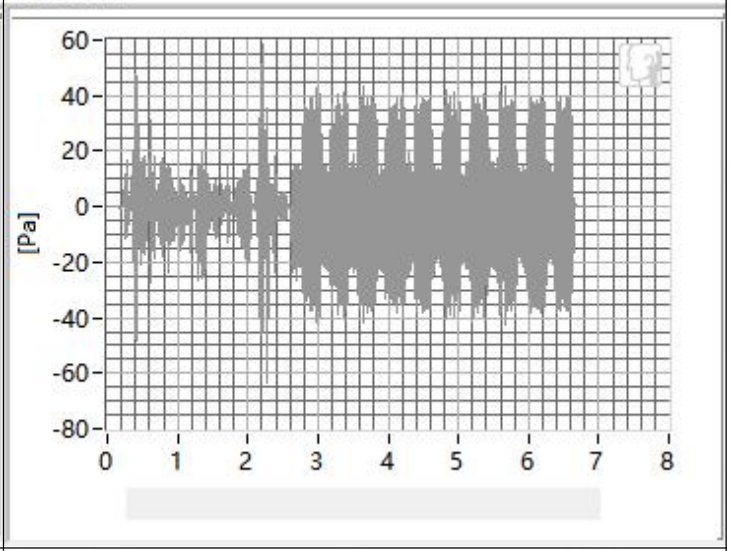
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

