



CE-EMC Test Report

Applicant:

Product Description: Bluetooth Speaker

Tested Model:

ETSI EN 301 489-1 V2.2.3 (2019-11)

Test Standards:

Draft ETSI EN 301 489-17 V3.2.2 (2019-12)

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The test results in this report apply exclusively to the tested model / sample. Without written approval of Shenzhen Jialian Testing Consulting Co., Ltd., the test report shall not be reproduced except in full.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:

Address of applicant:

Manufacturer:

Address of manufacturer:

General Description of EUT	
Product Name:	Bluetooth Speaker
Trade Name:	--
Model No.:	
Adding Model(s):	--
Rated Voltage:	Battery 3.7V, 300mAh
Adapter Model:	--
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Bluetooth Version:	Bluetooth V5.0
Frequency Range:	2402-2480MHz
Max.RF Output Power:	2.74dBm (EIRP)
Type of Modulation:	GFSK, Pi/4 DQPSK, 8DPSK
Data Rate:	1Mbps, 2Mbps, 3Mbps
Quantity of Channels	79/40
Channel Separation:	1MHz/2MHz
Type of Antenna:	Integral Antenna
Antenna Gain:	0dBi



1.2 Test Standards

The following report is prepared on behalf of the Deeray Global Co., Limited in accordance ETSI EN 301 489-1 V2.2.3 (2019-11) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU. Draft ETSI EN 301 489-17 V3.2.2 (2019-12) ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

The objective of the manufacturer is to demonstrate compliance with the standards ETSI EN 301 489-1 and Draft ETSI EN 301 489-17.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with the standard ETSI EN 301 489-1

1.4 Test Facility

CNAS Registration No.: L0579

Shenzhen Academy of Metrology and Quality Inspection is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L0579. All measurement facilities used to collect the measurement data are located at Metrology and Quality Inspection Building, Central Section of LongZhu Road, Nanshan District, Shenzhen (518055)



1.5 EUT Setup and Operation Mode

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the operation manual for use, more detailed description as follows:

Test Mode List:

Test Mode	Description	Remark
TM2	Operating	Charging(With Adapter)
TM2	Operating	Bluetooth TT & TR

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Conducted Emissions	150kHz-30MHz	$\pm 2.88\text{dB}$
Radiated Emissions	30MHz-6GHz	$\pm 5.10\text{dB}$



1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2019-07-01	2020-06-30
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-07-01	2020-06-30
Amplifier	Agilent	8447F	3113A06717	2019-07-01	2020-06-30
Amplifier	C&D	PAP-1G18	2002	2019-07-01	2020-06-30
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-07-01	2020-06-30
Horn Antenna	ETS	3117	00086197	2019-07-01	2020-06-30
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2019-07-01	2020-06-30
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2019-07-01	2020-06-30
AC LISN	Schwarz beck	NSLK8126	8126-224	2019-07-01	2020-06-30
Digital Power Analyzer	California Instrument	PACS-1	72831	2019-07-01	2020-06-30
Power Source	California Instrument	5001iX	25965	2019-07-01	2020-06-30
ESD Generator	TESQ AG	NSG 437	161	2019-07-01	2020-06-30
Signal Generator	Rohde & Schwarz	SMT03	100059	2019-07-01	2020-06-30
Voltage Probe	Rohde & Schwarz	URV5-Z2	100013	2019-07-01	2020-06-30
Power Amplifier	AR	150W1000	300999	2019-07-01	2020-06-30
Power Amplifier	AR	25S1G4AM1	305993	2019-07-01	2020-06-30
Transient 2000	EMC PARTNER	TRA2000	863	2019-07-01	2020-06-30
CW Simulator	EM Test	CWS 500C	0900-03	2019-07-01	2020-06-30
Anechoic chamber	Albatross Projects	MCDC	----	2019-07-01	2020-06-30
Universal Radio Communication Tester	Rohde & Schwarz	CMW500	----	2019-07-01	2020-06-30



1.8 Performance Criteria for EMS

According Clause 6.1 of EN 301 489-17,

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Table 1: Performance criteria

Criteria	During test	After test
A	Shall operate as intended. (see note 1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).
NOTE 1: Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		
NOTE 2: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		
NOTE 3: No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.		



