

Volume Control Test Report

Report No.: 20241217G26473X-W3
Product: Smart Phone
Model No.: A55
FCC ID: 2AQRMA55
Brand Name: FOXX
Applicant: FOXX Development Inc.
Address: 3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA
Test date: 12/19/2024~12/22/2024
Issued Date: 12/30/2024
Issued by: CCIC Southern Testing Co., Ltd.
Lab Location: Electronic Testing Building, No.43, Shahe Road, Xili Street,
Nanshan District, Shenzhen, Guangdong, China
Tel: 86-755-26627338 **E-Mail:** manager@ccic-set.com



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Test Report

Product. : Smart Phone

Model No.: A55

Brand Name.....: FOXX

Applicant.....: FOXX Development Inc.

Applicant Address.....: 3480 Preston Ridge Road, Suite500, Alpharetta, GA 30005, USA

Test Standards.....: ANSI C63.19-2019 American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids
FCC 47CFR §20.19 American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids
ANSI/TIA-5050-2018 Telecommunications Communications Products Receive Volume Control Requirements for Wireless (Mobile) Devices

Test Result.....: Pass

Tested by: Carl Wei
Carl Wei , Test Engineer

Reviewed by.....: Sun Jiaohui
Sun Jiaohui, Senior Engineer

Approved by.....: Chris You
Chris You , RF Manager

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1. Administrative Data

1.1 Testing Laboratory

Test Site:	CCIC Southern Testing Co., Ltd.
Address:	Electronic Testing Building, No.43, Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China
A2LA Lab Code:	CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.
FCC Registration:	CCIC-SET Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until June 30, 2025.
ISED Registration:	CCIC-SET Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A, CAB Identifier: CN0064, valid time is until June 30, 2025.
Test Environment Condition:	Temperature (°C): 18 °C ~25 °C Relative Humidity (%): 35%~75% RH Atmospheric Pressure (kPa): 86KPa-106KPa

2. Equipment Under Test (EUT)

Identification of the Equipment under Test

Sample Name:	Smart Phone	
Model Name:	A55	
Brand Name:	FOXX	
General description:	Support Band	GSM850/1900, WCDMA B2/4/5 LTE B2/4/5/12/17/25/26/41/66/71 2.4G WIFI, Bluetooth,
	Test Band	GSM 850/1900 WCDMA Band 2/4/5 LTE B2/4/5/12/17/25/26/41/66/71
	Development Stage	Identical Prototype
	Accessories	Power Supply
	Antenna type	PIFA Antenna
	Operation mode	GSM Voice WCDMA Voice LTE Voice
	Modulation mode	GSM: GMSK, 8PSK WCDMA: QPSK LTE: QPSK, 16QAM 2.4GHz WIFI: DSSS, OFDM BT: GFSK/ π /4-DQPSK/8-DPSK

Note: these models only the model name is difference for market purpose

3. SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 20.19	Hearing aid-compatible mobile handsets.
2	ANSI C63.19:2019	American National Standard Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids
3	ANSI/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

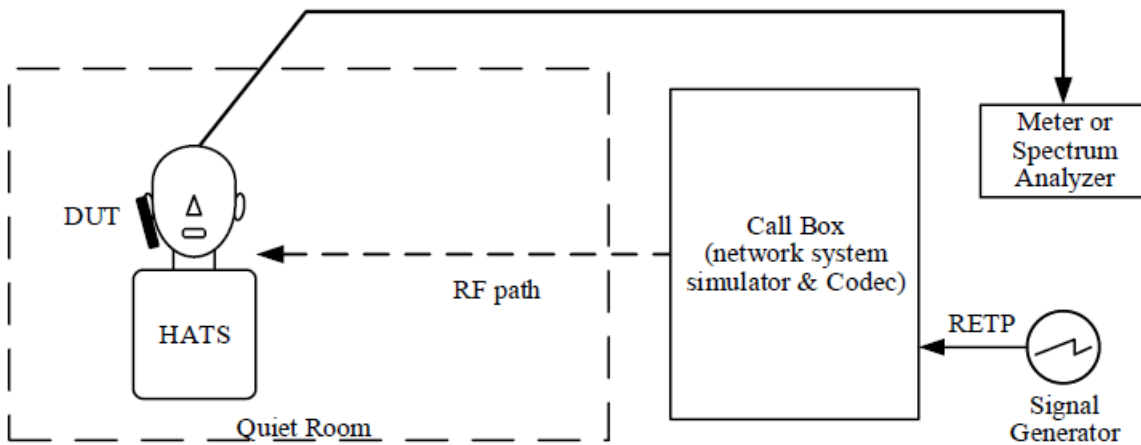
DT: Digital Transport Only

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

4. Measurement System

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.

5. Evaluation of Test

5.1 RECEIVE VOLUME CONTROL PERFORMANCE

5.1.1 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 ≥ 6 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.

5.1.2 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.

5.1.3 Test Result

Refer to test Annex C.

Remark: The report only reflects the test data plots of worst mode (for GSM 1900, WCDMA Band 4, LTE Band 4, 2.4G WIFI)

5.1.4 Test Conclusion

PASS.

5.2 RECEIVE DISTORTION AND NOISE PERFORMANCE

5.2.1 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. Wideband transmission mode: Each 1/3 octave band center frequency from 250 Hz to 5000 Hz.

5.2.2 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 C.
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 wideband 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 EqA-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.

5.2.3 Test Result

Refer to test Annex C.

Remark: The report only reflects the test data plots of worst mode (for GSM 1900, WCDMA Band 4, LTE Band 4, 2.4G WIFI)

5.2.4 Test Conclusion

PASS.

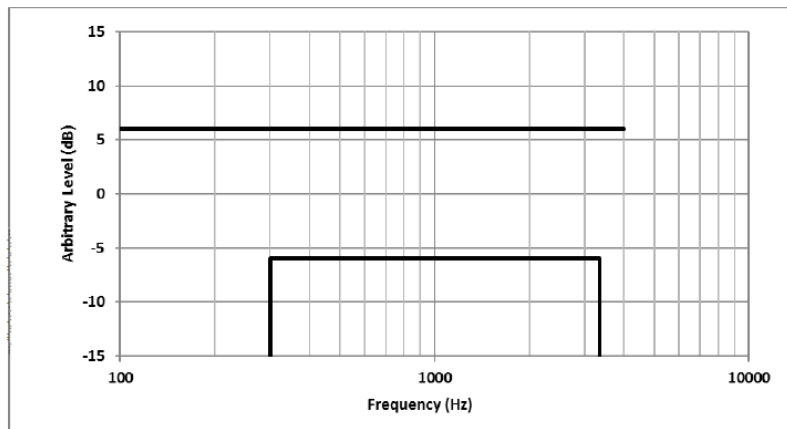
5.3 RECEIVE ACOUSTIC FREQUENCY RESPONSE PERFORMANCE

5.3.1 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

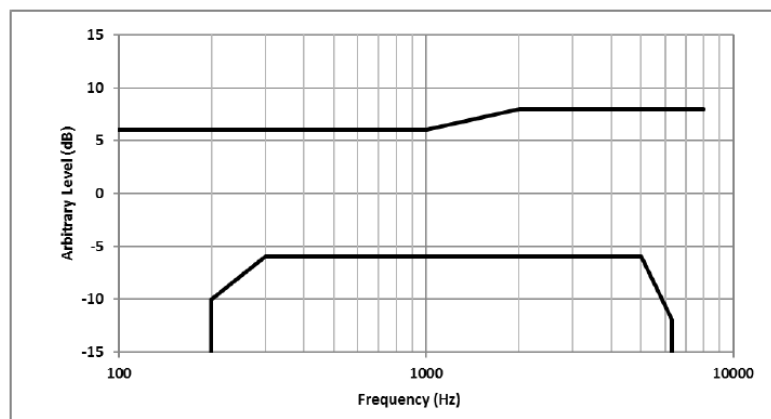
Lower Limit Frequency (Hz)	Lower Limit (dB)	Upper Limit Frequency (Hz)	Upper Limit (dB)
300	-6	100	+6
3400	-6	4000	+6



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



5.3.2 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.

5.3.3 Test Result

Refer to test Annex C.

Remark: The report only reflects the test data plots of worst mode (for GSM 1900, WCDMA Band 4, LTE Band 4, 2.4G WIFI)

5.3.4 Test Conclusion

PASS.

6. 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
VoLTE	Band 2/4/5/12/17/25/26/41/66/71	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85
VoWIFI	2.4G	AMR-NB	4.75/12.2
		AMR-WB	6.6/23.85

7. TEST RESULTS

7.1 Receive volume control, distortion and noise performance

Plot No.	frequency band	Channel /Freq.	BW	Code B B itrate	Vol ume Lev el	Codec Type	Codec Bandw idth	Mounting Force (N)	Freque ncy(H Z)	Min PN-S DNR(dB)	PN-S DNR (dB)	Signa l Qua lity (dB)	Conv ersati onal Gain	FCC CG Limit (dB)	CG Margi n (dB)	Verdict
1	GSM850	251	/	/	Max	EFR	NB	8N	3150	20.45	20.00	99.05	29.05	6.00	23.05	Pass
		/848.8MHz	/	/	Max	EFR	NB	2N	3150	20.78	20.00	98.23	28.23	6.00	22.23	
2	PCS1900	512	/	/	Max	EFR	NB	8N	3150	20.16	20.00	98.94	28.94	6.00	22.94	Pass
		/1850.2MHz	/	/	Max	EFR	NB	2N	3150	20.53	20.00	97.73	27.73	6.00	21.73	
3	WCDMA Band II	9262 /1952.4MHz	/	12.20	Max	AMR	NB	8N	3150	21.86	20.00	97.99	27.99	6.00	21.99	Pass
			/	12.20	Max	AMR	NB	2N	3150	21.62	20.00	97.28	27.28	6.00	21.28	
			/	23.85	Max	AMR	WB	8N	3150	22.14	20.00	98.12	28.12	6.00	22.12	
			/	23.85	Max	AMR	WB	2N	3150	21.88	20.00	98.42	28.42	6.00	22.42	
4	WCDMA Band IV	1413 /1732.6MHz	/	12.20	Max	AMR	NB	8N	3150	21.69	20.00	97.83	27.83	6.00	21.83	Pass
			/	12.20	Max	AMR	NB	2N	3150	21.46	20.00	97.02	27.02	6.00	21.02	
			/	23.85	Max	AMR	WB	8N	3150	22.05	20.00	97.96	27.96	6.00	21.96	
			/	23.85	Max	AMR	WB	2N	3150	21.63	20.00	97.25	27.25	6.00	21.25	
5	WCDMA Band V	4233 /846.6MHz	/	12.20	Max	AMR	NB	8N	3150	21.75	20.00	98.26	28.26	6.00	22.26	Pass
			/	12.20	Max	AMR	NB	2N	3150	21.69	20.00	97.77	27.77	6.00	21.77	
			/	23.85	Max	AMR	WB	8N	3150	22.28	20.00	98.45	28.45	6.00	22.45	
			/	23.85	Max	AMR	WB	2N	3150	21.98	20.00	98.39	28.39	6.00	22.39	
6	LTE FDD Band 2	18700 /1860.0MHz	20MHz _QPSK_1_0	12.20	Max	AMR	NB	8N	3150	20.68	20.00	96.68	26.68	6.00	20.68	Pass
				12.20	Max	AMR	NB	2N	3150	21.56	20.00	96.51	26.51	6.00	20.51	
				23.85	Max	AMR	WB	8N	3150	20.79	20.00	96.48	26.48	6.00	20.48	
				23.85	Max	AMR	WB	2N	3150	21.55	20.00	96.21	26.21	6.00	20.21	
7	LTE FDD Band 4	20300 /1745.0MHz	20MHz _QPSK_1_99	12.20	Max	AMR	NB	8N	3150	20.43	20.00	95.92	25.92	6.00	19.92	Pass
				12.20	Max	AMR	NB	2N	3150	21.21	20.00	95.81	25.81	6.00	19.81	
				23.85	Max	AMR	WB	8N	3150	20.59	20.00	96.14	26.14	6.00	20.14	
				23.85	Max	AMR	WB	2N	3150	21.37	20.00	95.98	25.98	6.00	19.98	
8	LTE FDD Band 5	20600 /844.0MHz	10MHz _QPSK_1_49	12.20	Max	AMR	NB	8N	3150	20.97	20.00	96.28	26.28	6.00	20.28	Pass
				12.20	Max	AMR	NB	2N	3150	21.66	20.00	96.01	26.01	6.00	20.01	
				23.85	Max	AMR	WB	8N	3150	21.11	20.00	96.40	26.40	6.00	20.40	
				23.85	Max	AMR	WB	2N	3150	21.85	20.00	96.27	26.27	6.00	20.27	
9	LTE FDD Band 12	23130 /711.0MHz	10MHz _QPSK_1_49	12.20	Max	AMR	NB	8N	3150	20.58	20.00	96.08	26.08	6.00	20.08	Pass
				12.20	Max	AMR	NB	2N	3150	21.36	20.00	96.01	26.01	6.00	20.01	
				23.85	Max	AMR	WB	8N	3150	20.72	20.00	96.38	26.38	6.00	20.38	
				23.85	Max	AMR	WB	2N	3150	21.54	20.00	96.25	26.25	6.00	20.25	
10	LTE FDD Band 17	23800 /711.0MHz	10MHz _QPSK_1_49	12.20	Max	AMR	NB	8N	3150	20.49	20.00	96.49	26.49	6.00	20.49	Pass
				12.20	Max	AMR	NB	2N	1250	21.30	20.00	96.32	26.32	6.00	20.32	
				23.85	Max	AMR	WB	8N	3150	20.58	20.00	96.58	26.58	6.00	20.58	
				23.85	Max	AMR	WB	2N	1000	21.42	20.00	96.44	26.44	6.00	20.44	

Plot No.	frequency band	Channel /Freq.	BW	Code B B itrate	Vol ume Lev el	Codec Type	Codec Bandw idth	Mounting Force (N)	Freque ncy(H Z)	Min PN-S DNR(dB)	PN-S DNR Limb (dB)	Signa l Qua lity (dB)	Conv ersati onal Gain	FCC CG Limit (dB)	CG Margi n (dB)	Verdict
11	LTE FDD Band 25	26590 /1905.0MHz	20MHz _QPSK_1_99	12.20	Max	AMR	NB	8N	3150	20.64	20.00	96.75	26.75	6.00	20.75	Pass
				12.20	Max	AMR	NB	2N	3150	21.63	20.00	96.64	26.64	6.00	20.64	
				23.85	Max	AMR	WB	8N	3150	20.78	20.00	96.89	26.89	6.00	20.89	
				23.85	Max	AMR	WB	2N	3150	21.85	20.00	96.77	26.77	6.00	20.77	
12	LTE FDD Band 26 Part 90	26740 /819.0MHz	10MHz _QPSK_1_0	12.20	Max	AMR	NB	8N	3150	20.54	20.00	96.28	26.28	6.00	20.28	Pass
				12.20	Max	AMR	NB	2N	3150	21.52	20.00	96.03	26.03	6.00	20.03	
				23.85	Max	AMR	WB	8N	3150	20.58	20.00	96.50	26.50	6.00	20.50	
				23.85	Max	AMR	WB	2N	3150	21.59	20.00	96.45	26.45	6.00	20.45	
13	LTE FDD Band 26 part 22	26915 /836.5MHz	15MHz _QPSK_1_74	12.20	Max	AMR	NB	8N	3150	20.58	20.00	96.35	26.35	6.00	20.35	Pass
				12.20	Max	AMR	NB	2N	3150	21.49	20.00	96.22	26.22	6.00	20.22	
				23.85	Max	AMR	WB	8N	3150	20.61	20.00	96.69	26.69	6.00	20.69	
				23.85	Max	AMR	WB	2N	3150	21.56	20.00	96.56	26.56	6.00	20.56	
14	LTE TDD Band 41	41490 /2680.0MHz	20MHz_QPS K_1_99	12.20	Max	AMR	NB	8N	3150	20.47	20.00	96.08	26.08	6.00	20.08	Pass
				12.20	Max	AMR	NB	2N	3150	21.28	20.00	95.85	25.85	6.00	19.85	
				23.85	Max	AMR	WB	8N	3150	20.53	20.00	96.17	26.17	6.00	20.17	
				23.85	Max	AMR	WB	2N	3150	21.37	20.00	95.92	25.92	6.00	19.92	
15	LTE FDD Band 66	132322 /1745.0MHz	20MHz _QPSK_1_99	12.20	Max	AMR	NB	8N	3150	20.78	20.00	96.15	26.15	6.00	20.15	Pass
				12.20	Max	AMR	NB	2N	3150	21.76	20.00	95.99	25.99	6.00	19.99	
				23.85	Max	AMR	WB	8N	3150	20.95	20.00	96.28	26.28	6.00	20.28	
				23.85	Max	AMR	WB	2N	3150	21.82	20.00	96.03	26.03	6.00	20.03	
16	LTE FDD Band 71	133322 /683.0MHz	20MHz _QPSK_1_99	12.20	Max	AMR	NB	8N	3150	20.66	20.00	96.34	26.34	6.00	20.34	Pass
				12.20	Max	AMR	NB	2N	3150	21.60	20.00	96.17	26.17	6.00	20.17	
				23.85	Max	AMR	WB	8N	3150	20.78	20.00	96.49	26.49	6.00	20.49	
				23.85	Max	AMR	WB	2N	3150	21.79	20.00	96.31	26.31	6.00	20.31	
17	2.4G WIFI 802.11b	1 /2412.0MHz	/	12.20	Max	AMR	NB	8N	3150	20.05	20.00	97.32	27.32	6.00	21.32	Pass
				12.20	Max	AMR	NB	2N	3150	20.15	20.00	96.85	26.85	6.00	20.85	
				23.85	Max	AMR	WB	8N	3150	20.22	20.00	97.62	27.62	6.00	21.62	
				23.85	Max	AMR	WB	2N	3150	20.37	20.00	97.14	27.14	6.00	21.14	