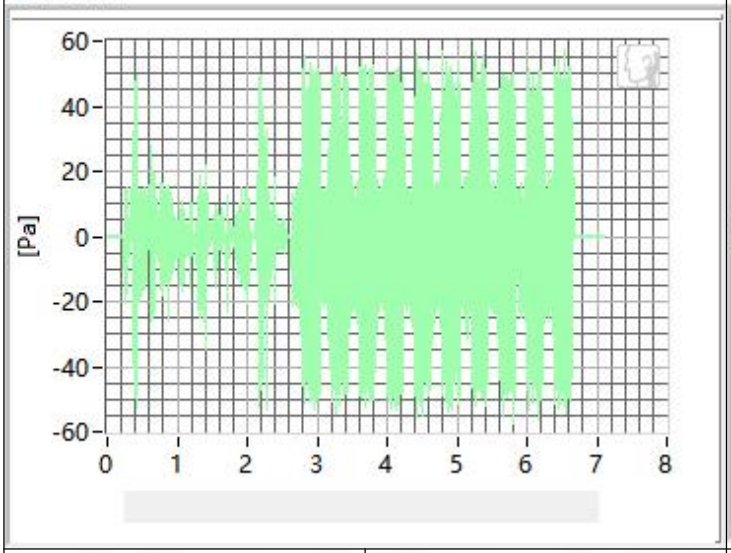
1600Hz



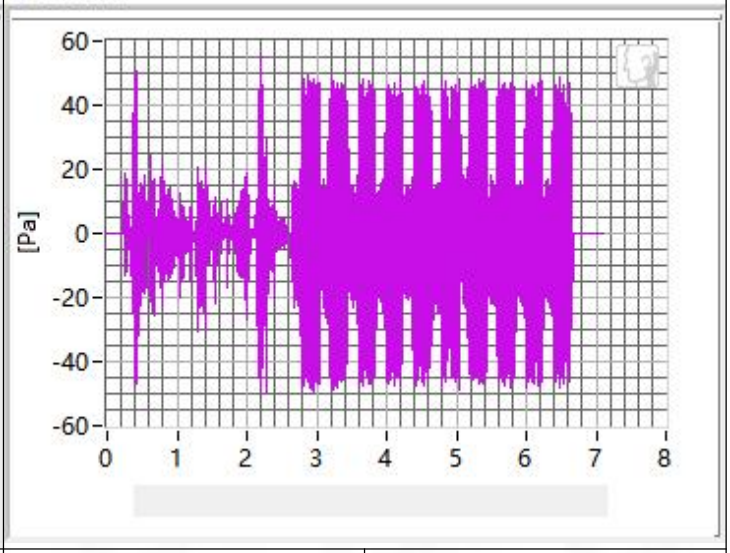
2000Hz



2500Hz



3150Hz



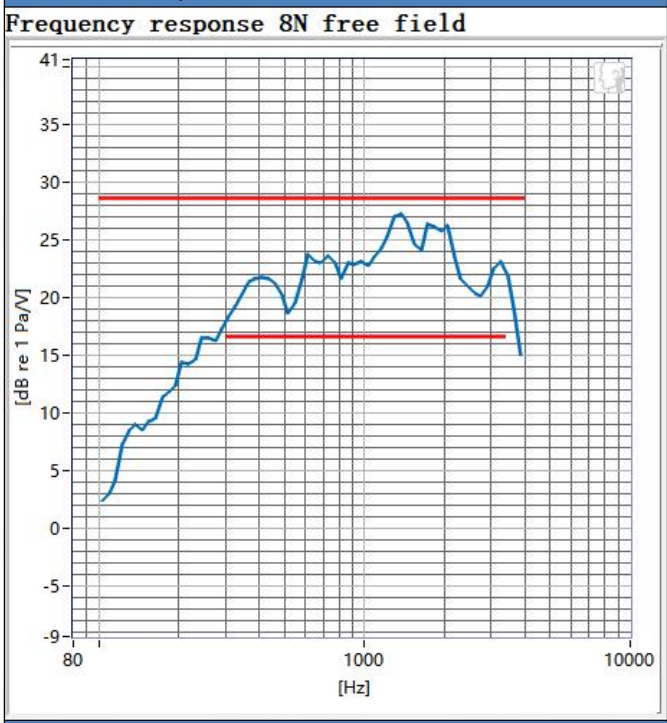
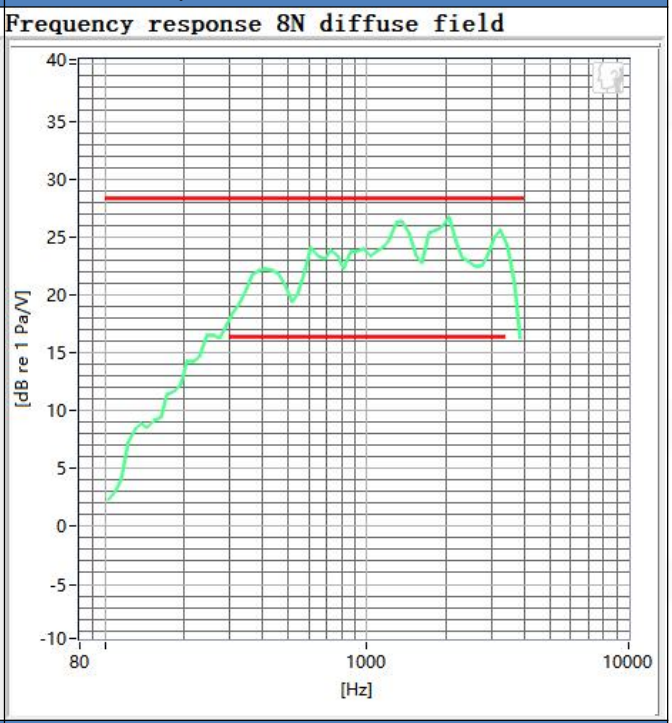
Frequency	SDNR	Frequency	SDNR
400Hz	27.74 dB	1250Hz	29.24 dB
500Hz	25.07 dB	1600Hz	26.04 dB