2. SUMMARY OF TEST RESULTS

Standards	Reference	Description of Test Item	Result
ETSI EN 301 489-1 V2.2.3 (2019-11)	8.2	Radiated Emissions	Pass
	8.3	Conducted Emissions for DC Power Port	N/A
	8.4	Conducted Emissions for AC Power Port	Pass
	8.5	Harmonic Current Emissions	Pass
	8.6	Voltage Fluctuations and Flicker	Pass
	8.7	Telecommunication Ports	N/A
	9.2	Radio Frequency Electromagnetic Field	Pass
	9.3	Electrostatic Discharge	Pass
	9.4	Fast Transients, Common Mode	Pass
	9.5	Radio Frequency, Common Mode	Pass
	9.6	Transient and Surges in the Vehicular Environment	N/A
	9.7	Voltage Dips and Interruptions	Pass
	9.8	Surges	Pass

Pass: The EUT complies with the essential requirements in the standard

Fail: The EUT does not comply with the essential requirements in the standard

N/A: not applicable



3. Conducted Emissions

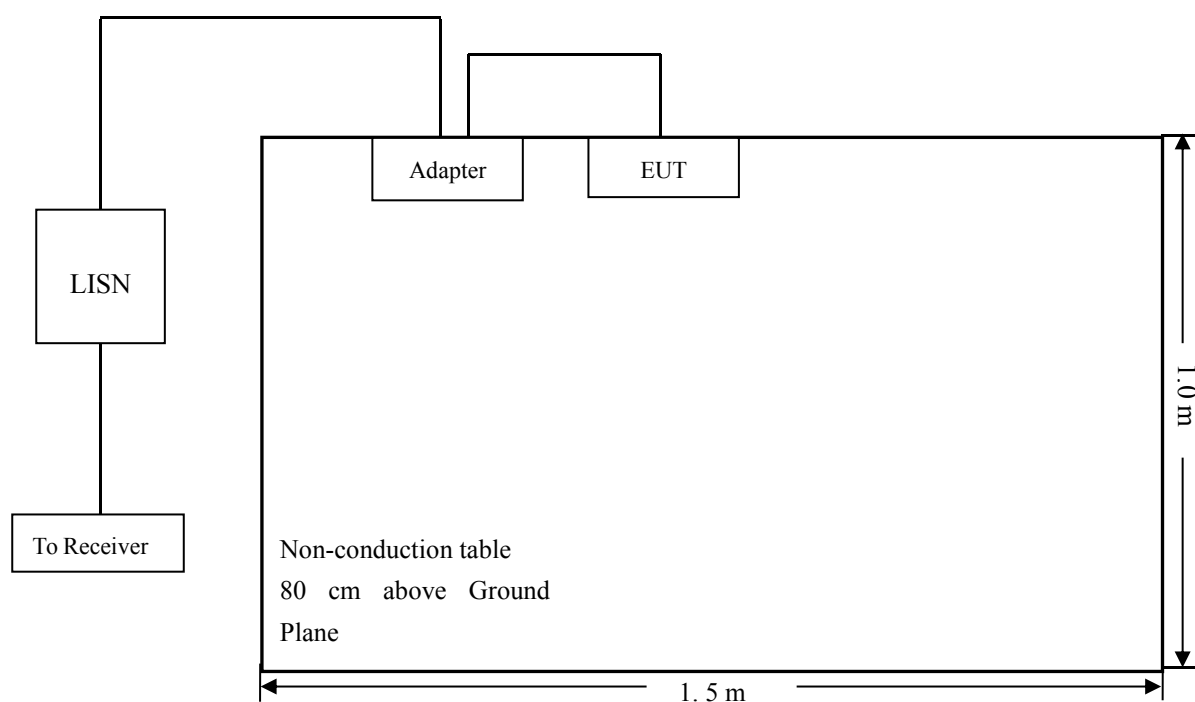
3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

3.2 Test Procedure

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.