7.2 Receive volume control, distortion and noise performance

Plot No	frequency band	Channel /Freq	BW/	Volume Level	Codec Type	Codec Bandwidth	Mounting Force (N)	RFR
								Test Result
1	GSM 850	251 /848.8MHz	/	Max	EFR	NB	2N	Pass
				Max	EFR	NB	8N	
2	PCS 1900	512 /1850.2MHz	/	Max	EFR	NB	2N	Pass
				Max	EFR	NB	8N	
3	WCDMA Band II	9262 /1952.4MHz	/	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
4	WCDMA Band IV	1413 /1732.6MHz	/	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
5	WCDMA Band V	4233 /846.6MHz	/	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_99	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
8	LTE FDD Band 5	20600 /844.0MHz	10MHz _QPSK_1_49	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
9	LTE FDD Band 12	23130 /711.0MHz	10MHz _QPSK_1_49	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_49	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	

Plot No	frequency band	Channel /Freq	BW/	Volume Level	Codec Type	Codec Bandwidth	Mounting Force (N)	RFR
								Test Result
11	LTE FDD Band 25	26590 /1905.0MHz	20MHz _QPSK_1_99	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
12	LTE FDD Band 26 part90	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_74	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
14	LTE TDD Band 41	41490 /2680.0MHz	20MHz _QPSK_1_99	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
15	LTE FDD Band 66	132322 /1745.0MHz	20MHz _QPSK_1_99	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
16	LTE FDD Band 71	133322 /683.0MHz	20MH z_QPSK_1_99	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	
17	2.4G WIFI 802.11b	1/2412.0MHz	/	Max	AMR	NB	2N	Pass
				Max	AMR	NB	8N	
				Max	AMR	WB	2N	
				Max	AMR	WB	8N	

8. Measurement Uncertainty

UNCERTAINTY EVALUATION FOR AUDIO HAC MEASUREMENT					
Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Uncertainty (dB)	Uncertainty (%)
Measurement System					
RF reflections	0.1	R	$\sqrt{3}$	0.06	
Acoustic noise	0.1	R	$\sqrt{3}$	0.06	
Probe coil sensitivity	0.49	R	$\sqrt{3}$	0.28	
Reference signal level	0.25	R	$\sqrt{3}$	0.14	
Positioning accuracy	0.4	R	$\sqrt{3}$	0.23	
Cable loss	0.1	N	2	0.05	
Frequency analyzer	0.15	R	$\sqrt{3}$	0.09	
System repeatability	0.2	N	1	0.20	
Repeatability of the WD	0.4	N	1	0.40	
Combined Standard Uncertainty		N	1	0.61	
Expanded uncertainty (confidence level of 95%,k = 2)		N	K=2	1.22	15.05
REPORTED Expanded uncertainty (confidence level of 95%, k = 2)		N	K=2	1.20	15.00

9. MAIN TEST INSTRUMENTS

No.	EQUIPMENT	Manufacture	Model	Series No.	Due Date
1	Acoustic and vibration analyzer	B&K	3560-C	2612040	2025/08/24
2	Sound Amplifier	B&K	Type-2690-030	2673666	2025/01/30
3	Head and Torso Simulator	B&K	Type 4128C	3107080	2025/01/30
4	Wireless Communication Tester	R&S	CMW500	148888	2025/03/26

Note: Sound Amplifier, Head and Torso Simulator is loaned from BTF TESTING LAB (SHENZHEN) CO., LTD, due to our CCIC-SET's equipment out of the Calibration cycle.

10. Volume Control Verification Test Results

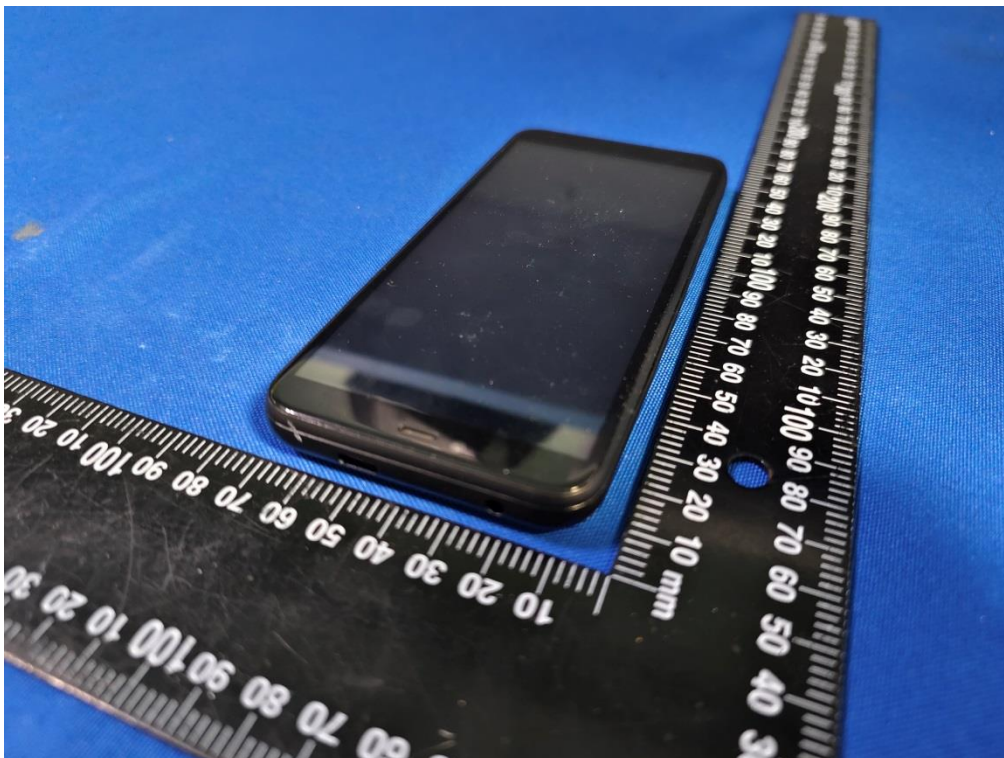
Date of Testing	Test Location	Air Interface Equipment	Acoustical Calibrator	HATS Sens.(dB)	Ambient Noise(dBA)
12/19/2024	Whisper 1	CMW 500	Type 4182C	97.35	32.69
12/19/2024	Whisper 1	CMW 500	Type 4182C	97.37	32.42
12/19/2024	Whisper 1	CMW 500	Type 4182C	97.41	32.65