630Hz	24.55 dB	2000Hz	28.18 dB
800Hz	26.01 dB	2500Hz	24.91 dB
1000Hz	26.58 dB	3150Hz	22.22 dB

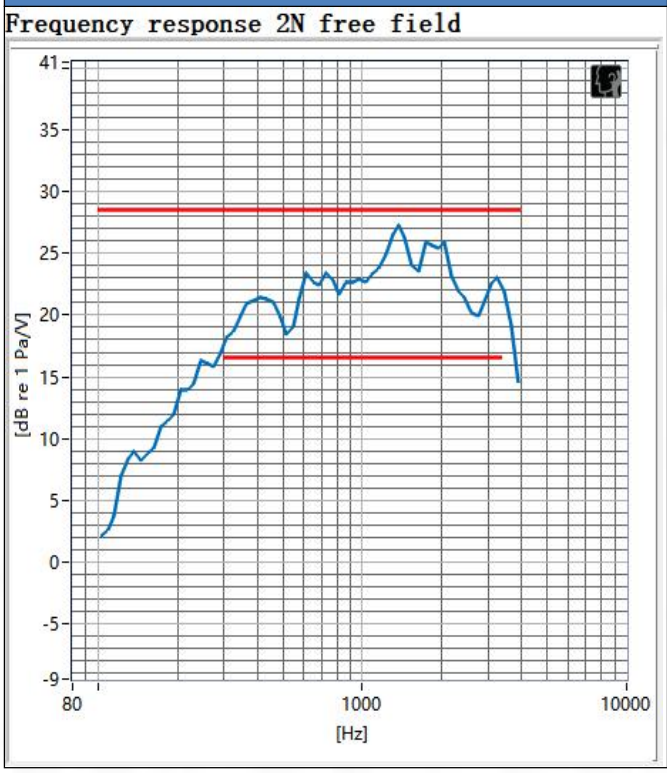
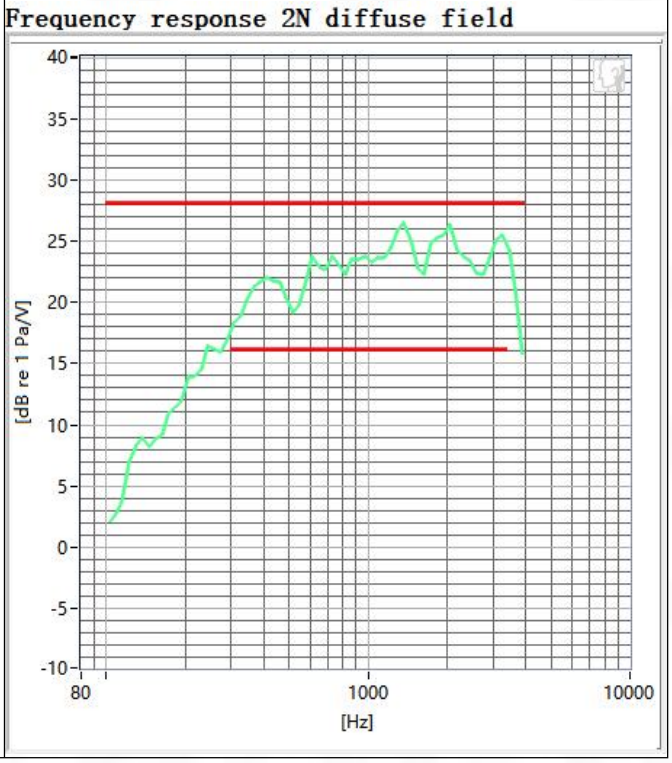
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 22.22 dB at 3150Hz.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