3.3 Basic Test Setup Block Diagram





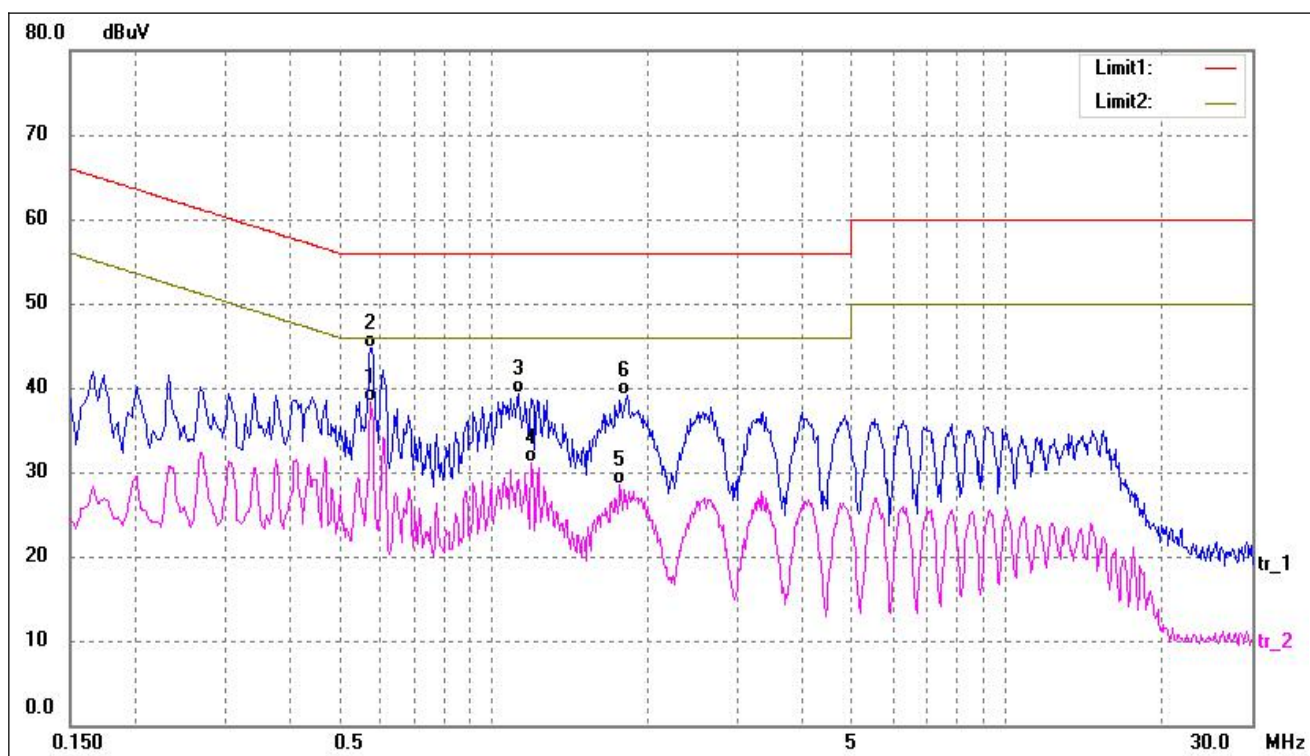
3.5 Environmental Conditions

Temperature:	22 ° C
Relative Humidity:	55 %
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the EN 301489