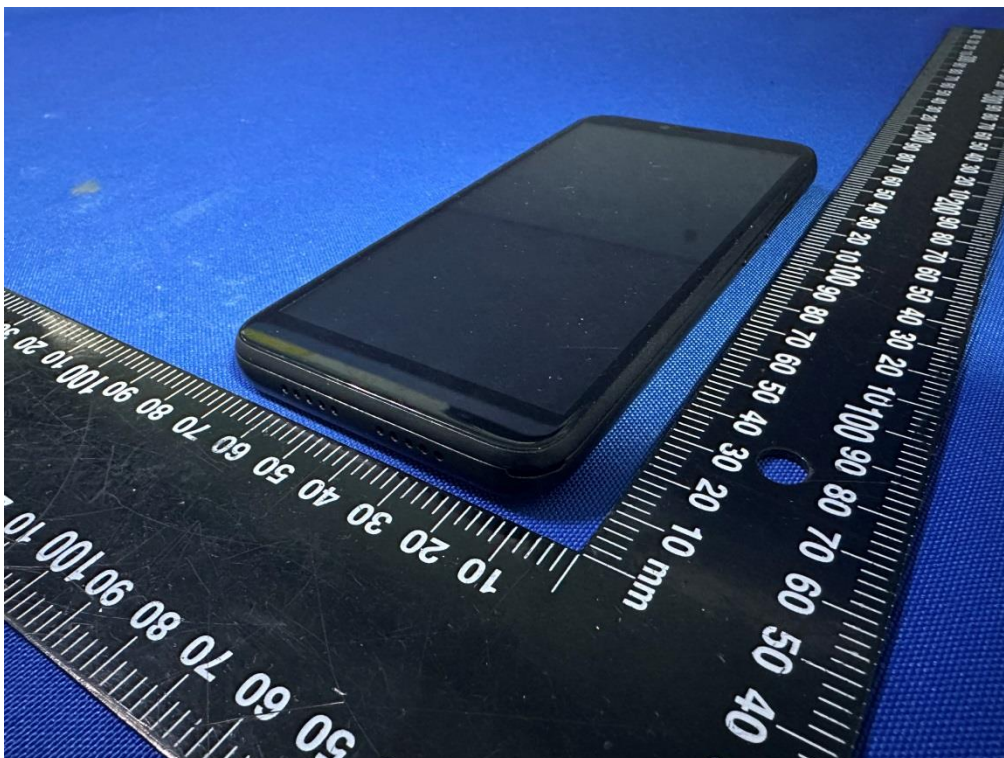
11. ANNEX A SYSTEM SETUP



Fig.1 Testing Photo

12. ANNEX B EUT PHOTO



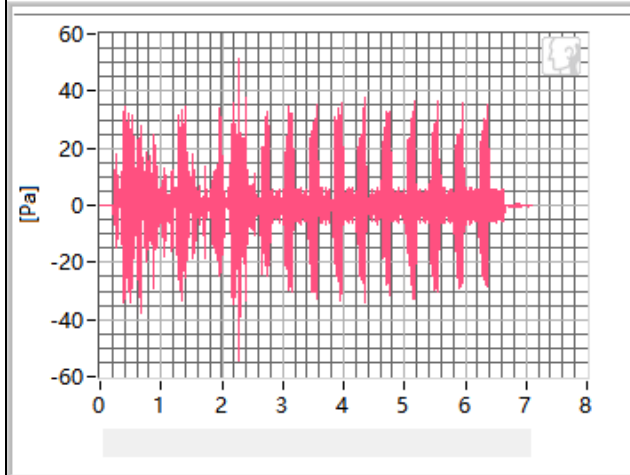


13. ANNEX C TEST PLOTS

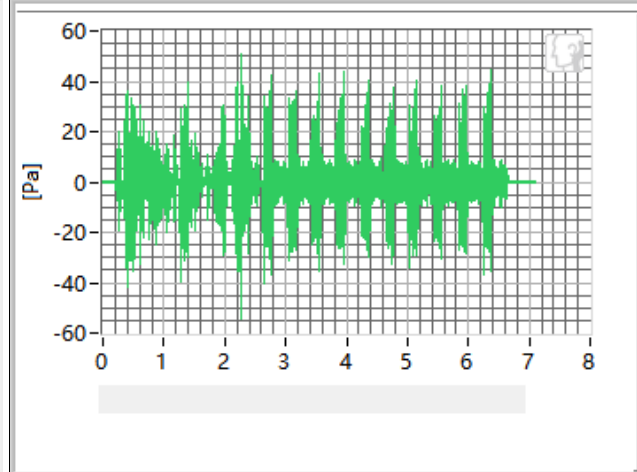
13.1 GSM 1900 in channel 512

13.1.1 Receive Distortion and Noise 8N NB

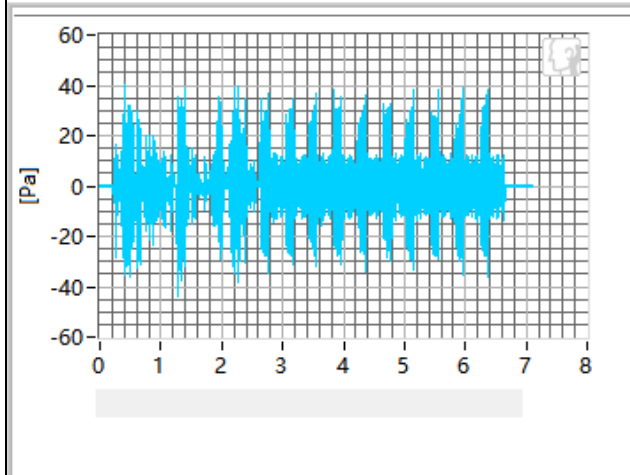
400Hz



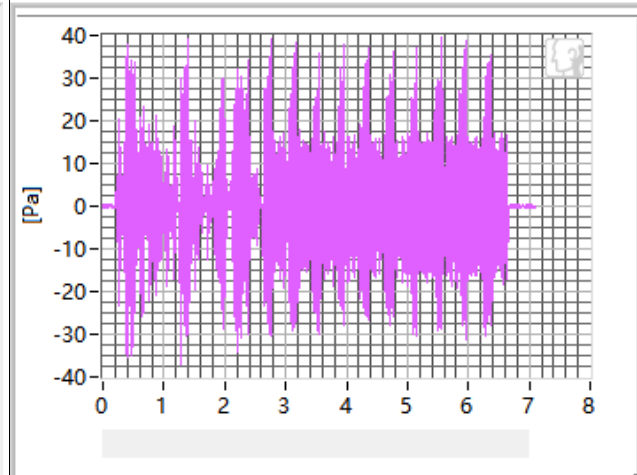
500Hz



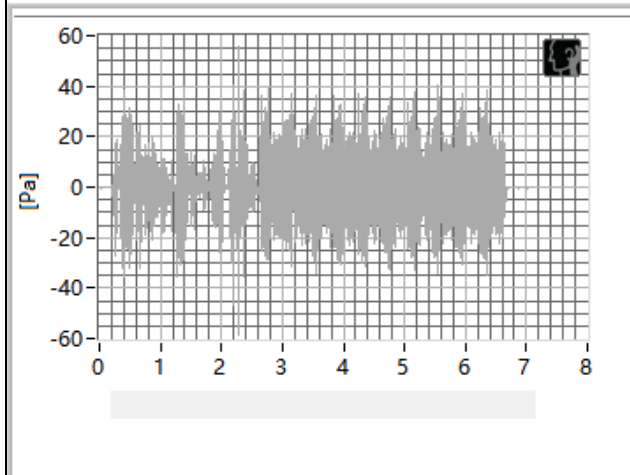
630Hz



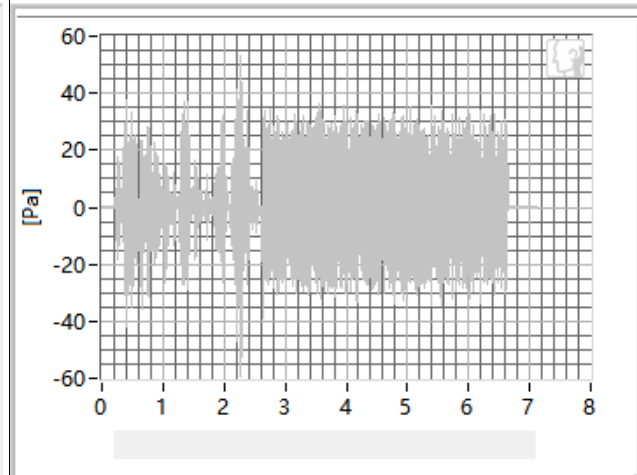
800Hz

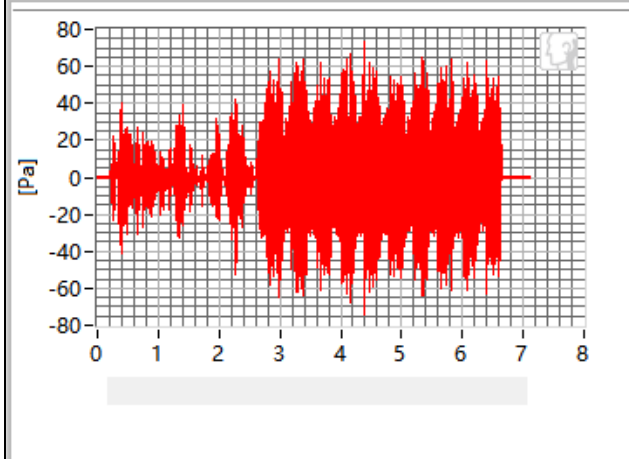
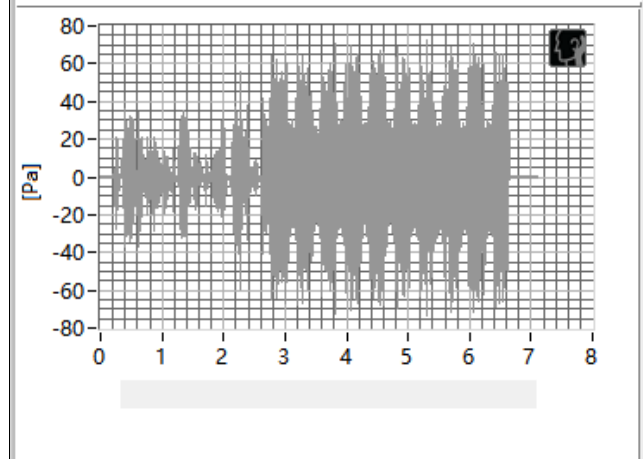
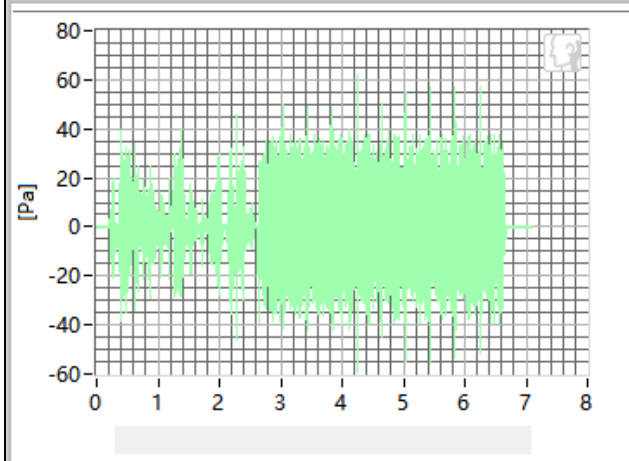
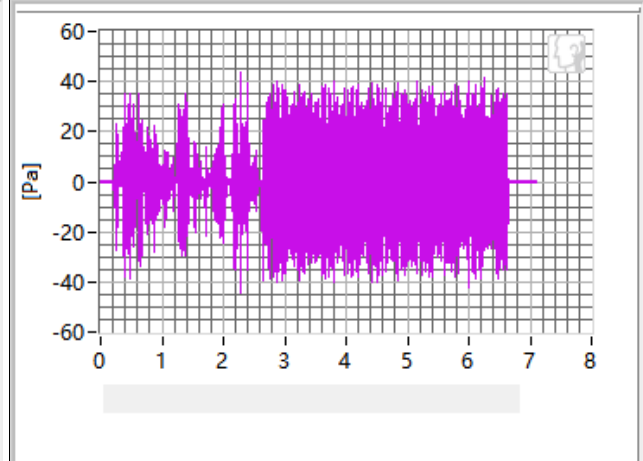


1000Hz



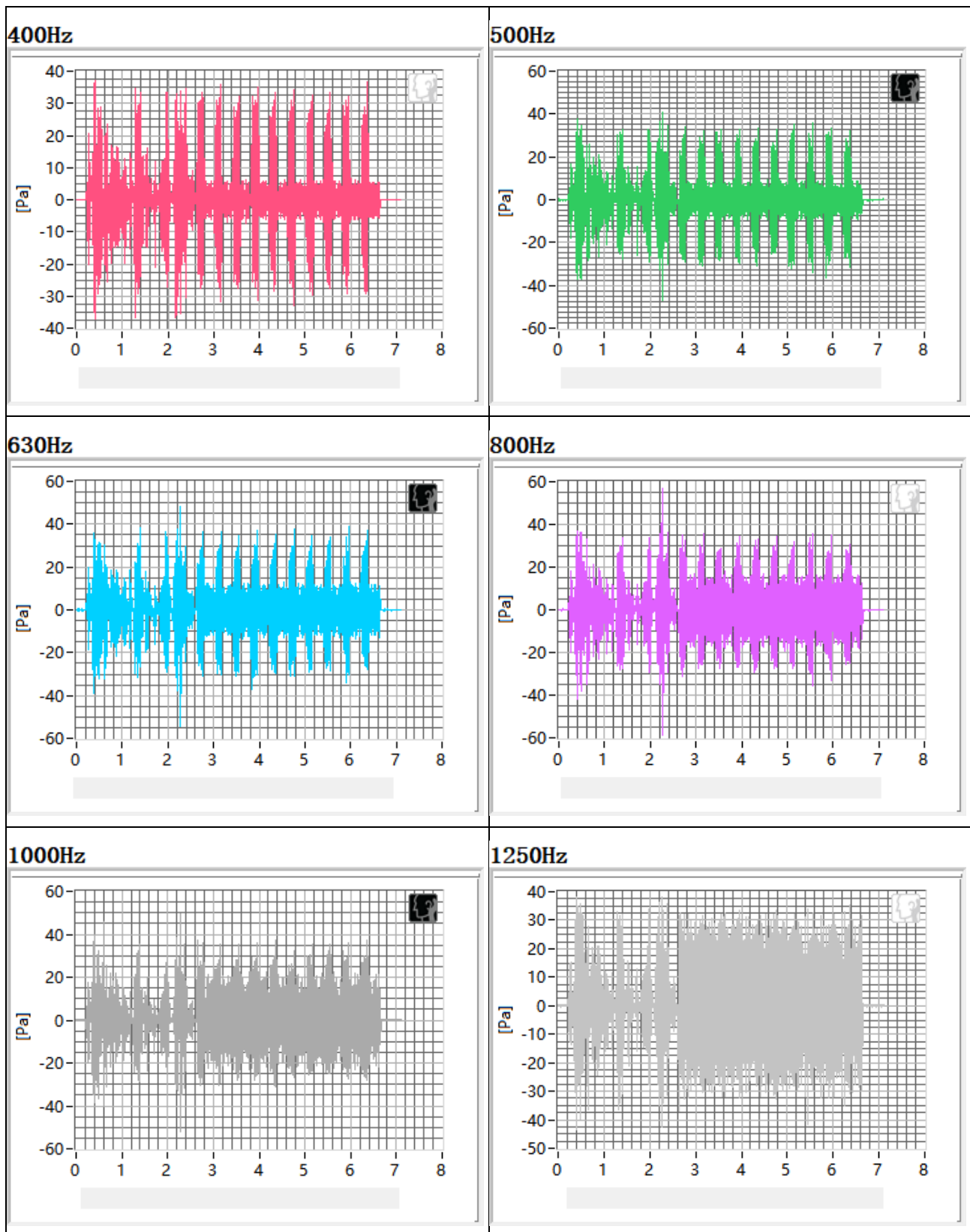
1250Hz

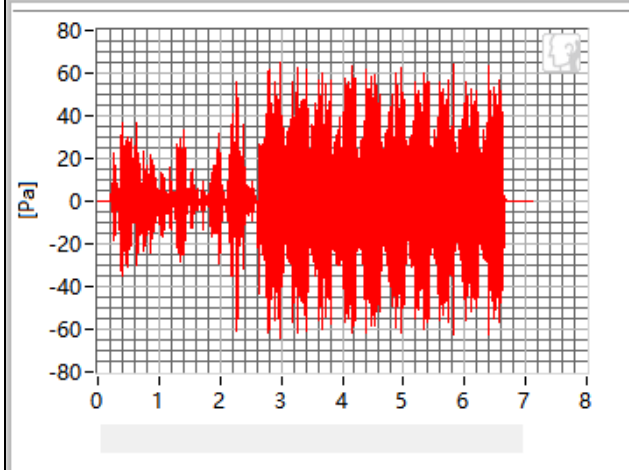
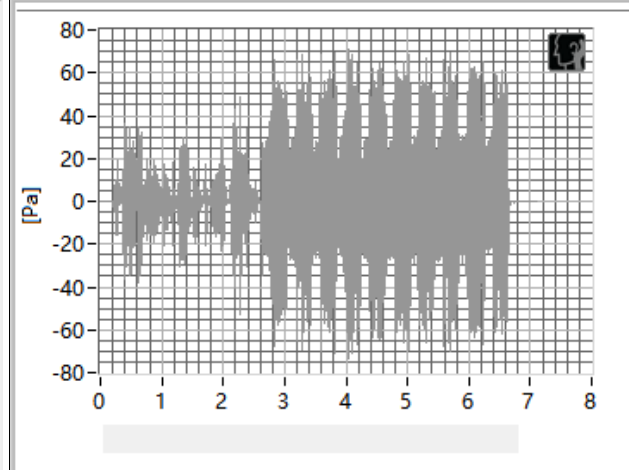
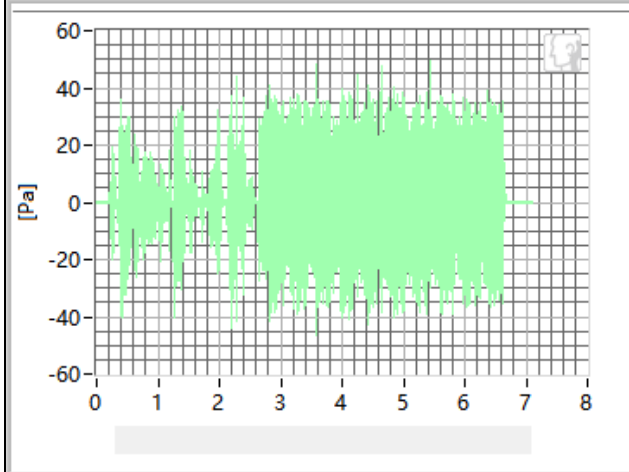
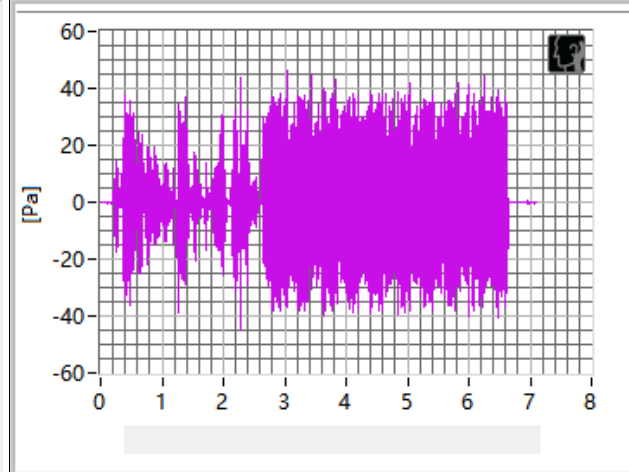


1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	25.55 dB	1250Hz	23.60 dB
500Hz	24.55 dB	1600Hz	24.64 dB
630Hz	24.94 dB	2000Hz	22.32 dB
800Hz	23.25 dB	2500Hz	21.19 dB
1000Hz	23.56 dB	3150Hz	20.16 dB

All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 20.16dB at 3150Hz.

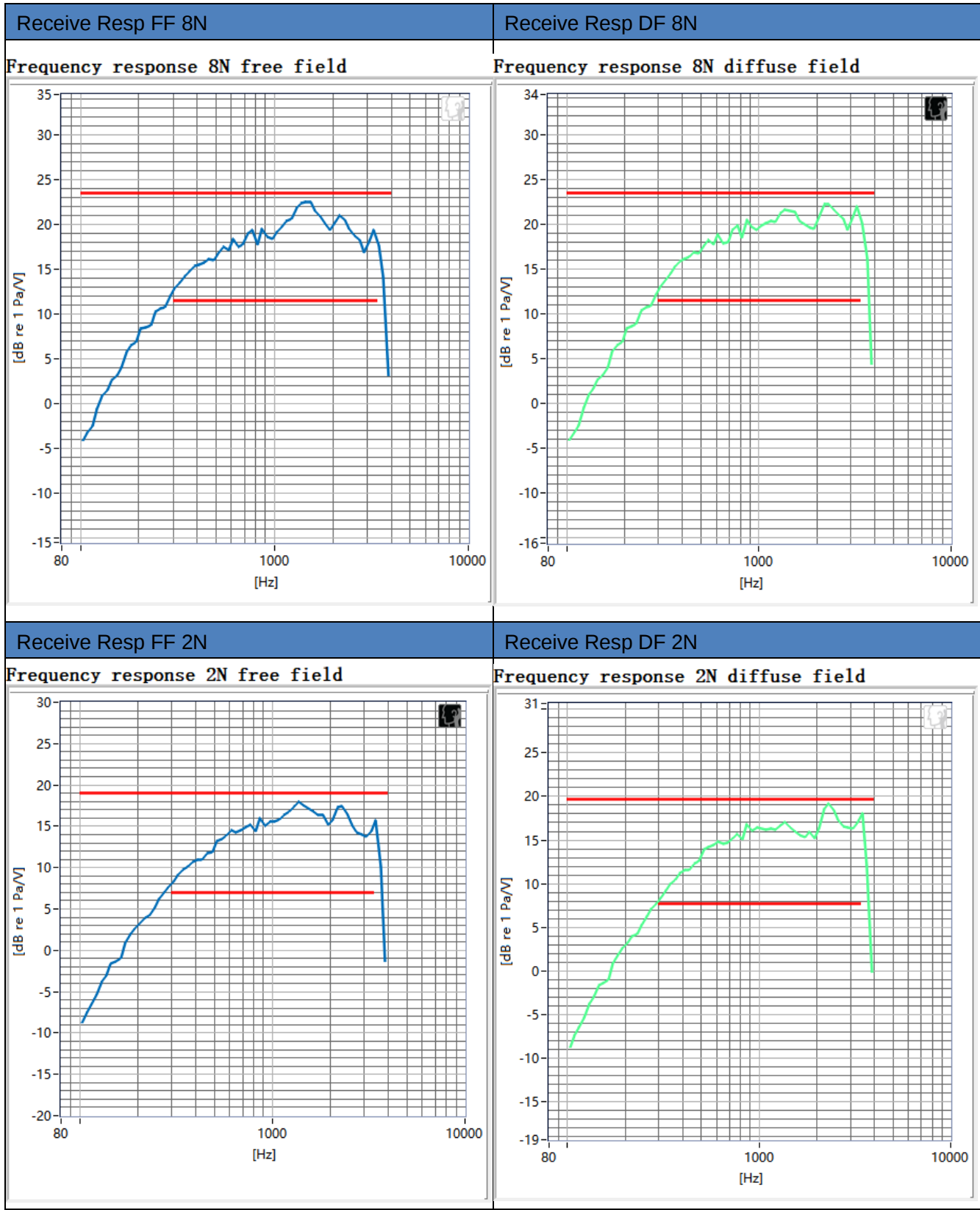
13.1.2 Receive Distortion and Noise 2N NB

1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	26.96 dB	1250Hz	25.45 dB
500Hz	25.62 dB	1600Hz	25.86 dB
630Hz	24.90 dB	2000Hz	23.48 dB
800Hz	24.18 dB	2500Hz	22.66 dB
1000Hz	23.11 dB	3150Hz	20.53 dB