2.3 Receive Frequency Response

Receive Resp FF 8N	Receive Resp DF 8N
	

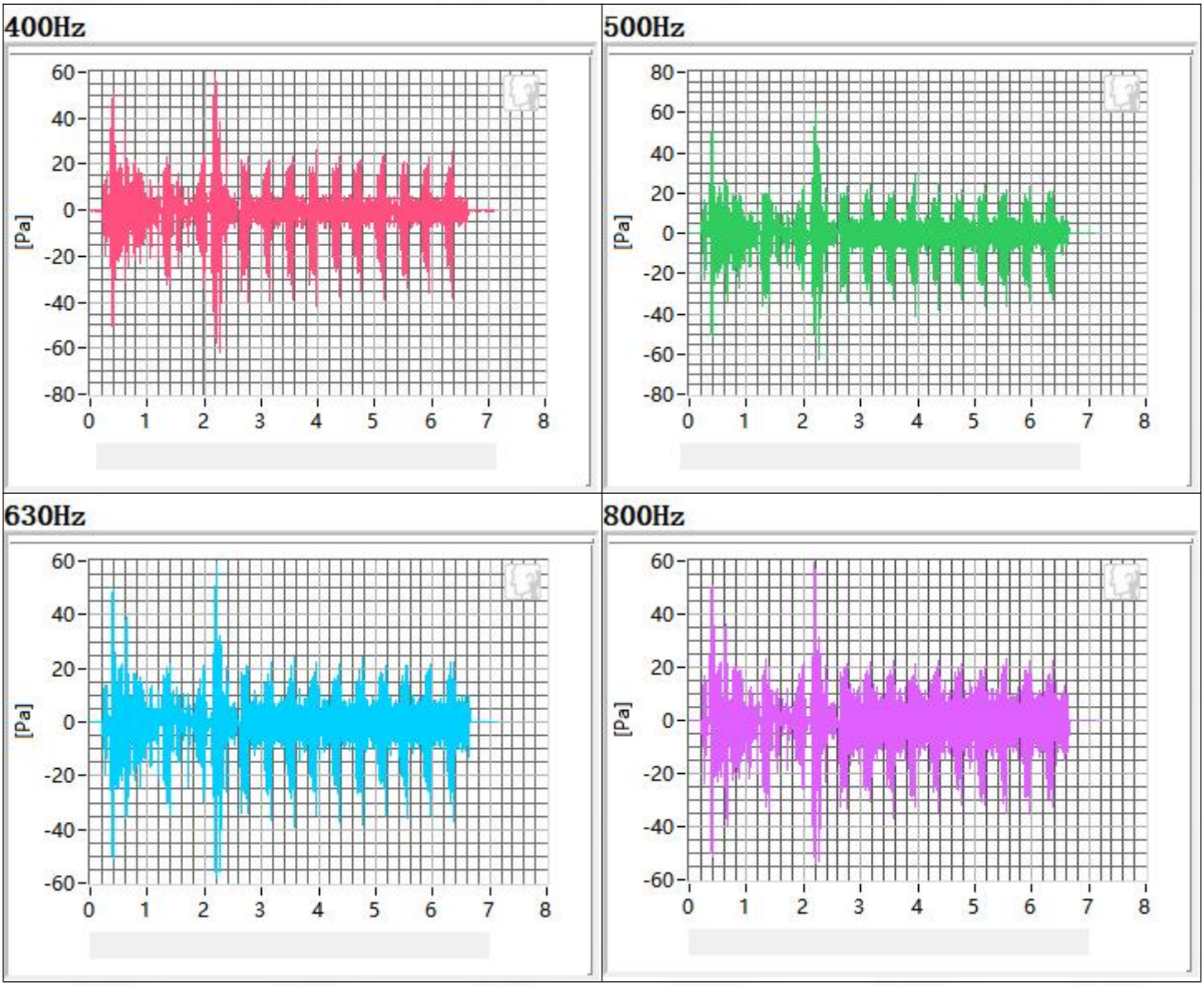
Receive Resp FF 2N	Receive Resp DF 2N
	

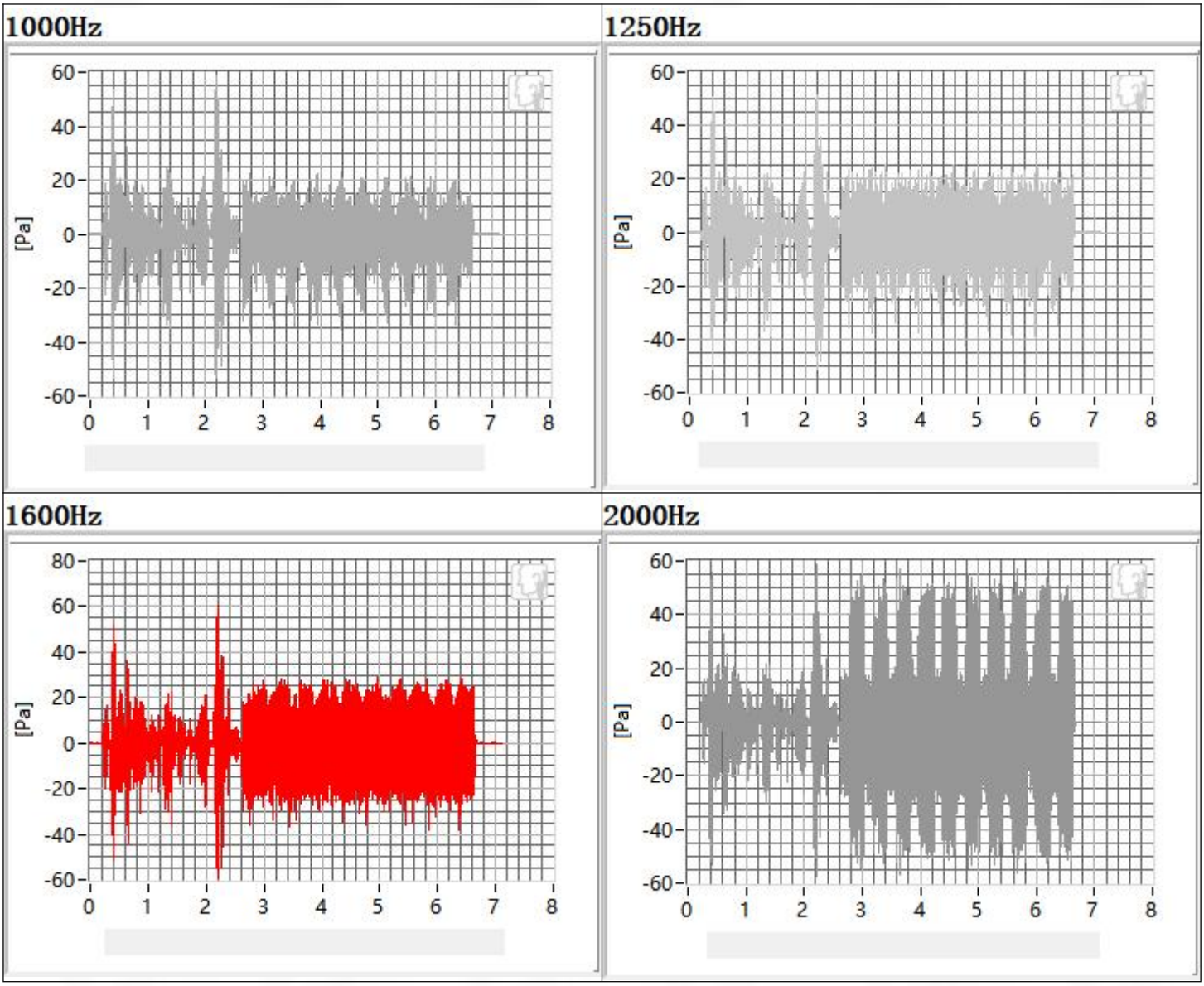
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

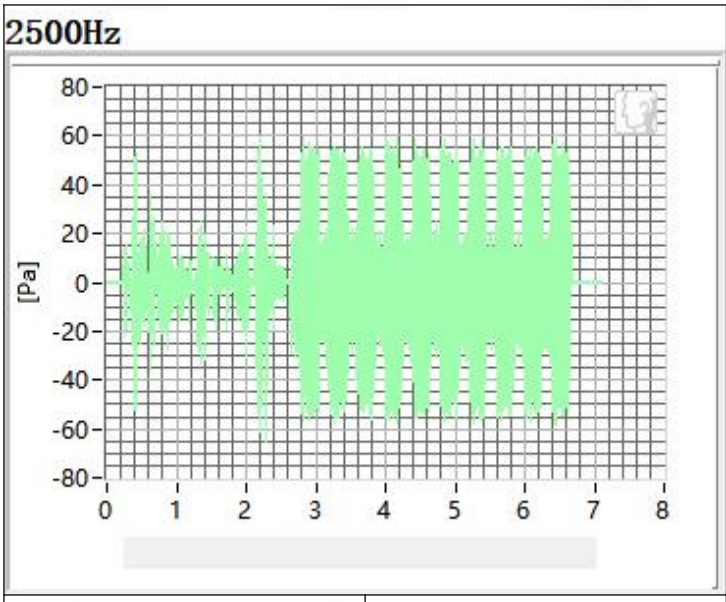
BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