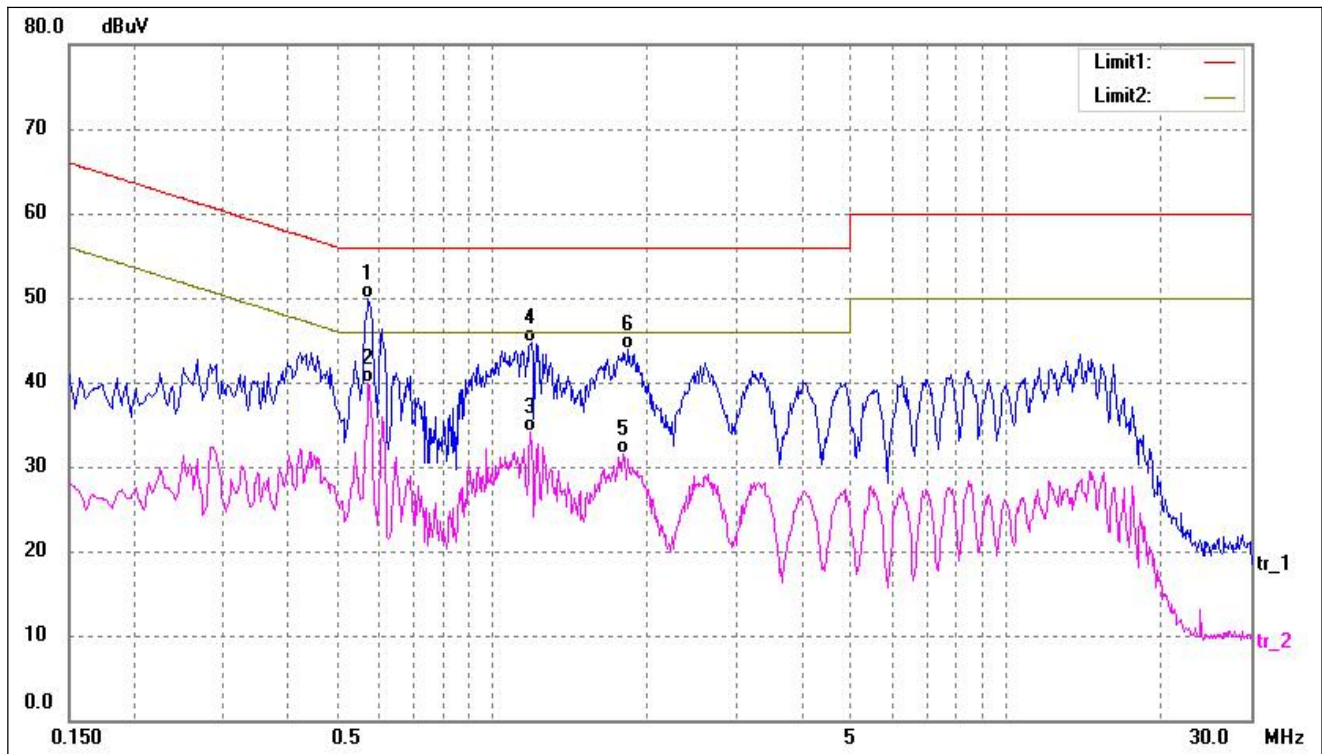
3.5 Conducted Emissions Test Data

**Plot of Conducted Emissions Test Data***EUT:* Bluetooth Speaker*Tested Model:* HSK-M2*Operating Condition:* TM1*Comment:**Test Specification:* Neutral

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.5780	28.18	10.05	38.23	46.00	-7.77	AVG
2	0.5820	34.70	10.05	44.75	56.00	-11.25	QP
3	1.1180	28.91	10.38	39.29	56.00	-16.71	QP
4	1.1900	20.67	10.38	31.05	46.00	-14.95	AVG
5	1.7700	18.20	10.37	28.57	46.00	-17.43	AVG
6	1.8260	28.69	10.37	39.06	56.00	-16.94	QP



Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.5740	39.95	10.04	49.99	56.00	-6.01	QP
2	0.5740	29.92	10.04	39.96	46.00	-6.04	AVG
3	1.1900	23.69	10.38	34.07	46.00	-11.93	AVG
4	1.1940	34.34	10.38	44.72	56.00	-11.28	QP
5	1.7980	21.11	10.37	31.48	46.00	-14.52	AVG
6	1.8420	33.63	10.37	44.00	56.00	-12.00	QP

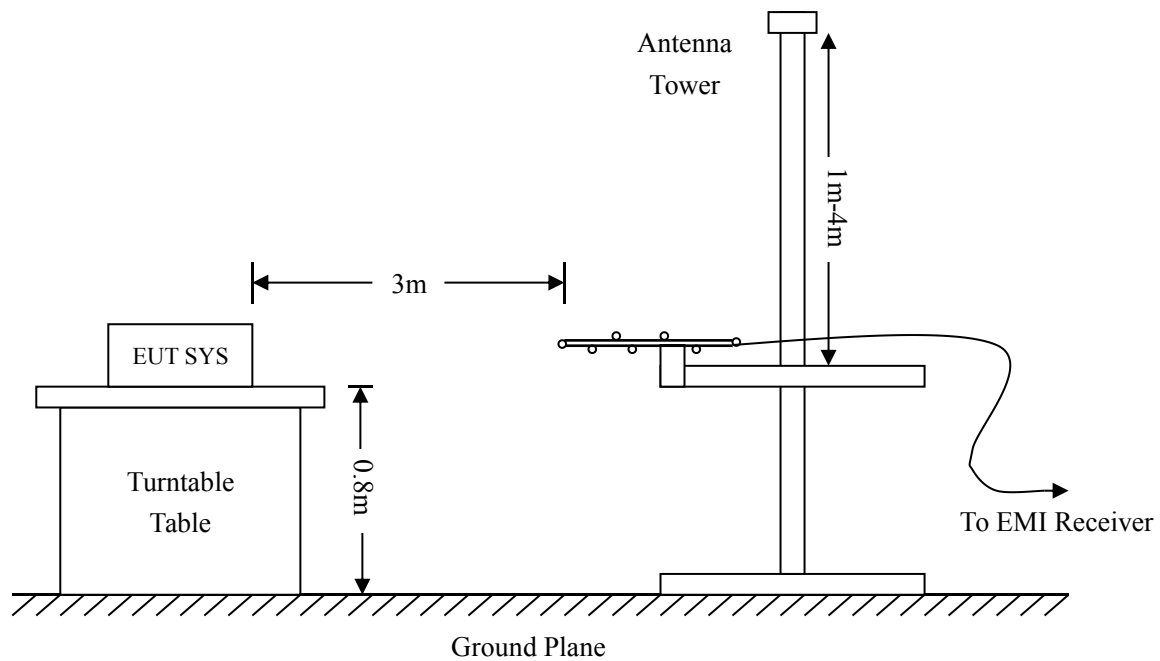
4. Radiated Emissions

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any radiation emissions measurement is ± 5.10 dB.

4.2 Test Procedure

Test is conducting under the description of EN55032 Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.





4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for Class B device. The equation for margin calculation is as follows:

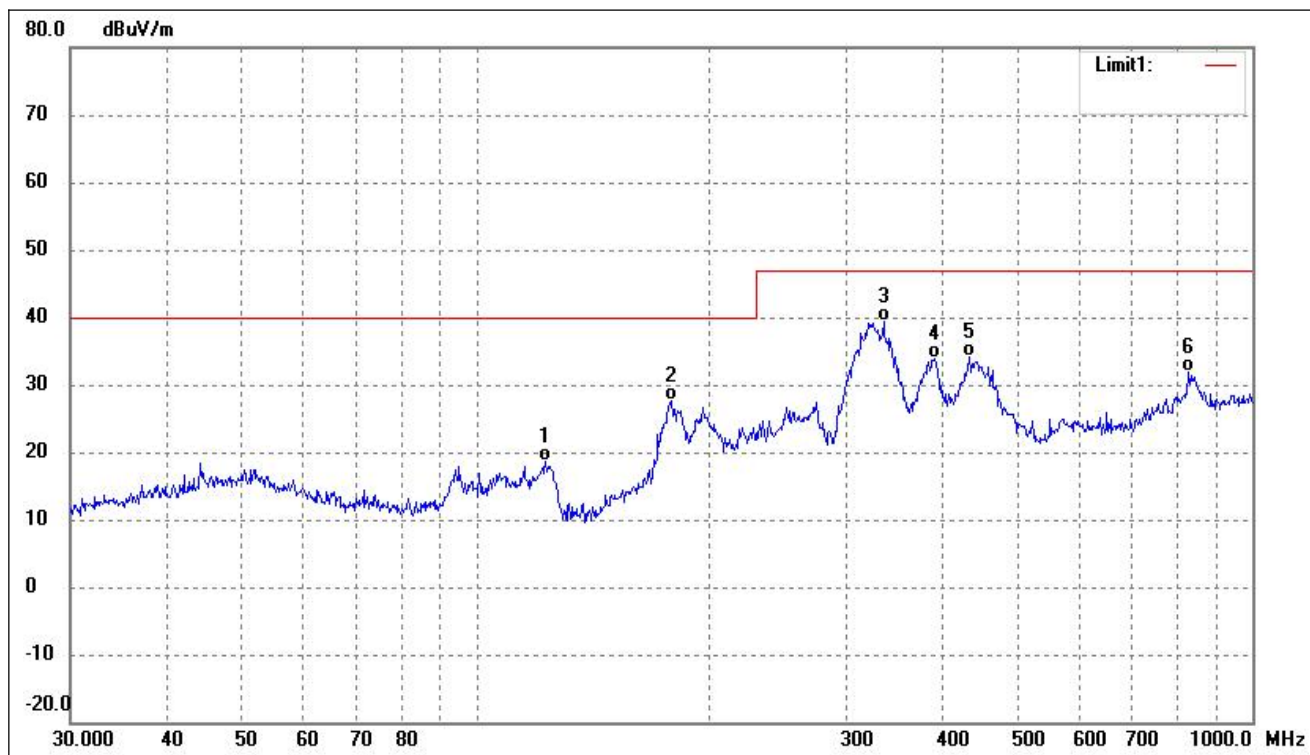
$$\text{Margin} = \text{Corr. Ampl.} - \text{EN 301489 Class B Limit}$$