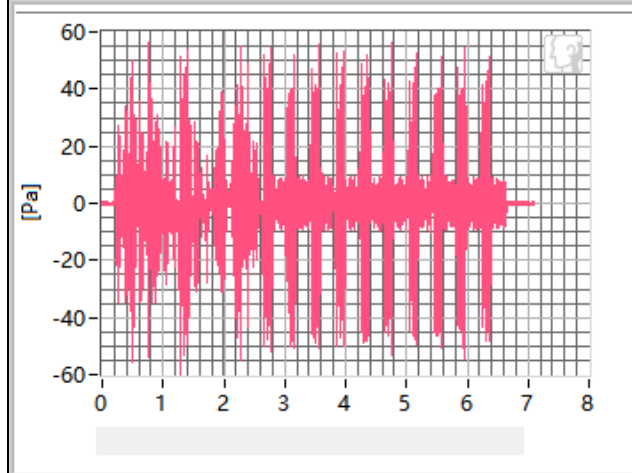
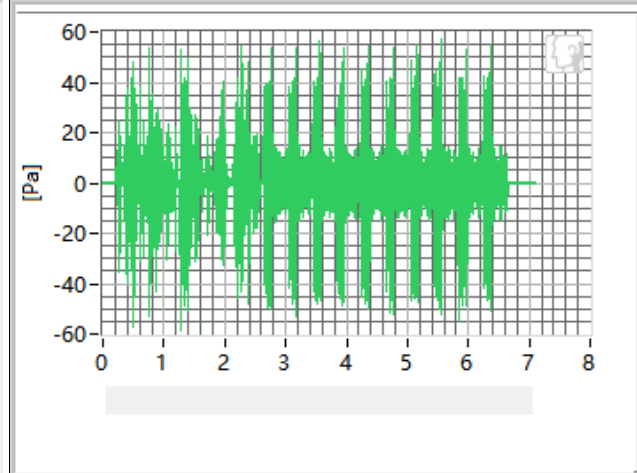
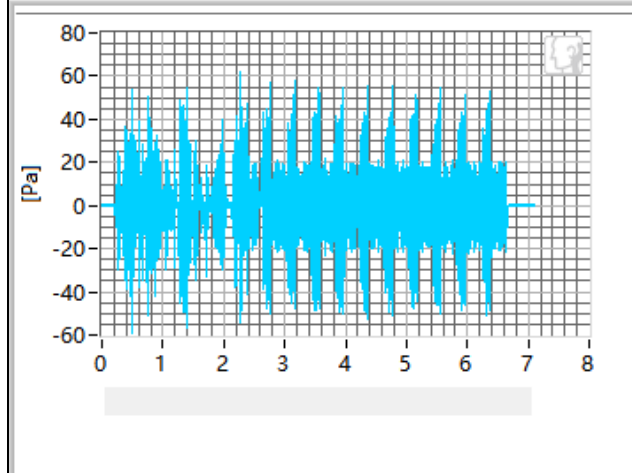
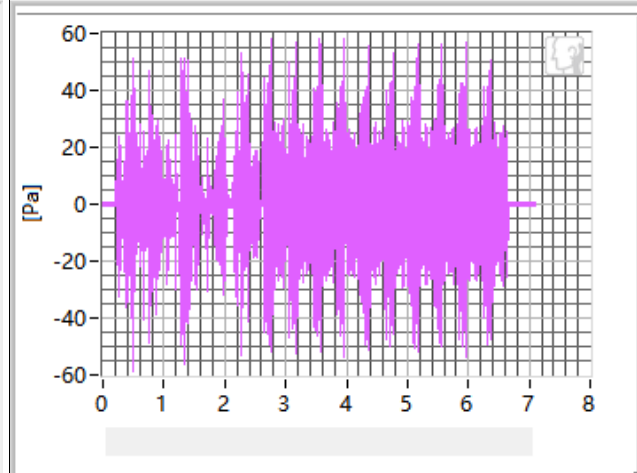
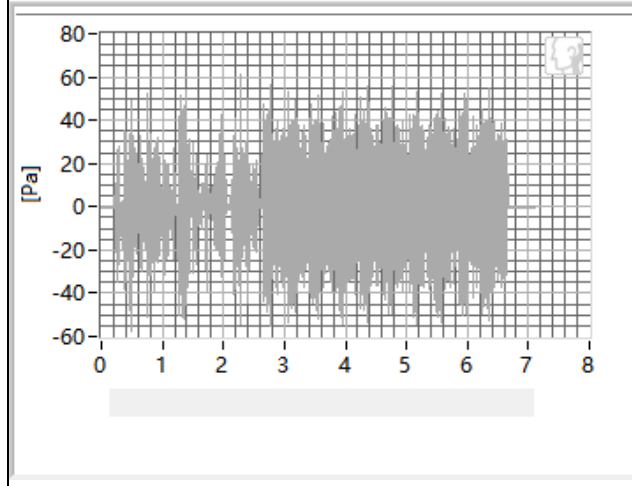
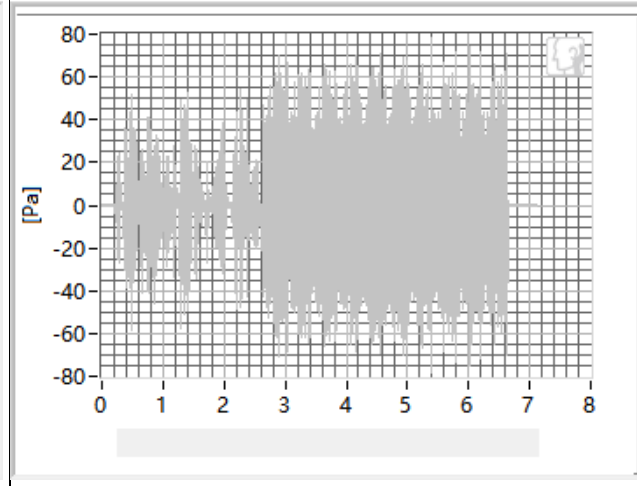
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 20.53dB at 3150Hz.

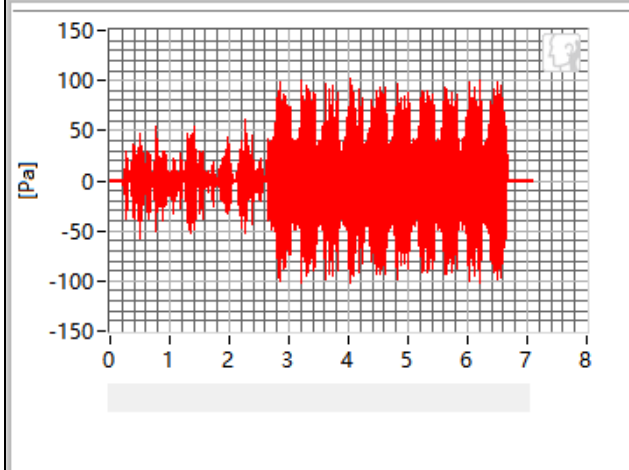
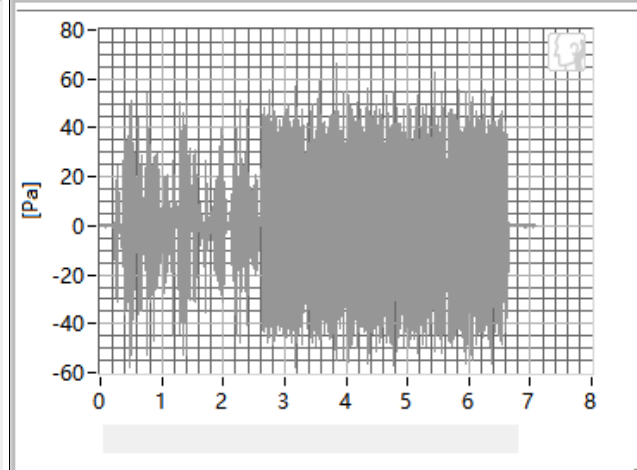
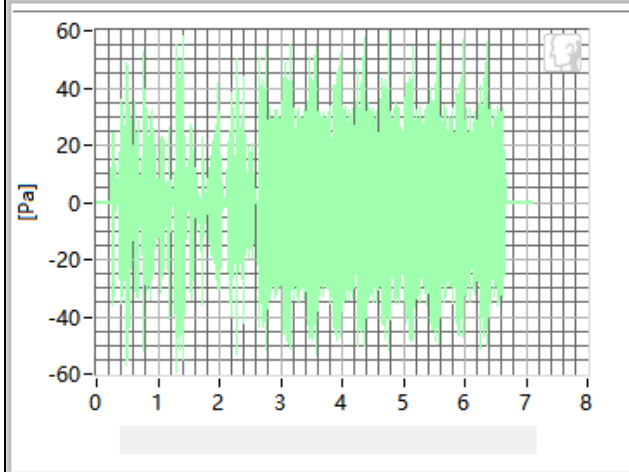
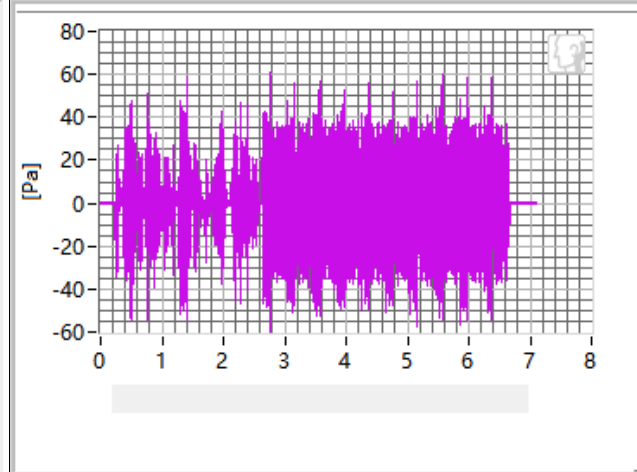
13.1.3Receive Frequency Response



13.2 WCDMA band 4 in channel 1413

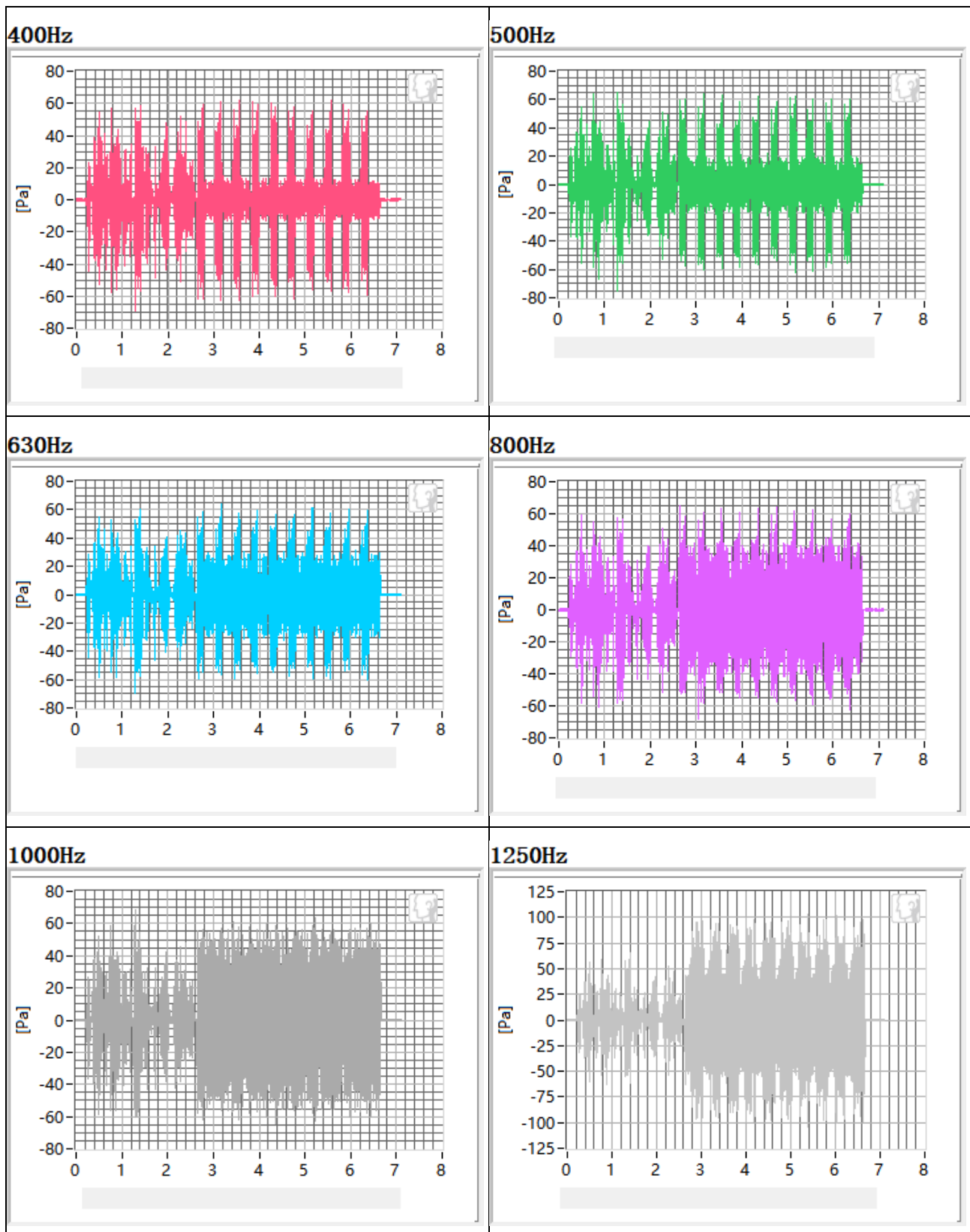
13.2.1 Receive Distortion and Noise 8N NB

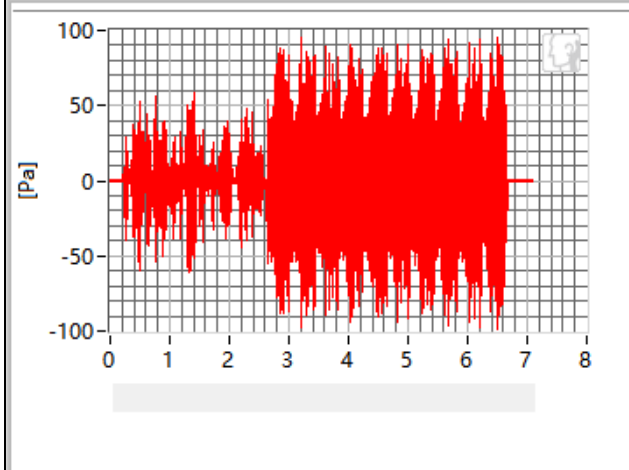
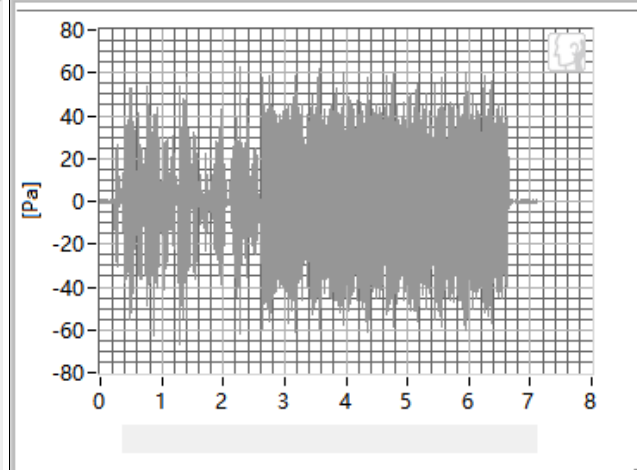
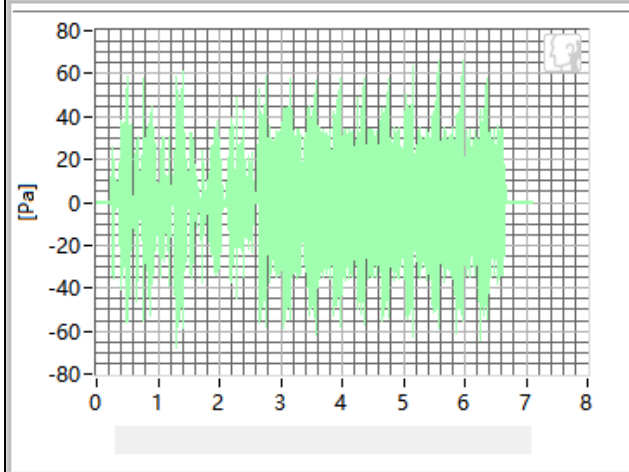
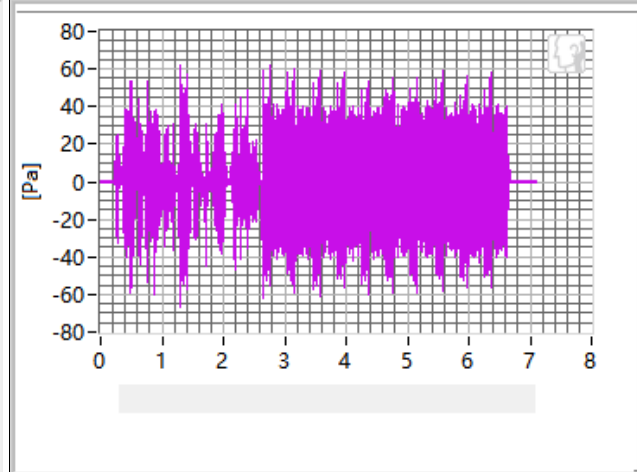
400Hz**500Hz****630Hz****800Hz****1000Hz****1250Hz**

1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	28.83 dB	1250Hz	25.90 dB
500Hz	27.81 dB	1600Hz	25.99 dB
630Hz	25.56 dB	2000Hz	23.39 dB
800Hz	23.76 dB	2500Hz	23.75 dB
1000Hz	22.83 dB	3150Hz	21.69 dB

All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 21.69 dB at 3150Hz.