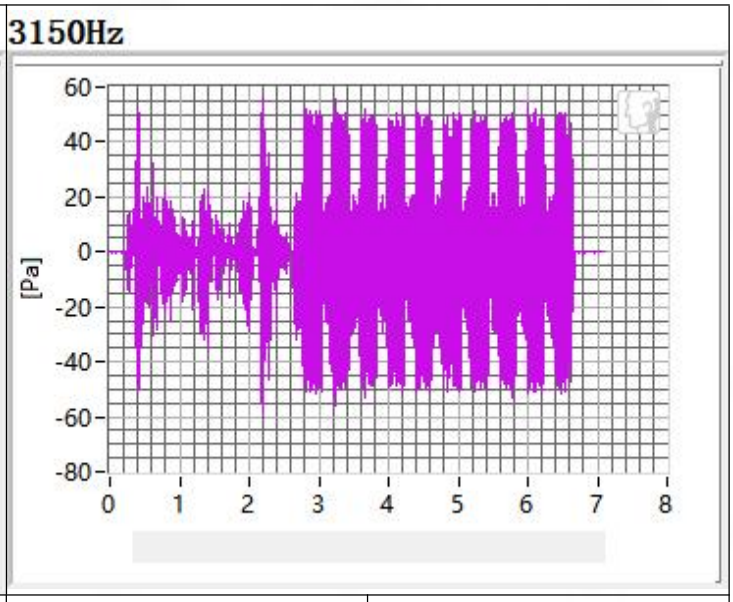
3. LTE band 5 in channel 20525

3.1 Receive Distortion and Noise 8N NB



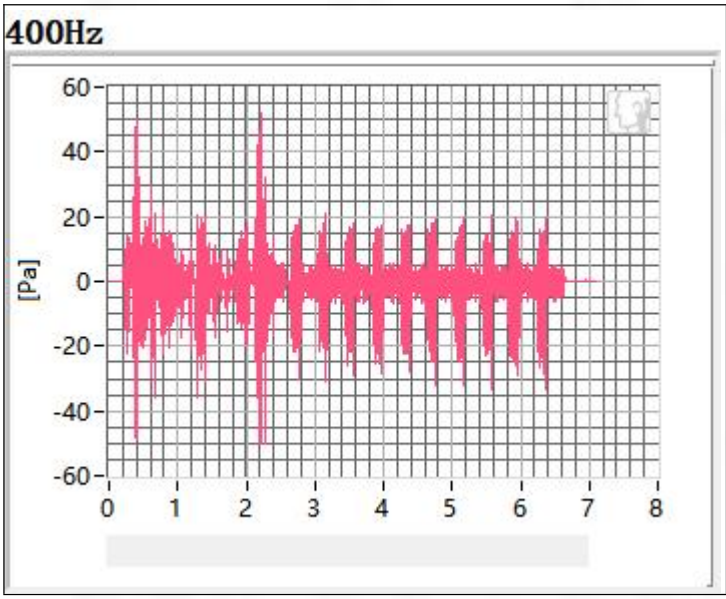

1000Hz
1250Hz
1600Hz
2000Hz
[Pa]
60
40
20
0
-20
-40
-60
80
0 1 2 3 4 5 6 7 8

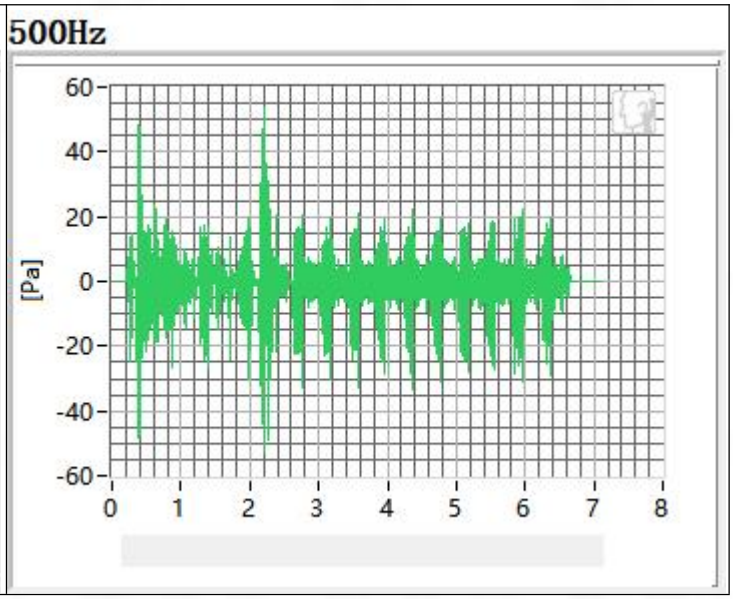




Frequency	SDNR	Frequency	SDNR
400Hz	24.00 dB	1250Hz	29.81 dB
500Hz	24.37 dB	1600Hz	28.27 dB
630Hz	27.90 dB	2000Hz	27.92 dB
800Hz	27.89 dB	2500Hz	23.44 dB
1000Hz	27.94 dB	3150Hz	22.39 dB
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 22.39 dB at 3150 Hz.			