4.4 Environmental Conditions

Temperature:	23° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

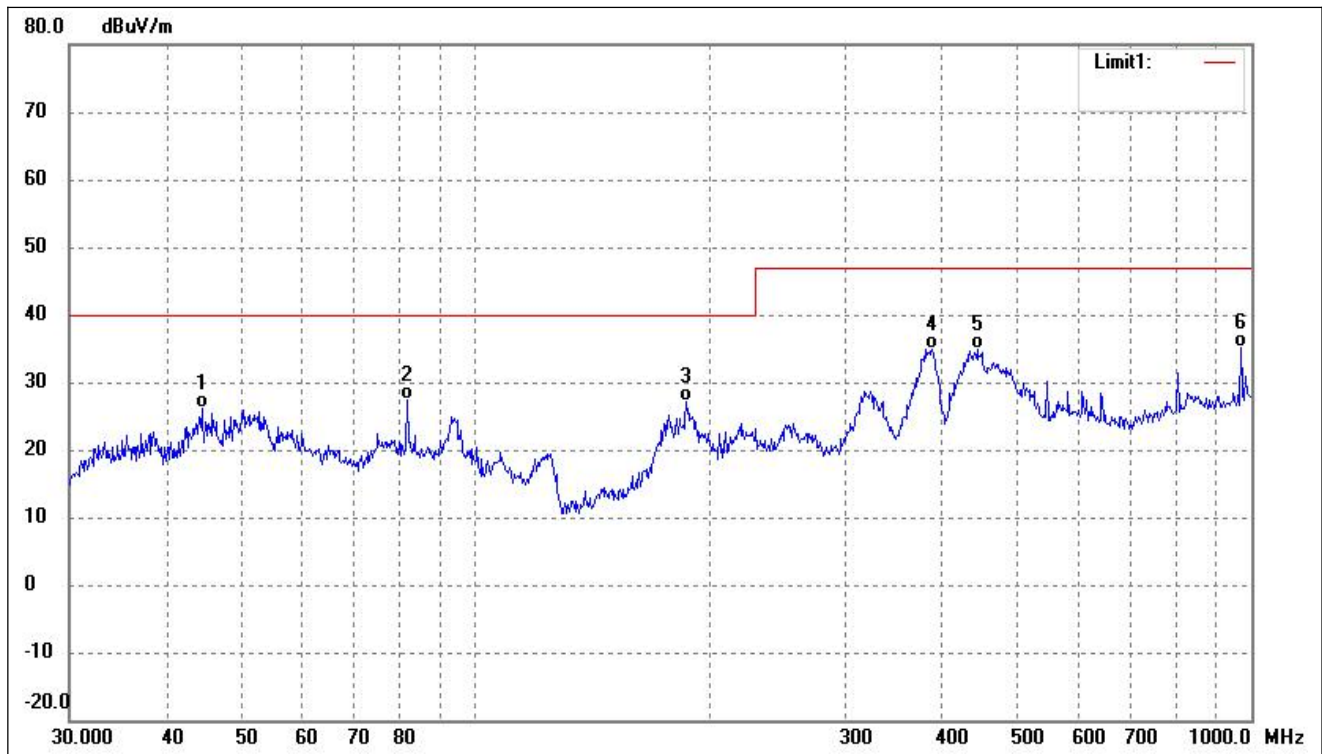
According to the data in section 4.6, the EUT complied with the EN 301489 Class B standards

**Plot of Radiated Emissions Test Data***EUT:* Bluetooth Speaker*Tested Model:* HSK-M2*Operating Condition:* TM1 (Worst case)*Comment:**Test Specification:* Horizontal

No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	()	(cm)	
1	122.8340	33.50	-14.91	18.59	40.00	-21.41	264	100	QP
2	178.7584	42.30	-14.63	27.67	40.00	-12.33	311	100	QP
3	334.8589	48.17	-8.89	39.28	47.00	-7.72	94	100	QP
4	389.3549	41.52	-7.63	33.89	47.00	-13.11	278	100	QP
5	432.5457	40.35	-6.19	34.16	47.00	-12.84	192	100	QP
6	827.4934	33.43	-1.59	31.84	47.00	-15.16	192	100	QP



Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	44.4308	37.61	-11.48	26.13	40.00	-13.87	176	100	QP
2	81.7833	42.95	-15.51	27.44	40.00	-12.56	186	100	QP
3	187.0958	40.92	-13.75	27.17	40.00	-12.83	112	100	QP
4	387.9920	42.53	-7.62	34.91	47.00	-12.09	135	100	QP
5	443.2943	41.04	-6.25	34.79	47.00	-12.21	228	100	QP
6	968.9338	34.85	0.25	35.10	47.00	-11.90	95	100	QP



5. Harmonic Current Emissions

5.1 Test Procedure

Test is conducting under the description of EN61000-3-2.

5.2 Test Standards

EN61000-3-2, Clause 7.1 Limits for Class A equipment.

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	48%
ATM Pressure:	1022 mbar

5.3 Harmonic Current Emissions Test Data

According to Clause 7 of EN61000-3-2, the EUT is less than 75W, belong to 'equipment with a rated power of 75W or less', therefore 'limits are not specified in this edition of the standards'. It is deem to full fit the requirements of the standards.

Result: The EUT is compliance with the requirements of this section.



6. Voltage Fluctuation and Flicker

6.1 Test Procedure

Test is conducting under the description of EN61000-3-3.