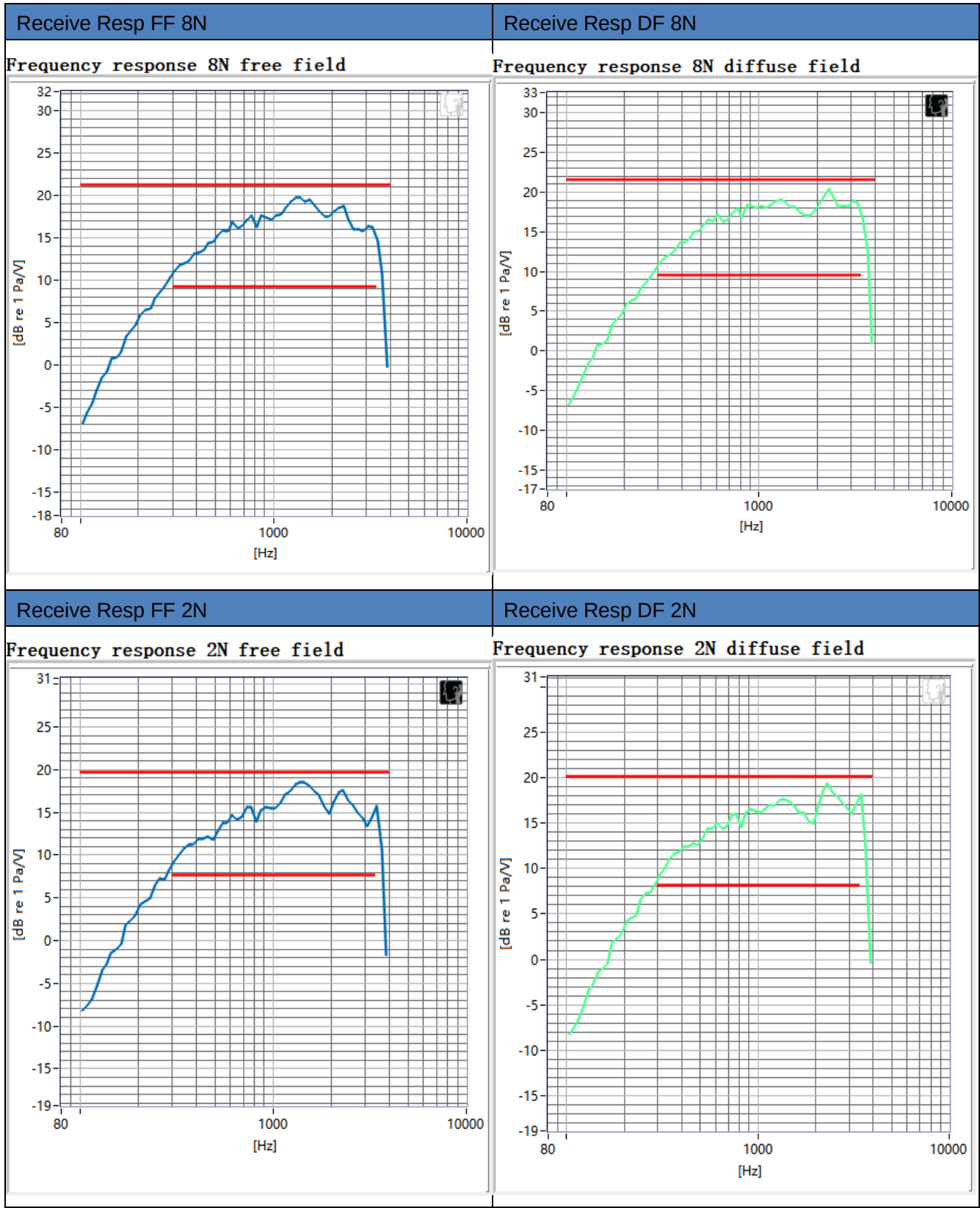
13.2.2 Receive Distortion and Noise 2N NB

1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	29.00 dB	1250Hz	25.38 dB
500Hz	27.11 dB	1600Hz	26.04 dB
630Hz	26.77 dB	2000Hz	24.23 dB
800Hz	22.82 dB	2500Hz	22.75 dB
1000Hz	24.77 dB	3150Hz	21.46 dB

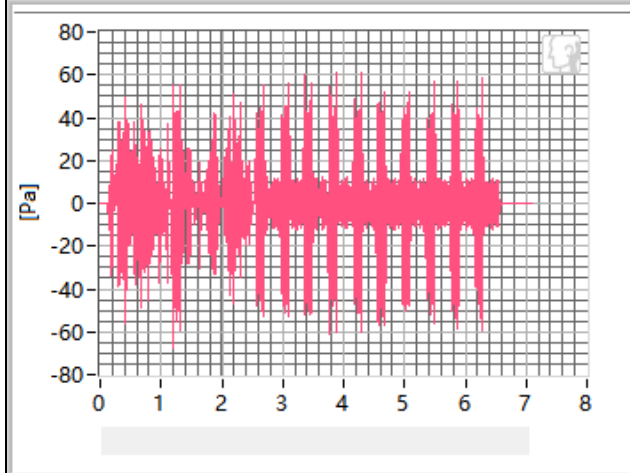
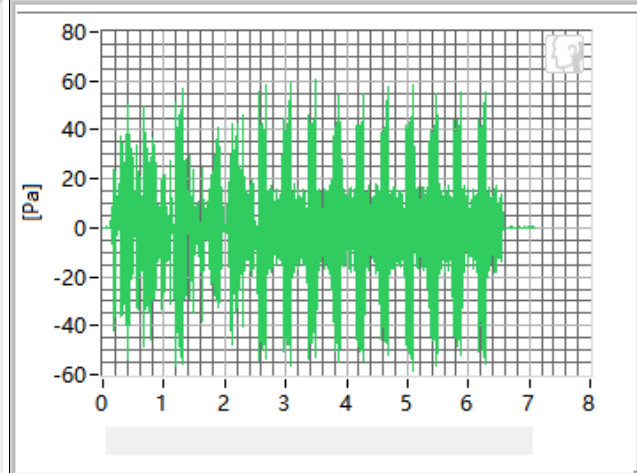
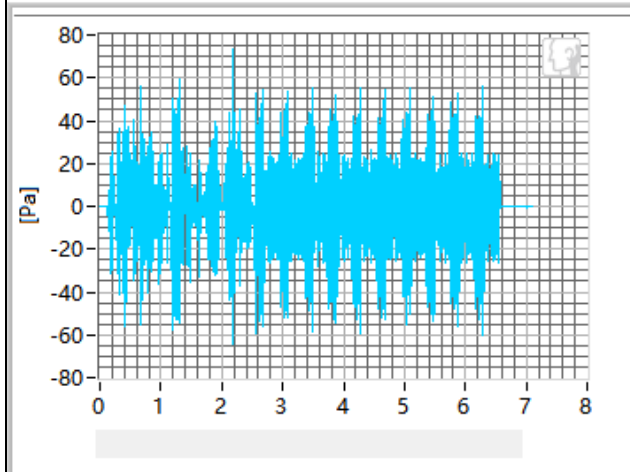
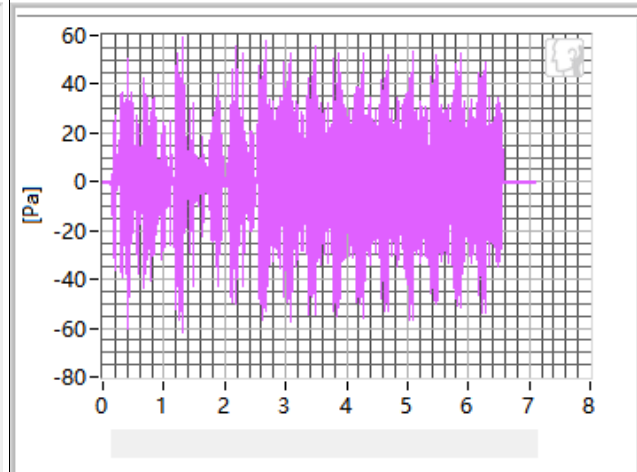
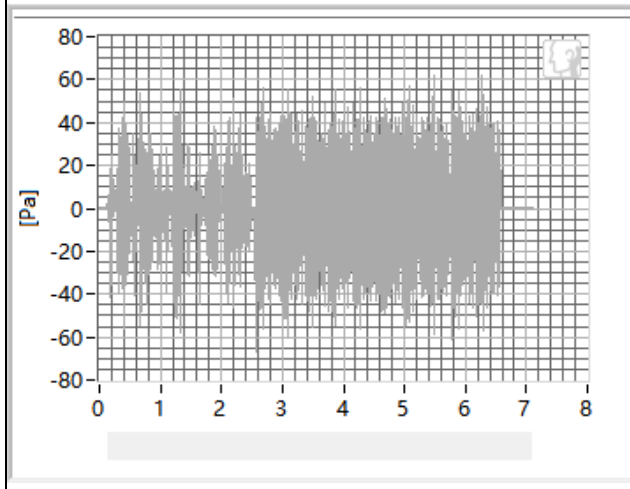
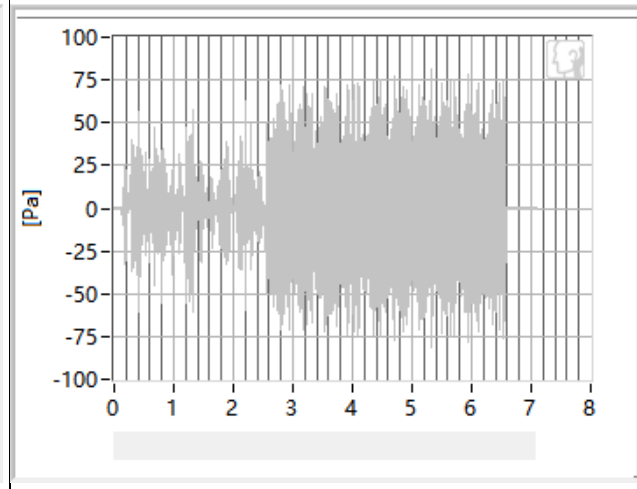
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 21.46 dB at 3150Hz.

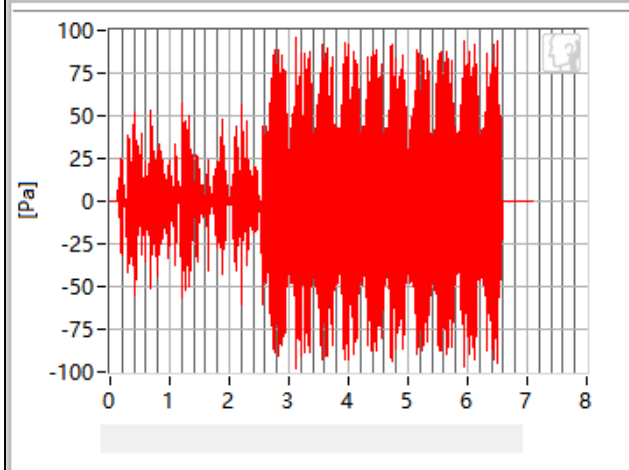
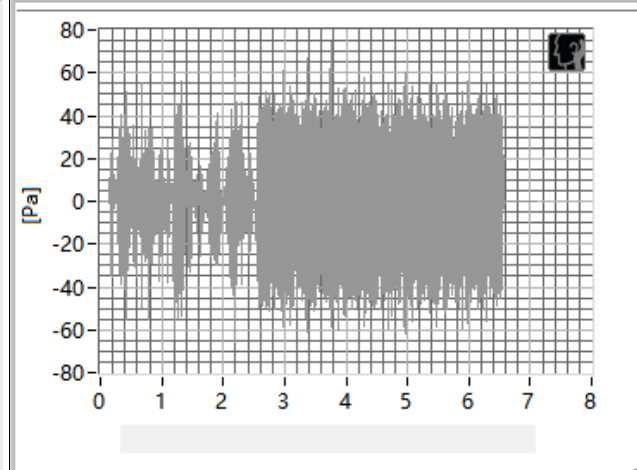
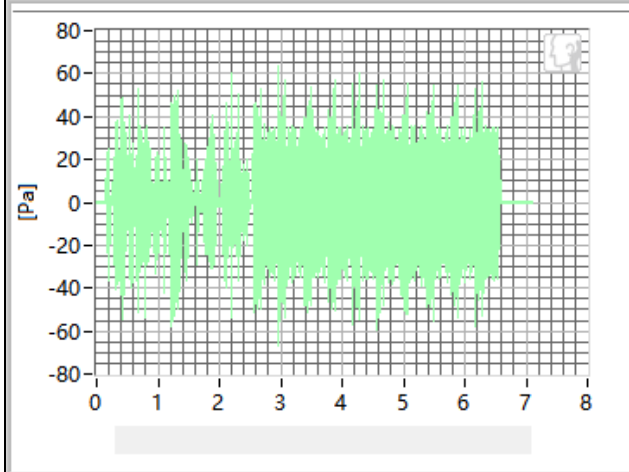
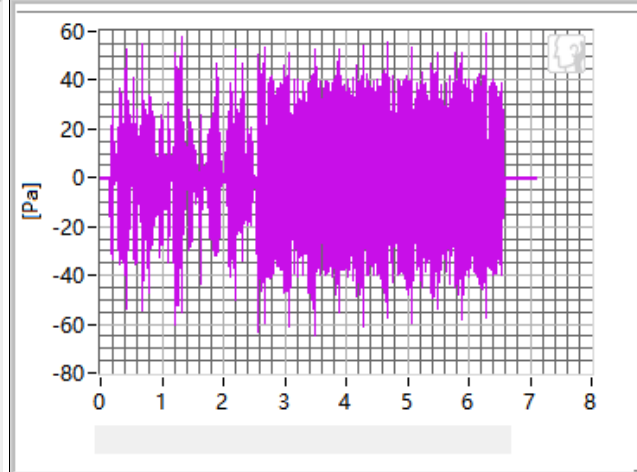
13.2.3Receive Frequency Response



13.3 LTE band 4 in channel 20300

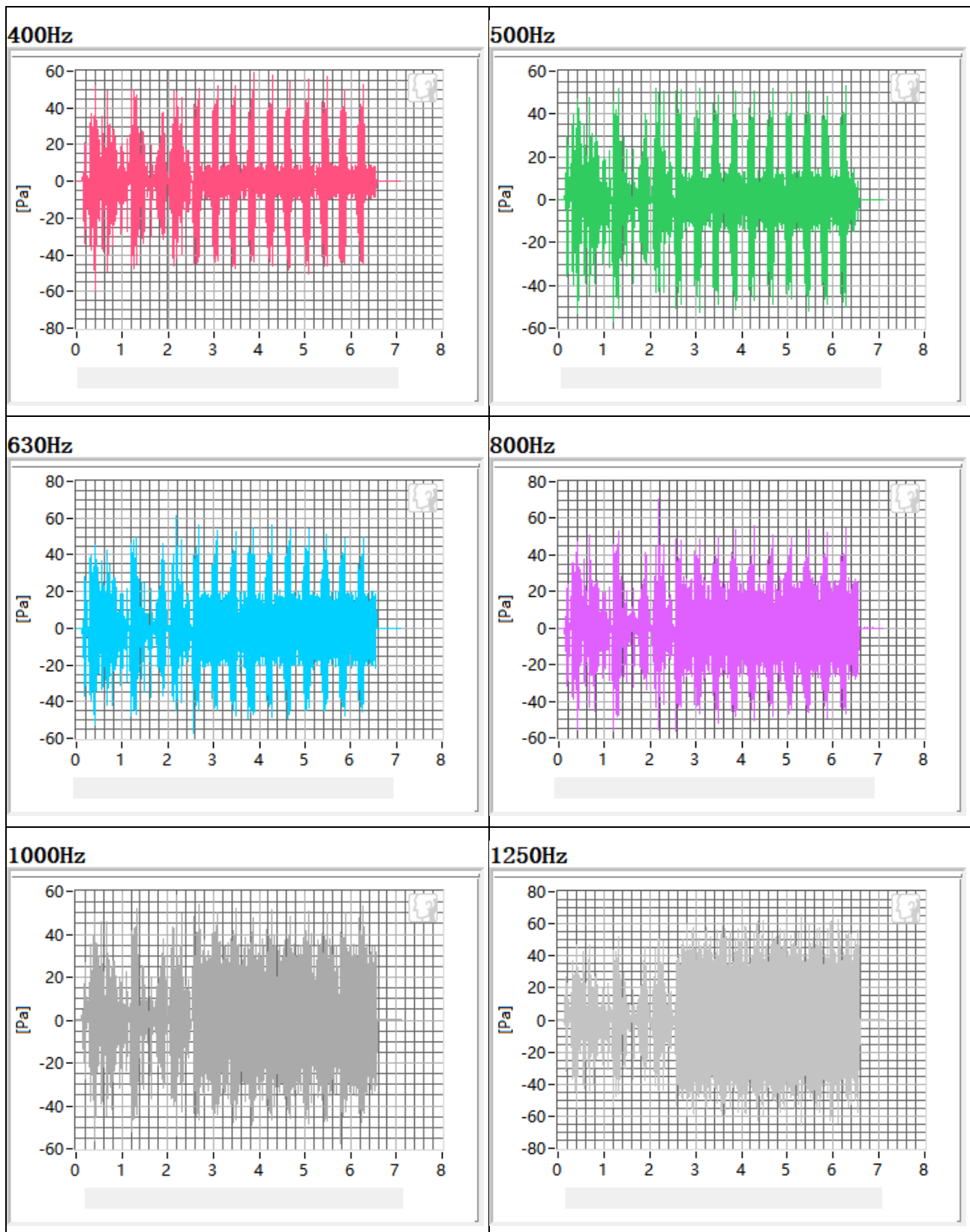
13.3.1 Receive Distortion and Noise 8N NB