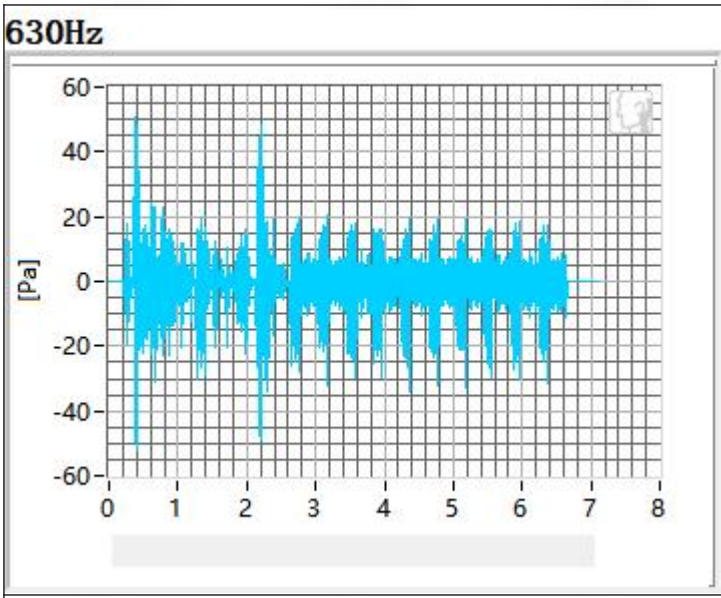
3.2 Receive Distortion and Noise 2N NB

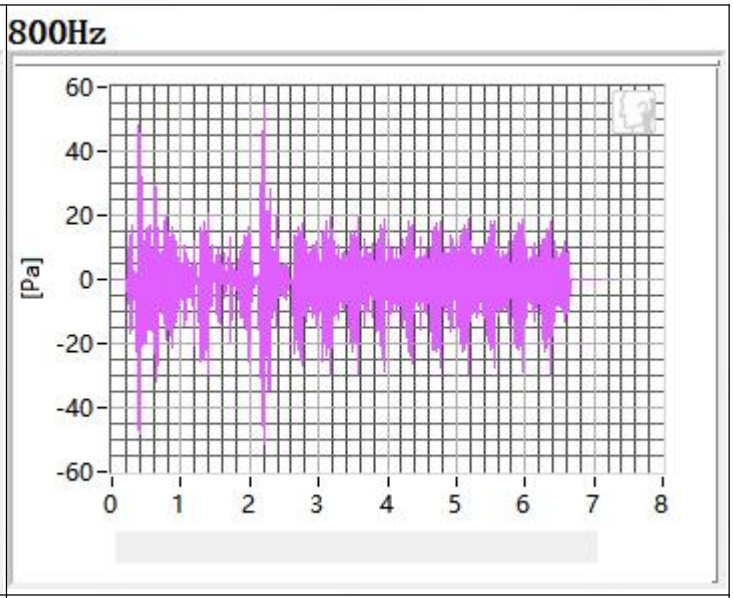


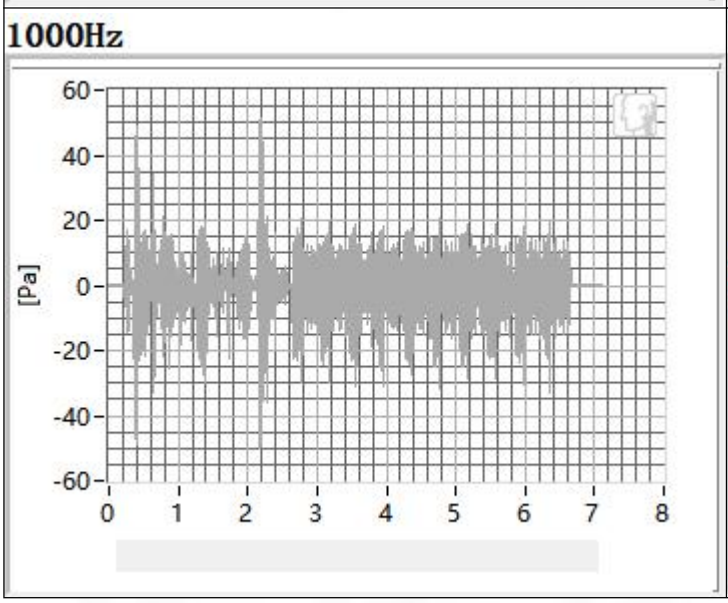


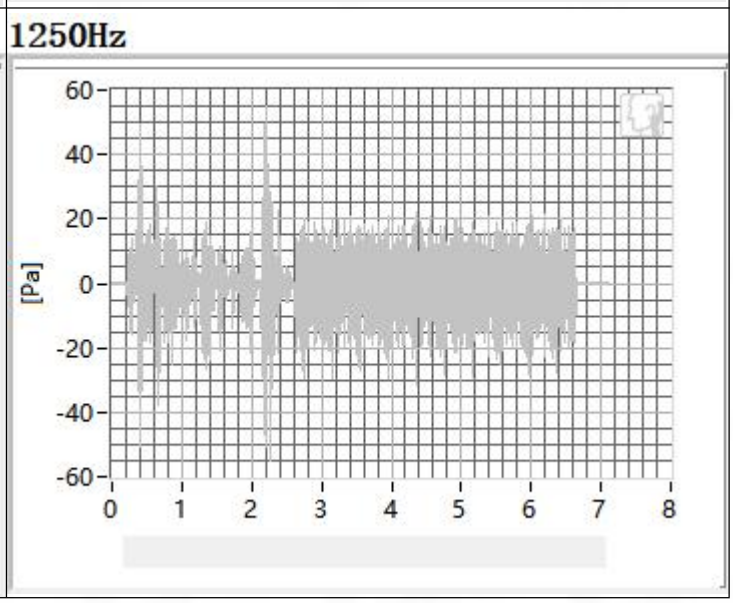
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China





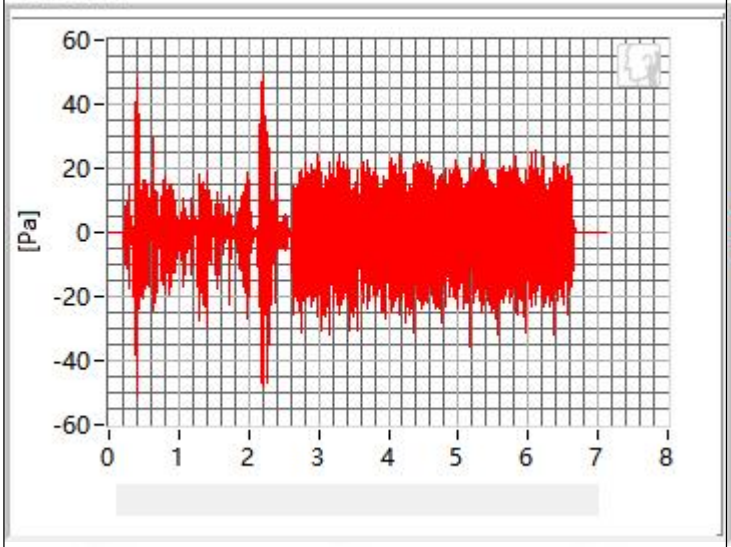




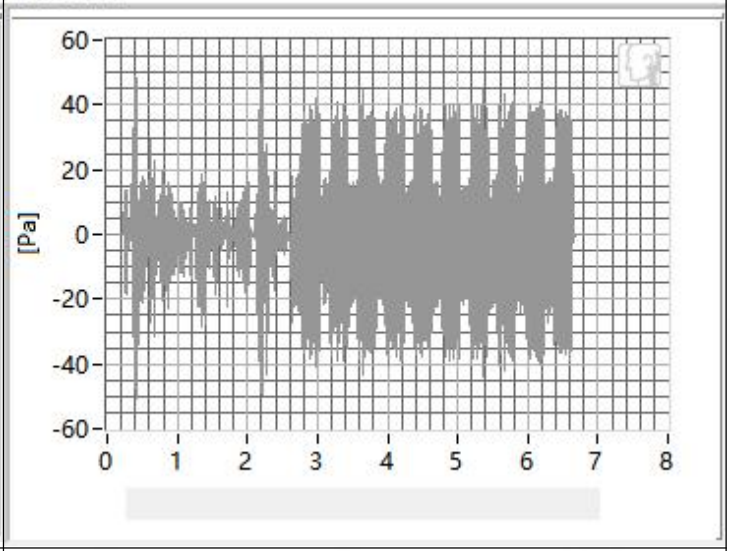
Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