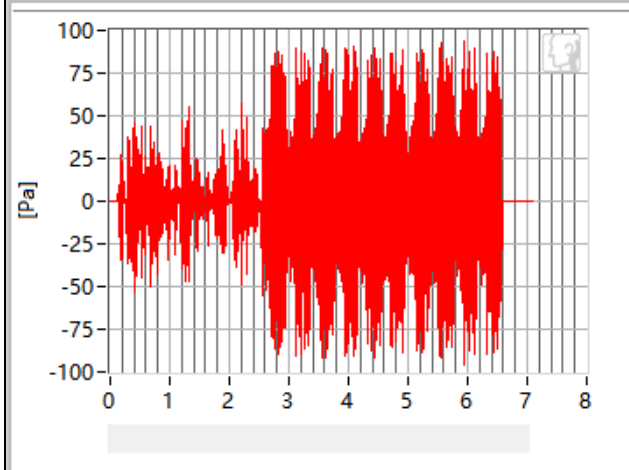
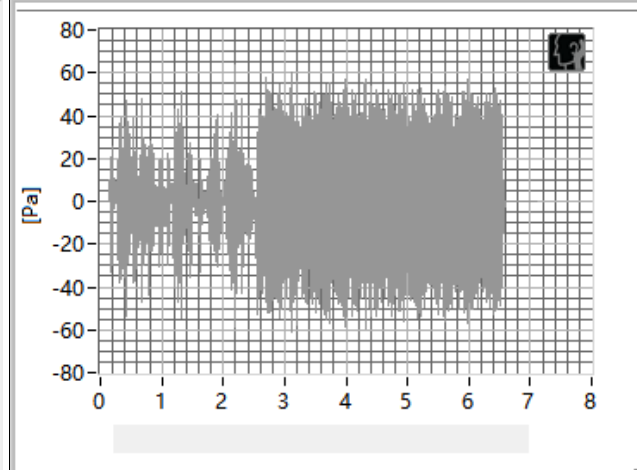
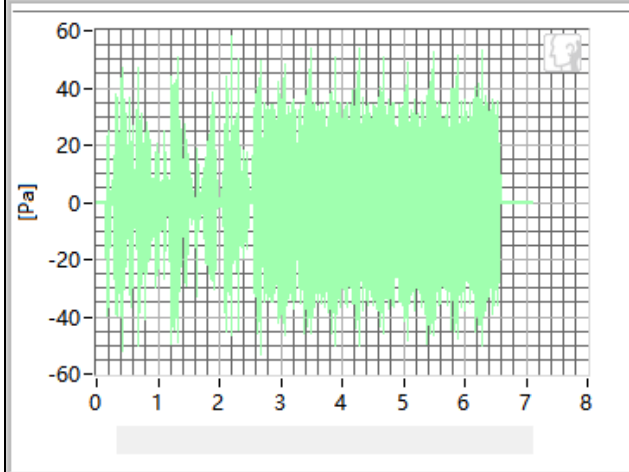
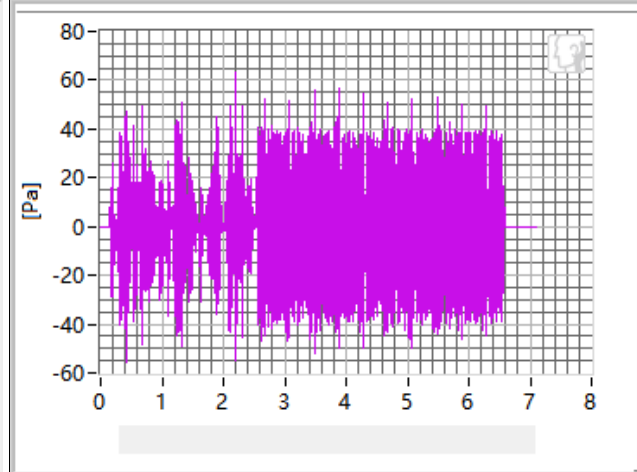
400Hz**500Hz****630Hz****800Hz****1000Hz****1250Hz**

1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	27.16 dB	1250Hz	23.47 dB
500Hz	26.15 dB	1600Hz	25.75 dB
630Hz	25.12 dB	2000Hz	24.71 dB
800Hz	22.47 dB	2500Hz	21.89 dB
1000Hz	23.50 dB	3150Hz	20.43 dB

All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 20.43 dB at 3150 Hz.

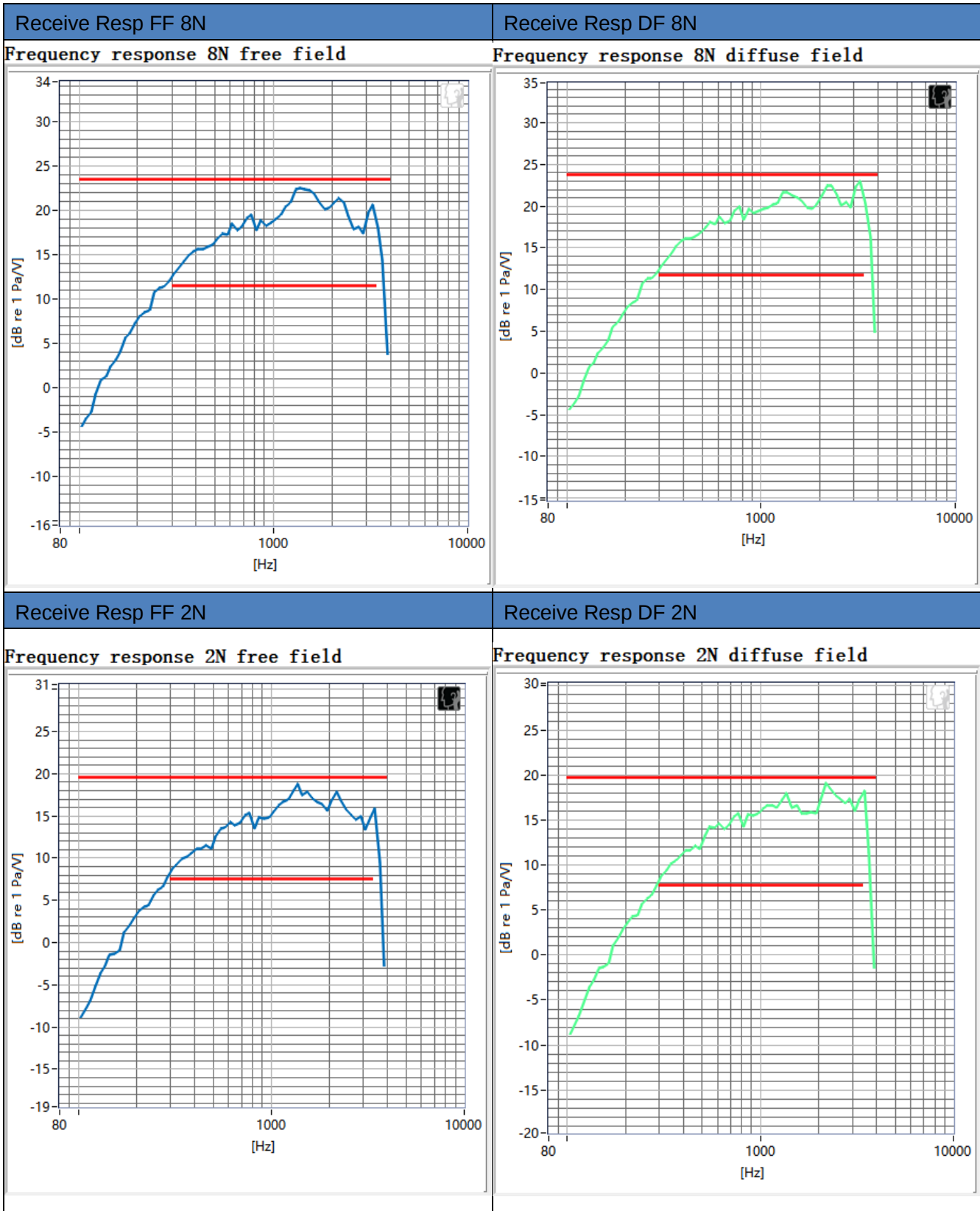
13.3.2 Receive Distortion and Noise 2N NB

1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	29.03 dB	1250Hz	22.17 dB
500Hz	27.89 dB	1600Hz	25.82 dB
630Hz	25.60 dB	2000Hz	24.03 dB
800Hz	21.56 dB	2500Hz	22.96 dB
1000Hz	23.55 dB	3150Hz	21.21 dB

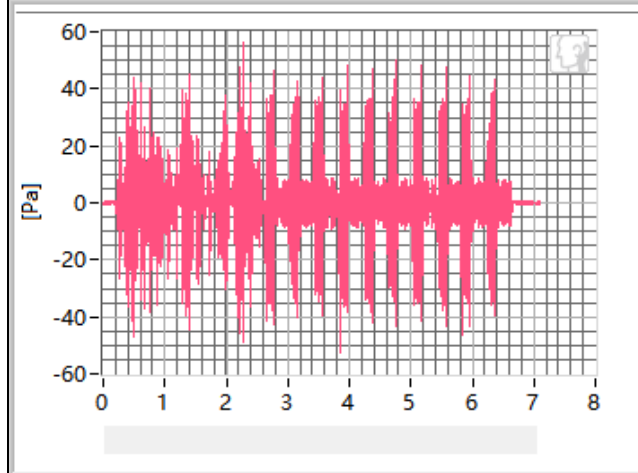
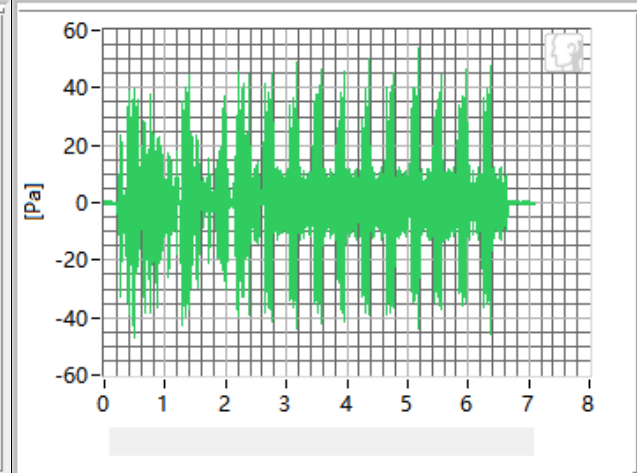
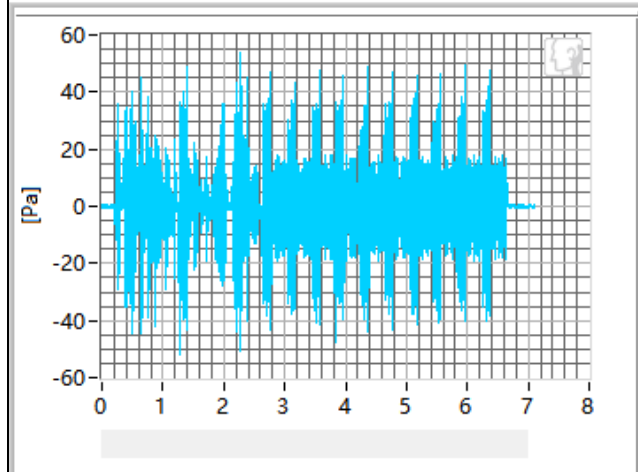
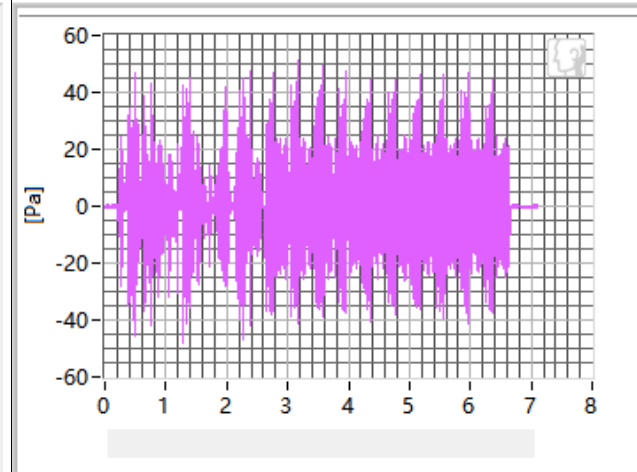
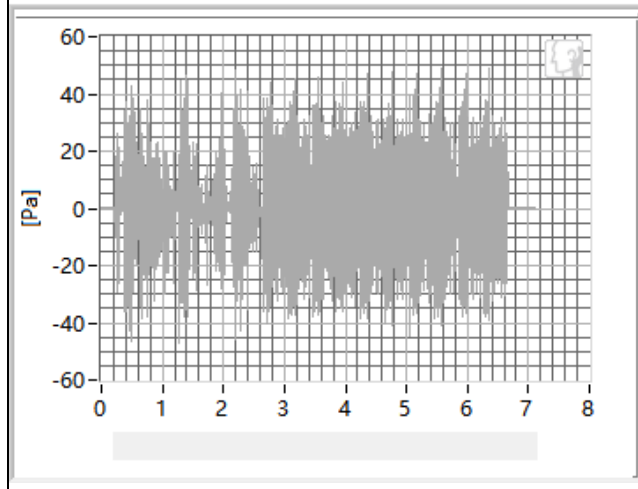
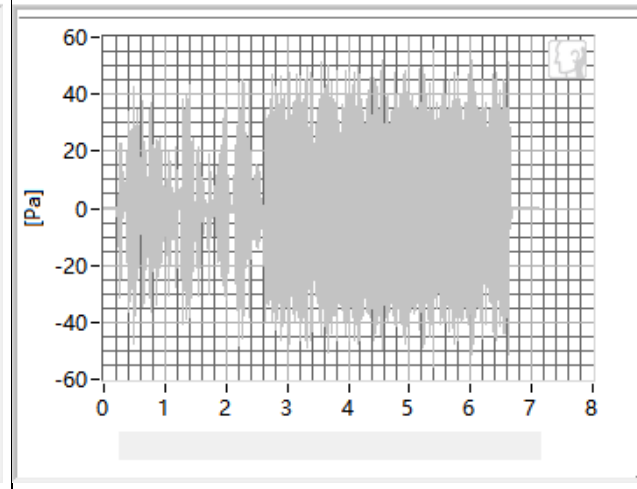
All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 21.21 dB at 3150Hz.

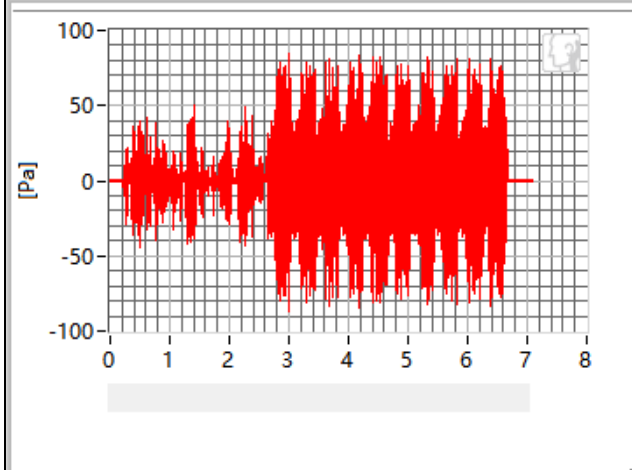
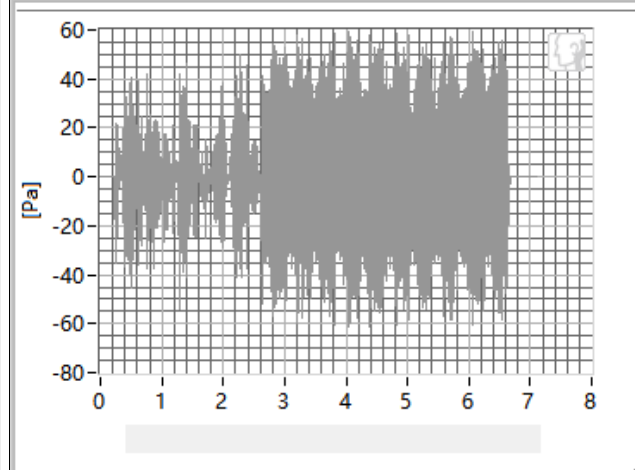
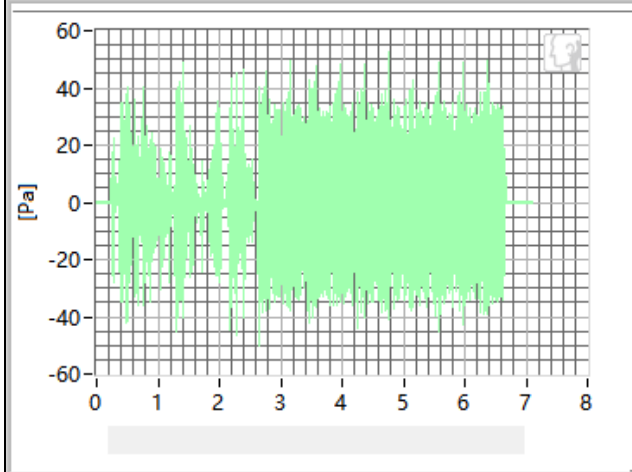
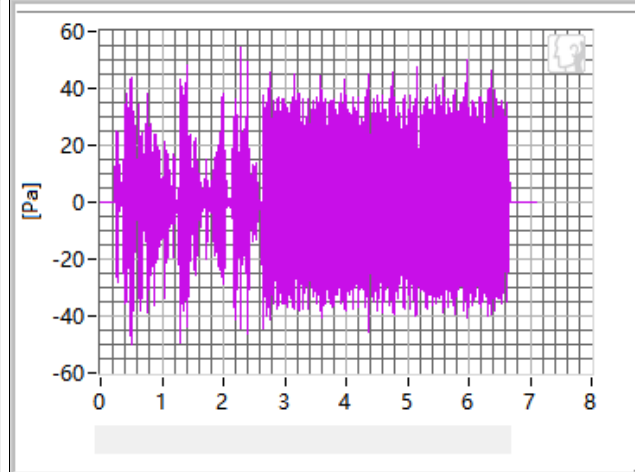
13.3.3 Receive Frequency Response



13.4 2.4G WIFI in channel 1

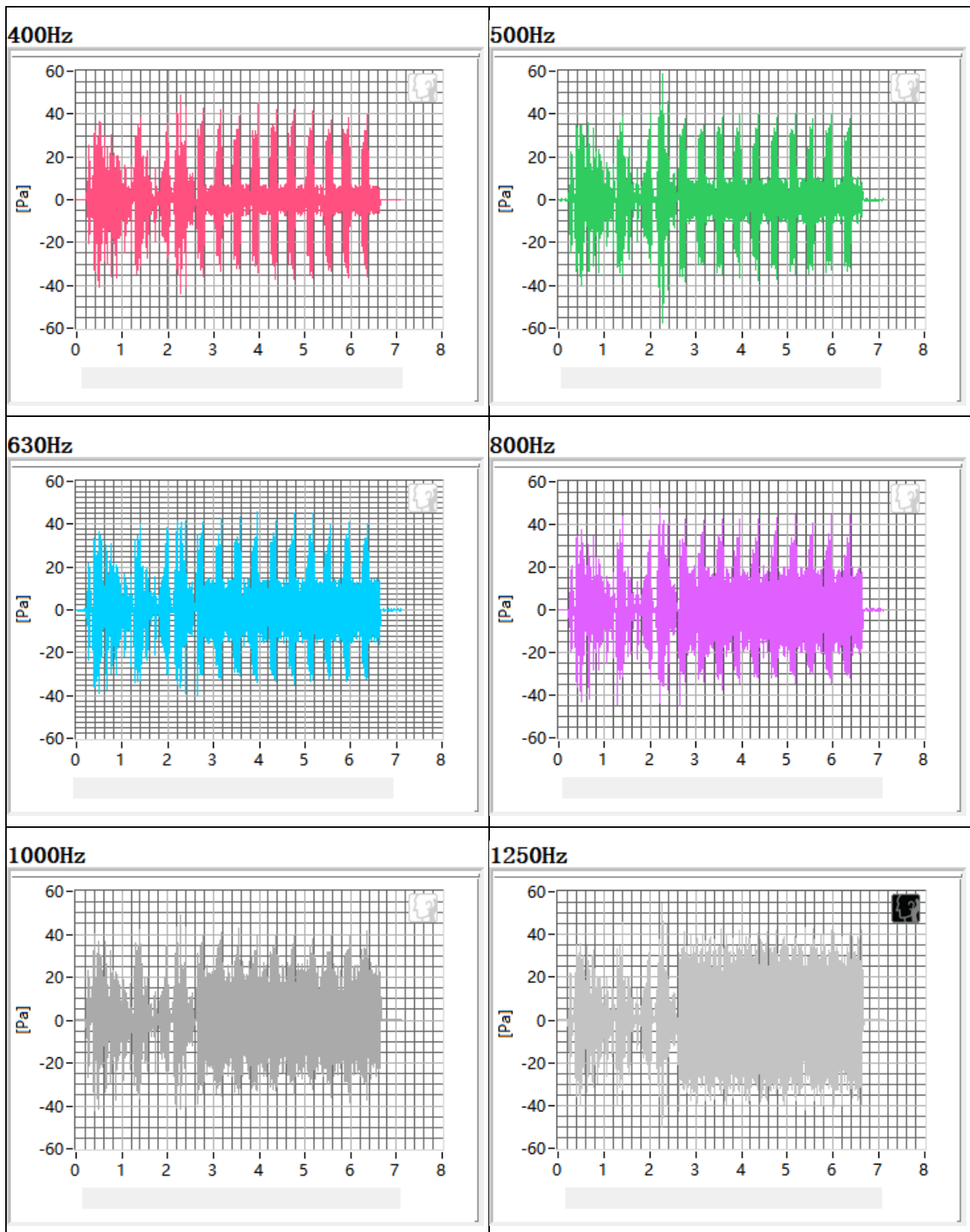
13.4.1 Receive Distortion and Noise 8N NB

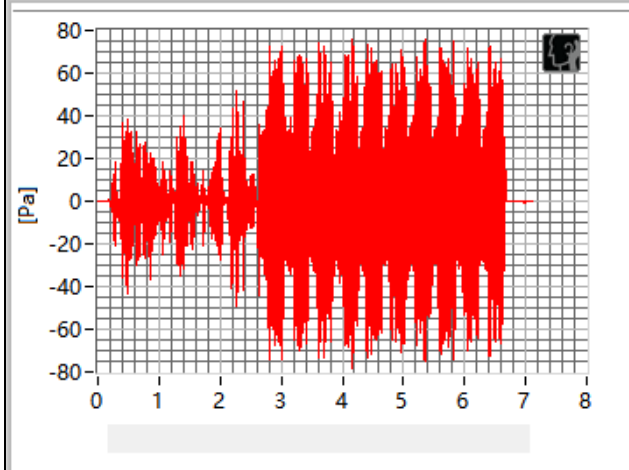
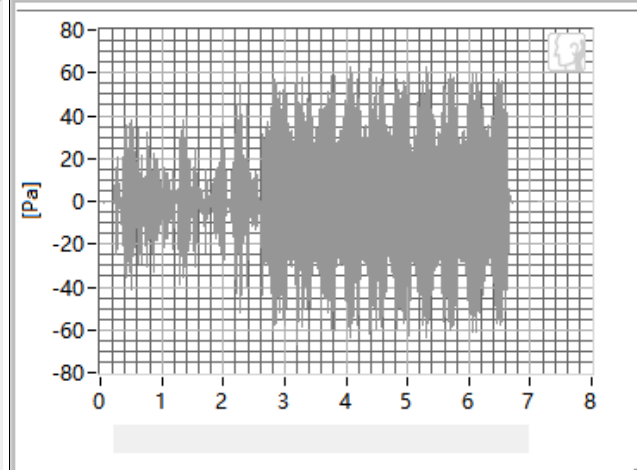
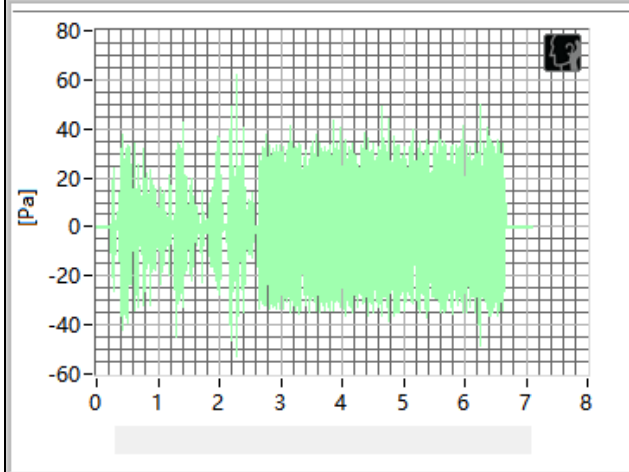
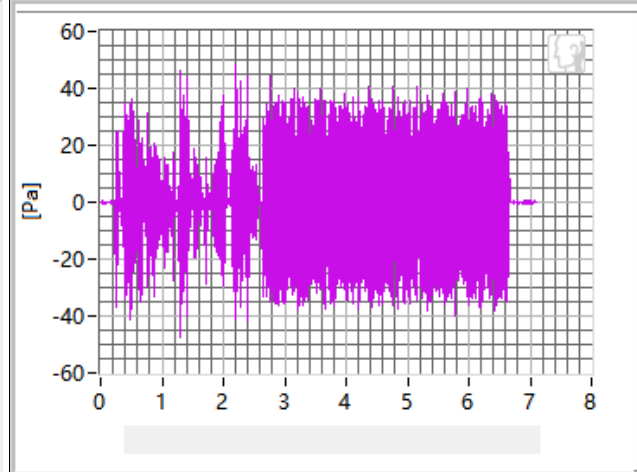
400Hz**500Hz****630Hz****800Hz****1000Hz****1250Hz**

1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	27.44 dB	1250Hz	24.87 dB
500Hz	26.44 dB	1600Hz	25.64 dB
630Hz	24.93 dB	2000Hz	24.76 dB
800Hz	21.31 dB	2500Hz	20.61 dB
1000Hz	23.60 dB	3150Hz	20.05 dB

All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 20.05 dB at 3150Hz.

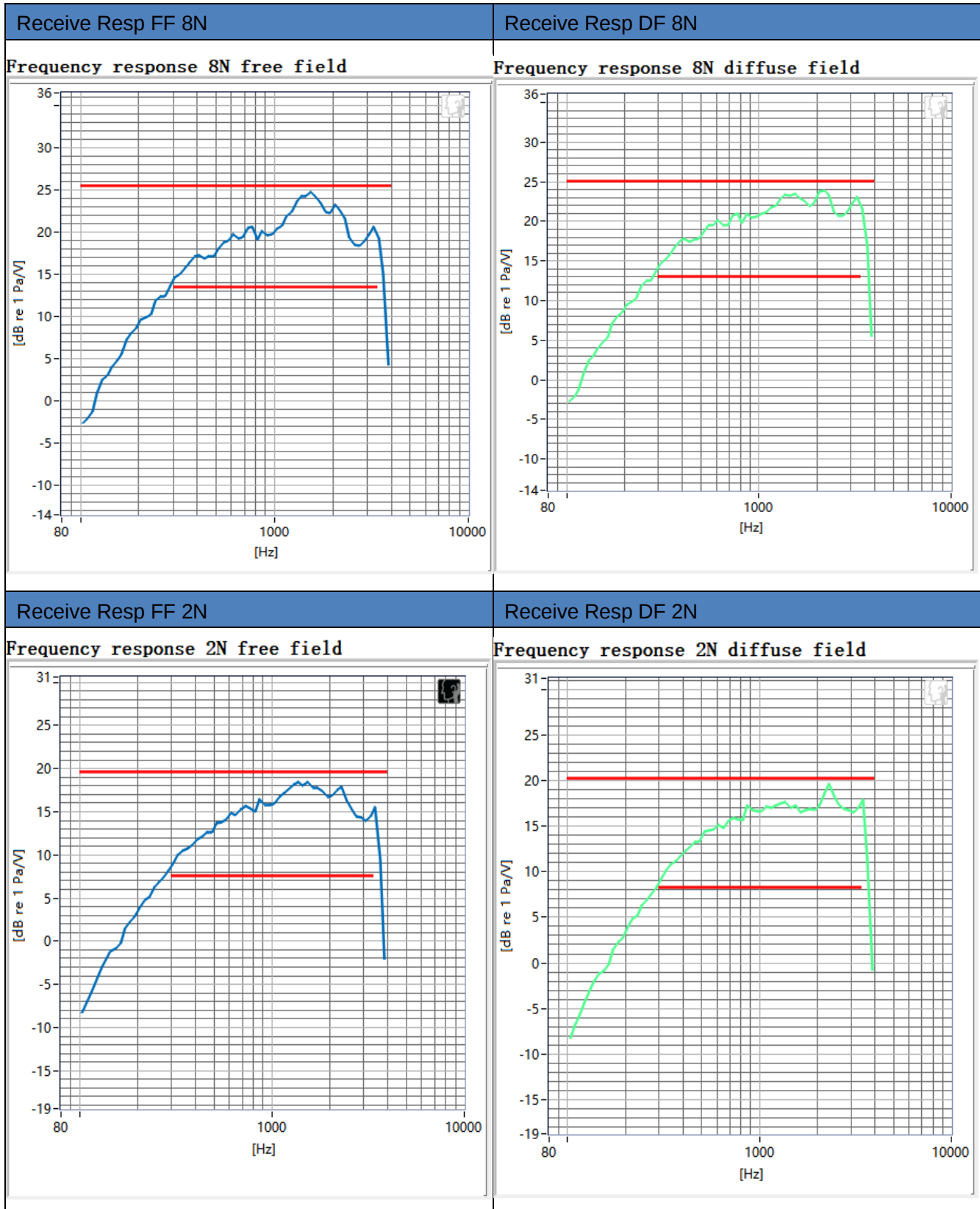
13.4.2 Receive Distortion and Noise 2N NB

1600Hz**2000Hz****2500Hz****3150Hz**

Frequency	SDNR	Frequency	SDNR
400Hz	30.00 dB	1250Hz	24.10 dB
500Hz	28.51 dB	1600Hz	26.00 dB
630Hz	25.02 dB	2000Hz	24.19 dB
800Hz	20.70 dB	2500Hz	23.51 dB
1000Hz	25.33 dB	3150Hz	20.15 dB

All SDNRs were greater than 20.0 dB, requirement was met. Smallest SDNR was 20.15 dB at 3150Hz.

13.4.3Receive Frequency Response



14. ANNEX D CALIBRATION REPORT

SMQ 深圳市计量质量检测研究院
Shenzhen Academy of Metrology & Quality Inspection



校准证书

CALIBRATION CERTIFICATE



证书编号: JL2402024831

第 1 页, 共 6 页

Page 1 of 6 Pages

客户名称 : 信恒检测技术(深圳)有限公司
Name of Customer
客户地址 : 广东省深圳市宝安区松岗街道潭头社区潭头工业 城二区 1 栋厂房 101、201、301
Address of Customer
计量器具名称 : Conditioning Amplifier 调节放大器
Name of Instrument
型号/规格 : Type-2690-030
Type/Specification
出厂编号 : 2673666
Serial No
资产编号 : BTF-EM-146
Asset No
制造单位 : Brule&Kjaer
Manufacture
校准依据 : JJF1157-2006 测量放大器校准规范
Calibrated in Accordance to



批准人 : 张瑞纹
Approved by
签名 : 张瑞纹
Signature
核验员 : 胡芳
Checked by
校准员 : 阮晓峰
Calibrated by

校准日期 : 2024 年 01 月 30 日
Operation Date Year Month Day
建议复校日期: --- 年 -- 月 -- 日
Suggested Recal.Date Year Month Day
签发日期 : 2024 年 01 月 30 日
Issue Date Year Month Day

证书首页背面“重要声明”是证书的组成部分。任何未包含“重要声明”内容的复制均为不完整复制。

深圳市计量质量检测研究院
地址: 广东省深圳市南山区龙珠大道 92 号
客户服务热线: 400 900 8999 - 1
邮编: 518055 网址: www.smq.com.cn
电子邮件: kfzx@smq.com.cn

Shenzhen Academy of Metrology & Quality Inspection
Add: No.92, Longzhu Avenue, NanShan District, Shenzhen.
Customer Service Hotline: 400 900 8999 - 1
Post Code: 518055 http://www.smq.com.cn
Email: kfzx@smq.com.cn

重要声明

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1. 本院(站)是由深圳市人民政府依据《中华人民共和国计量法》设置并由国家市场监督管理总局、广东省市场监督管理局依法授权的法定计量检定机构。
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The relevant content and effectiveness is subject to the electronic version of the original report which was only applied for. When an electronic report and a paper report are applied for at the same time, the electronic report is only a copy of the paper report, and the relevant content and effectiveness is subject to the paper report.
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The QR code has the function of browsing and downloading complete report. Setting this function or not is chosen by the customer. The QR code and its copy enable anyone to scan and obtain the complete electronic version of the test report. Thus, if the owner of this report needs to restrict others from obtaining the content of the test report through the QR code, he shall cover or remove the QR code attached to the test report and its copies by himself. SMQ assumes no responsibility for the information leakage caused by the customer's selection of the QR code function of the test report (This clause applies to certificates with QR code attached).