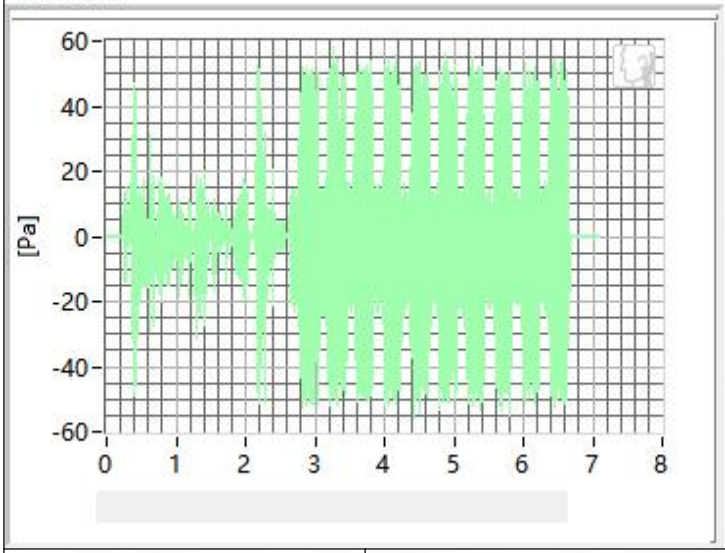
1600Hz



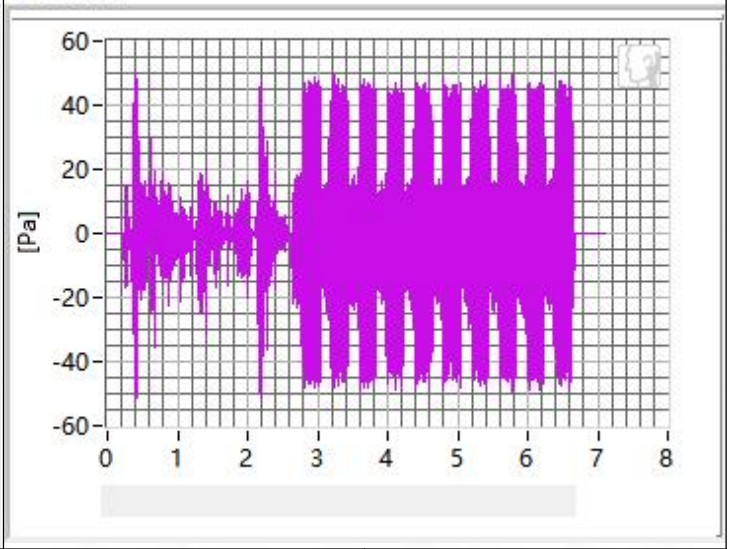
2000Hz



2500Hz



3150Hz



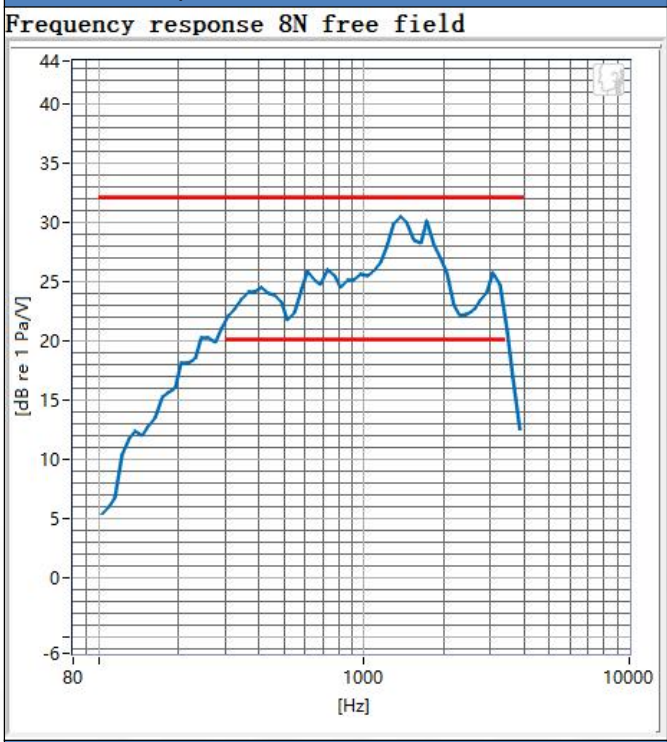
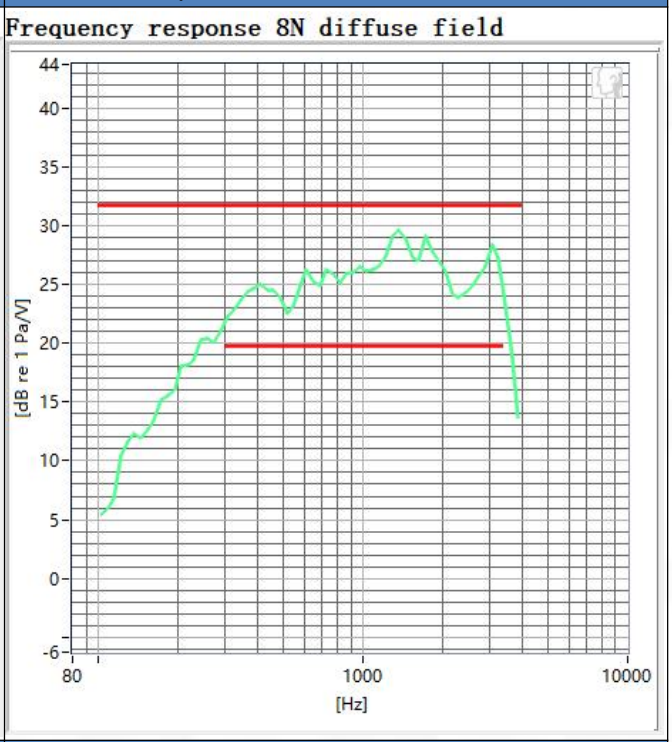
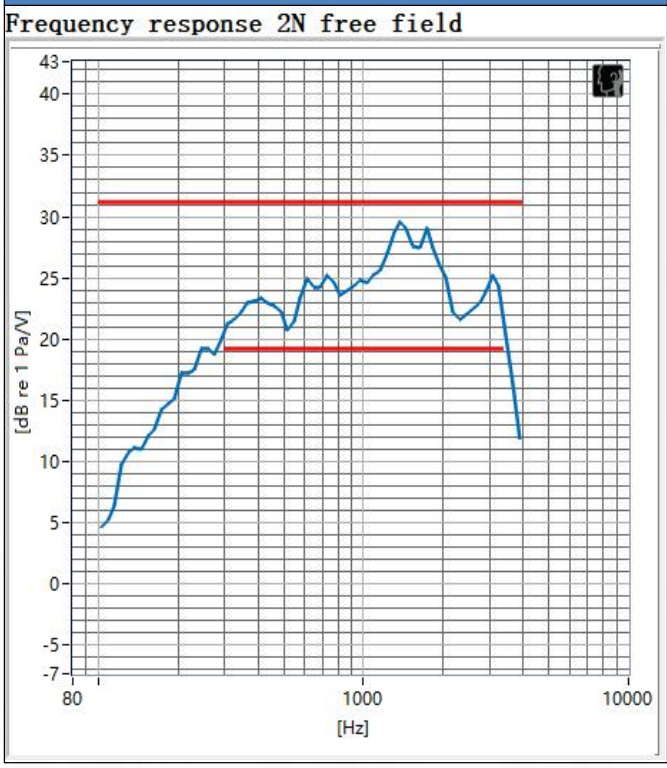
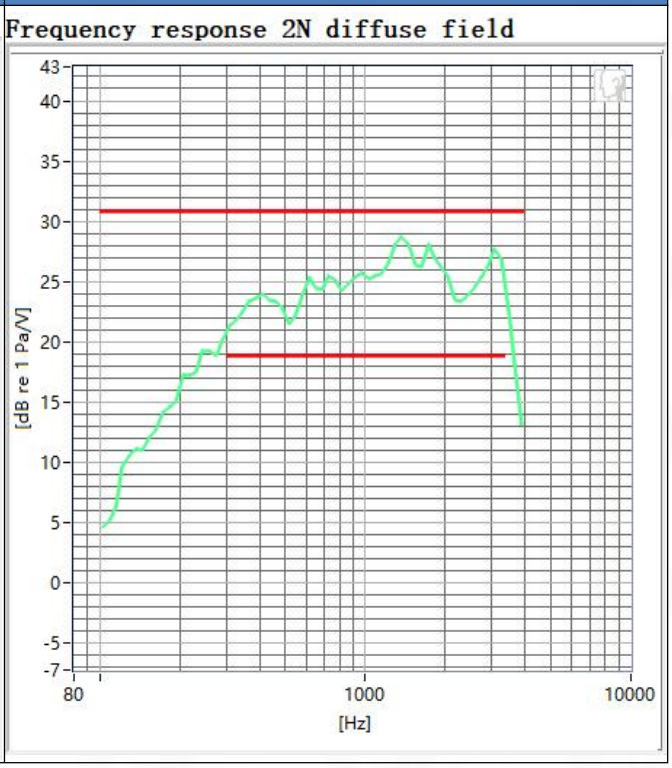
Frequency	SDNR	Frequency	SDNR
400Hz	24.46 dB	1250Hz	28.94 dB
500Hz	25.69 dB	1600Hz	28.07 dB
630Hz	26.88 dB	2000Hz	26.70 dB
800Hz	25.97 dB	2500Hz	22.87 dB
1000Hz	27.06 dB	3150Hz	22.47 dB

All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 22.47 dB at 3150Hz.

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

3.3 Receive Frequency Response

Receive Resp FF 8N	Receive Resp DF 8N
	
Receive Resp FF 2N	**Receive Resp DF 2N**
	

Total or partial reproduction of this document without permission of the Laboratory is not allowed.

BTF Testing Lab (Shenzhen) Co., Ltd.
101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

ANNEX B Test Setup Photo

Please refer the document “ANNEX B Test Setup Photo_VC.pdf”.

ANNEX C CALIBRATION REPORT

Please refer the document “CALIBRATION REPORT.pdf”.

BTF Testing Lab (Shenzhen) Co., Ltd.

101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

www.btf-lab.com

--END OF REPORT--

Total or partial reproduction of this document without permission of the Laboratory is not allowed.