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National Digital Electronic Product Testing Center (NETC)
国家营养食品质量监督检验中心(广东)
National Nutrition Food Testing Center (Guangdong)
国家体育用品质量监督检验中心(广东)
National Sports Product Testing Center (Guangdong)
国家环保产品质量监督检验中心(广东)
National Environmental Product Testing Center (Guangdong)
国家分布式光伏发电系统质量检验检测中心(广东)
National Distributed Photovoltaic Power Generation System Testing Center (Guangdong)
国家电动汽车电池及充电系统产业计量测试中心
National Metrology Center for Electric Vehicle Battery and Charging System Industry
国家民用无人机产品质量检验检测中心(广东)
National Civil Unmanned Aerial Vehicle Product Testing Center (Guangdong)
国家高新技术计量站
National High-tech Metrology Station
国家医疗器械产业计量测试中心
National Metrology and Testing Center for Medical Device Industry
国家计量数据科学中心深圳分中心
National Metrology Data Science Center (Shenzhen)
国家城市能源计量中心(深圳)
National Urban Energy Measurement Center (Shenzhen)
中国轻工联合会家具质量监督检测深圳站
Accredited Testing Station (Shenzhen) for Furniture by China National Light Industry Council (CNLIC)
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广东省质量监督学生用品检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Student's Articles (Shenzhen)
广东省质量监督自行车检验站
Guangdong Quality Supervision and Inspection Institution for Bicycle Quality
广东省质量监督钟表检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Horological Products (Shenzhen)
广东省质量监督节能环保产品(安全性能)检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Safety Performance of Environmental Protection and Energy Saving Products (Shenzhen)
广东省质量监督眼镜检验站(深圳)
Guangdong Quality Supervision and Inspection Institution for Eyewear Products (Shenzhen)
广东省质量监督电磁兼容检验站
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深圳市消防产品燃烧性能检测中心
Shenzhen Testing Center for Burning Behavior of Fire Protection Products

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联系电话 Contact Tel.: 0755-26941696 26941546 (龙岗) 27591789 (宝安) 82426246 (八卦岭) 28932280 (龙岗) 0769-21684525 (东莞)
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校准证书

CALIBRATION CERTIFICATE

证书编号: JL2402024831
Certificate No.

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校准用主要计量标准装置信息

Main Standard Devices Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	计量标准考核证书号 Certificate No.	有效期至 Due Date
_____	_____	_____	_____	_____

校准用主要标准器信息

Main Standards of Measurement Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	设备编号 Equipment No.	有效期至 Due Date	溯源单位/ 证书号 Traceability to/ Certificate No.
多功能声分析系统	0.1 Hz ~ 100 kHz	电压 $U_{rel} = 0.1\%$, $k = 2$	SB3979	2024-06-11	
数字万用表	1 MHz, 1 kV	$U_{rel} = 0.01\%$, $k = 2$	SB0425	2024-06-12	
函数发生器	80 MHz	平坦度优于 0.1dB	SB5260	2024-09-07	

附加说明

Appended Directions

委托日期:
Application Date

2024 年 01 月 26 日

环境条件:

Operation Environment

温度 22.9°C 相对湿度 60.1%

校准地点:

Operation Location

本院声学龙珠实验室

校准项目/参数说明:

Items Instructions

本次校准根据委托方要求实施, 校准项目/参数详见校准结果

符合性及限制使用说明:

Statement of Compliance and Limitation

参见校准结果使用(Use referring to the results of Calibration)



校准结果

RESULTS OF CALIBRATION

证书编号: JL2402024831
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第 3 页, 共 6 页
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1 外观检查: 符合要求
Appearance Check: Pass.

2 频率响应特性 (参考频率: 1000 Hz): 见表1
Frequency Response(Ref. 1000 Hz):See Table 1

表1 Table 1

频率 Frequency	频率响应 Frequency Response		最大允许范围 Limit
(Hz)	(dB)		(dB)
	CH1	CH2	
20	-0.08	-0.08	±0.2
31.5	-0.01	-0.02	±0.2
63	0.00	-0.01	±0.2
125	0.00	0.00	±0.2
250	0.00	0.00	±0.2
500	0.00	0.00	±0.2
1000	0.0 (ref)	0.0 (ref)	±0.2
2000	0.00	0.00	±0.2
4000	0.00	0.00	±0.2
8000	0.00	-0.01	±0.2
12500	0.00	0.00	±0.2
16000	0.00	0.01	±0.2
20000	+0.01	+0.01	±0.2

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校准结果

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3 总谐波失真: 见表2
THD: See Table 2

表2 Table 2

频率标称值 Freq. Nominal Value	总谐波失真 THD		最大允许范围 M.P.R.
(Hz)	(%)		(%)
	CH1	CH2	
63	0.054	0.068	≤0.3
125	0.045	0.038	≤0.3
250	0.049	0.032	≤0.3
500	0.041	0.048	≤0.3
1000	0.044	0.045	≤0.1
2000	0.051	0.055	≤0.3
4000	0.054	0.057	≤0.3
8000	0.051	0.052	≤0.3
12500	0.055	0.044	≤0.3
16000	0.044	0.047	≤0.3
20000	0.047	0.047	≤0.3

用

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4 增益控制偏差 (1 kHz): 见表3、表4
Gain Indication Error: See Table 3 and Table 4

CH1 表3 Table 3

增益档 Gain	增益标称值 Gain Indi. Value	增益实测值 Gain Meas. Value	误差 Error	最大允许误差 M.P.E.
(mV/Pa)	dB	dB	dB	dB
10	-20	-19.99	0.01	±0.1
31.6	-10	-10.00	0.00	±0.1
100	0	0.00	0.00	±0.1
316	10	10.00	0.00	±0.1
(V/Pa)	dB	dB	dB	dB
1	20	20.00	0.00	±0.1
3.16	30	30.00	0.00	±0.1
10	40	40.00	0.00	±0.1
31.6	50	50.01	0.01	±0.1

CH2 表4 Table 4

增益档 Gain	增益标称值 Gain Indi. Value	增益实测值 Gain Meas. Value	误差 Error	最大允许误差 M.P.E.
(mV/Pa)	dB	dB	dB	dB
10	-20	-19.99	0.01	±0.1
31.6	-10	-10.00	0.00	±0.1
100	0	0.00	0.00	±0.1
316	10	10.00	0.00	±0.1
(V/Pa)	dB	dB	dB	dB
1	20	20.00	0.00	±0.1
3.16	30	30.00	0.00	±0.1
10	40	40.00	0.00	±0.1
31.6	50	50.01	0.01	±0.1

（请见附表）



校准结果

RESULTS OF CALIBRATION

证书编号: JL2402024831
Certificate No

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附注:

Notes:

- 1.电压测量结果扩展不确定度: $U_{rel} = 0.1\%, k = 2$
Relative Expanded Uncertainty of Voltage: $U_{rel} = 0.1\%, k = 2$
- 2.失真测量结果扩展不确定度: $U_{rel} = 1.8\%, k = 2$
Relative Expanded Uncertainty of Distortion: $U_{rel} = 1.8\%, k = 2$
- 3.本证书中给出的测量不确定度依据 JJF 1059.1-2012 《测量不确定度评与表示》评定
The uncertainty given in this certificate is evaluated according to JJF 1059.1-2012 *Evaluation and Expression of Uncertainty in Measurement*.

校准结果

校准证书

CALIBRATION CERTIFICATE



证书编号: JL2402024851

第 1 页, 共 11 页
Page 1 of 11 Pages

客户名称 : 信恒检测技术(深圳)有限公司
Name of Customer :
客户地址 : 广东省深圳市宝安区松岗街道潭头社区潭头工业 城二区 1 栋厂房 101、201、301
Address of Customer :
计量器具名称 : Head and Torso Simulator 头部躯干模拟器
Name of Instrument :
型号/规格 : Type 4128C
Type/Specification :
出厂编号 : 3107080
Serial No :
资产编号 : BTF-EM-148
Asset No :
制造单位 : Brule&Kjaer
Manufacture :
校准依据 : JJF1520-2015 声学用头和躯干模拟器校准规范
Calibrated in Accordance to :
JJF1520-2015 声学用头和躯干模拟器校准规范



批准人 : 张瑞纹
Approved by :
签名 : 张瑞纹
Signature :
核验员 :
Checked by :
校准员 : 阮晓峰
Calibrated by :

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Operation Date : Year Month Day
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Shenzhen Academy of Metrology & Quality Inspection
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National Distributed Photovoltaic Power Generation System Testing Center (Guangdong)

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校准证书

CALIBRATION CERTIFICATE

证书编号: JL2402024851
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校准用主要计量标准装置信息

Main Standard Devices Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	计量标准考核证书号 Certificate No	有效期至 Due Date

校准用主要标准器信息

Main Standards of Measurement Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/ 最大允许误差 Uncertainty/Accuracy Class/ Maximum Permissible Error	设备编号 Equipment No	有效期至 Due Date	溯源单位/ 证书号 Traceability to/ Certificate No
标准传声器	(20~20k)Hz	声压级 $U=0.2\text{dB}, k=2$	S83979/01	2024-11-26	
噪声、振动测试系统	DC~51.2kHz	电平 $\pm 0.01\text{dB}$	S85196	2025-01-22	深圳检测院 /JL2401848311

附加说明

Appended Directions

委托日期:
Application Date

2024 年 01 月 26 日

环境条件:

Operation Environment

温度 21.4°C 相对湿度 70%

校准地点:

Operation Location

本院声学龙珠实验室

校准项目/参数说明:

Items Instructions

本次校准根据委托方要求实施, 校准项目/参数详见校准结果

符合性及限制使用说明:

Statement of Compliance and Limitation

参见校准结果使用(Use referring to the results of Calibration)

校准结果

RESULTS OF CALIBRATION

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- 1 外观检查: 符合要求。
Appearance Check: Pass.
- 2 灵敏度 (参考频率: 1000 Hz): 见表1
Sensitivity of Ear Simulator(Ref. Freq:1000 Hz): See Table 1

表 1 Table 1

通道 Channel	传声器型号 Type	传声器编号 No.	灵敏度 (mV/Pa) Sensitivity
L通道	/	/	11.6
R通道	/	/	11.5

- 3 耳自由场频率响应(声源位于正前方1.0 m处):
Frequency Response of Ear Simulator (The distance is 1m) : See Table 2

表 2 Table 2

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right	允许范围 M.P.E.
(Hz)	(dB)	(dB)	(dB)
100	0.5	0.1	+1.0 ~ -1.0
125	0.2	-0.1	+1.0 ~ -1.0
160	0.3	0.1	+1.0 ~ -1.5
200	0.7	0.0	+1.0 ~ -1.5
250	-0.1	-0.3	+1.5 ~ -1.0
315	-0.2	-0.5	+2.0 ~ -0.5
400	1.0	0.8	+2.5 ~ 0.0
500	1.8	1.3	+3.5 ~ +1.0
630	3.9	3.6	+4.0 ~ +1.5
800	2.8	2.8	+6.0 ~ +2.5
1000	4.9	5.0	+5.5 ~ +2.0
1250	3.7	3.9	+6.0 ~ +0.5

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1600	4.5	4.8	+7.0 ~ +2.0
2000	10.0	10.8	+13.5 ~ +9.0
2500	16.4	15.9	+19.5 ~ +14.5
3150	17.1	15.2	+20.5 ~ +13.5
4000	13.8	12.5	+18.0 ~ +12.0
5000	9.0	8.6	+15.5 ~ +8.5
6300	6.8	6.1	+9.0 ~ +2.5
8000	2.2	2.1	+11.0 ~ -1.0
10000	7.3	6.1	+10.0 ~ +0.5

4 耳指向性:

Ear directivity

4.1耳指向性0°:

Ear directivity of 0 ° : See Table 3

表 3 Table 3

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right
(Hz)	(dB)	(dB)
100	71.2	70.7
125	69.4	69.2
160	67.7	67.4
200	67.4	66.8
250	64.4	64.2
315	66.0	65.7
400	64.4	64.2
500	67.7	67.2
630	69.1	68.8
800	71.7	71.7
1000	72.6	72.7
1250	71.3	71.4
1600	72.9	73.2
2000	78.0	78.8

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2500	85.3	84.8
3150	93.9	92.0
4000	85.2	83.9
5000	80.8	80.4
6300	83.9	83.2
8000	68.2	68.2
10000	73.3	72.1

4.2耳指向性90°:
Ear directivity of 90 ° : See Table 4

表 4 Table 4

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right
(Hz)	(dB)	(dB)
100	71.3	72.3
125	68.8	71.0
160	67.7	70.1
200	66.7	68.9
250	64.4	67.1
315	64.8	68.6
400	62.1	68.1
500	66.9	72.0
630	66.8	72.5
800	71.4	76.5
1000	69.1	76.2
1250	69.5	75.9
1600	71.1	78.0
2000	73.2	79.5
2500	76.4	84.7
3150	81.4	93.0
4000	71.9	85.4
5000	70.8	88.8
6300	73.4	93.3

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8000	56.2	82.1
10000	57.6	76.3

4.3耳指向性180°:

Ear directivity of 180 ° : See Table 5

表 5 Table 5

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right
(Hz)	(dB)	(dB)
100	71.5	71.2
125	69.6	69.1
160	67.8	67.3
200	67.1	67.0
250	64.9	64.4
315	65.7	65.3
400	63.9	63.2
500	67.4	67.0
630	68.6	68.0
800	71.8	71.4
1000	73.1	72.8
1250	72.4	72.1
1600	73.5	73.5
2000	76.8	76.8
2500	82.5	81.8
3150	90.6	88.9
4000	83.4	82.0
5000	75.6	75.3
6300	77.1	77.3
8000	67.5	68.4
10000	68.2	67.1

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4.4耳指向性270°:
Ear directivity of 270 ° : See Table 6

表 6 Table 6

频率 Frequency	左耳频响 F.R.of Left	右耳频响 F.R.of Right
(Hz)	(dB)	(dB)
100	72.2	70.3
125	71.0	68.0
160	69.9	66.6
200	69.0	66.1
250	67.5	63.9
315	69.1	64.3
400	68.6	61.8
500	72.3	66.3
630	72.7	66.2
800	76.9	71.2
1000	76.2	68.8
1250	76.0	69.3
1600	77.8	71.2
2000	79.0	73.8
2500	85.0	75.5
3150	94.5	79.4
4000	88.0	72.2
5000	89.3	69.5
6300	94.0	72.1
8000	82.0	55.3
10000	77.3	54.6

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5 嘴参考点处的幅频特性:
Frequency Response of MPR: See Table 7

表 7 Table 7

频率 Frequency	声压级 SPL
(Hz)	(dB)
100	59.6
125	64.8
160	70.0
200	75.1
250	77.1
315	75.9
400	74.0
500	72.7
630	71.8
800	71.8
1000	72.4
1250	73.1
1600	75.8
2000	74.8
2500	68.8
3150	66.3
4000	65.9
5000	64.1
6300	67.8
8000	63.8
10000	64.5

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6 嘴参考点处的失真:
THD of MPR: See Table 8

表 8 Table 8

频率 Frequency	失真 THD
(Hz)	(%)
100	10.50
125	6.20
160	2.87
200	1.32
250	1.30
315	1.62
400	1.60
500	2.64
630	3.05
800	2.50
1000	2.11
1250	1.62
1600	1.05
2000	1.82
2500	2.13
3150	3.57
4000	1.51
5000	3.40
6300	1.20
8000	0.34
10000	0.42



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7 嘴自由场幅频特性 (传声器位于嘴前0.5 m):
Amplitude-frequency characteristics: See Table 9

表 9 Table 9

频率 Frequency	声压级 SPL
(Hz)	(dB)
100	50.6
125	56.0
160	59.9
200	65.5
250	67.7
315	67.0
400	65.8
500	67.5
630	65.5
800	61.5
1000	63.6
1250	65.3
1600	70.0
2000	69.6
2500	63.1
3150	61.6
4000	62.1
5000	60.4
6300	64.5
8000	61.5
10000	61.3

附注:
Notes:

1. 参考频率声压级测量结果扩展不确定度:
Related Expanded Uncertainty of Sound Pressure Level at Reference Frequency:

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$U=1.0\text{ dB}$, $k=2$ (20 Hz ~ 200 Hz) ;
 $U=0.8\text{ dB}$, $k=2$ (250 Hz ~ 400 Hz) ;
 $U=0.6\text{ dB}$, $k=2$ (500 Hz ~ 1.25 kHz) ;
 $U=1.0\text{ dB}$, $k=2$ (1.6 kHz ~ 10 kHz) 。
 $U=1.2\text{ dB}$, $k=2$ (12.5 kHz ~ 20 kHz) 。

2. 失真测量结果扩展不确定度:

Relative Expanded Uncertainty of Distortion:

 $U_{rel}=0.5\%$, $k=2$ (0.05%~30%, 20 Hz ~ 20 kHz) 。

3. 本证书中给出的测量不确定度依据 JJF 1059.1-2012 《测量不确定度评与表示》评定

The uncertainty given in this certificate is evaluated according to JJF 1059.1-2012 *Evaluation and Expression of Uncertainty in Measurement*.

-----End of the Report-----