6.2 Test Standards

EN61000-3-3, Limit: Clause 5.

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	48%
ATM Pressure:	1022 mbar

6.3 Voltage Fluctuation and Flicker Test Data

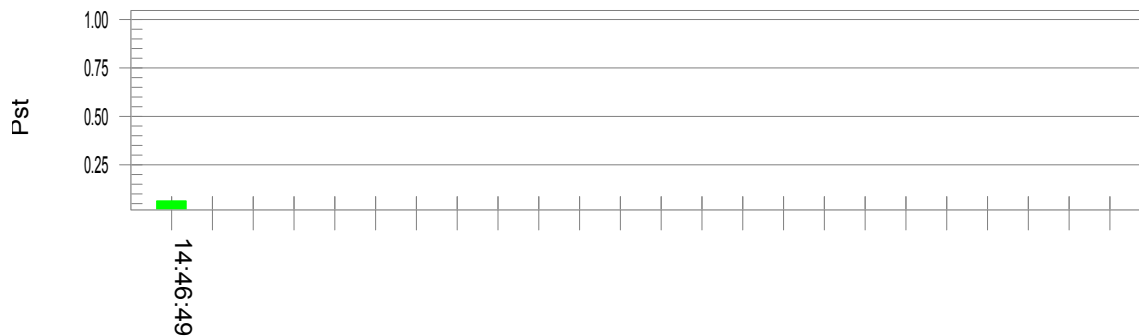
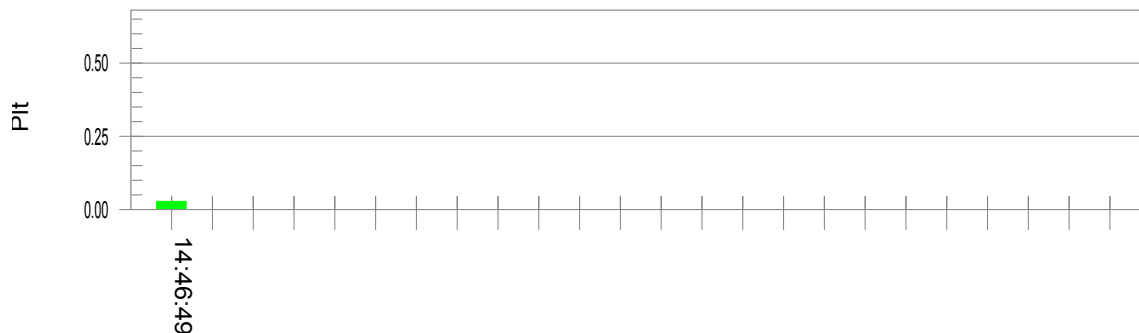
According to clause 6.1 of EN 61000-3-3, “Tests need not be made on equipment which is unlikely to produce significant voltage fluctuations or flicker.”

Result: The EUT is compliance with the requirements of this section.



Test mode:

TM1

Pst and limit lineEuropean LimitsPlt and limit line**Parameter values recorded during the test:****Vrms at the end of test (Volt): 231.45**

T-max (mS):	0	Test limit (mS):	500.0	Pass
Highest dc (%):	0.00	Test limit (%):	3.30	Pass
Highest dmax (%):	0.00	Test limit (%):	4.00	Pass
Highest Pst (10 min. period):	0.062	Test limit:	1.000	Pass
Highest Plt (2 hr. period):	0.026	Test limit:	0.650	Pass



7. Electrostatic Discharge (ESD)

7.1 Test Procedure

Test is conducting under the description of IEC61000-4-2.

Test Performance

Performance Criterion: B for TT, TR

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

7.2 Electrostatic Discharge Immunity Test Data

Operating Condition: TM1

EN 61000-4-2 Test Points	Test Levels (kV)							
	-2	+2	-4	+4	-6	+6	-8	+8
Air Discharge								
Slots	A	A	A	A	A	A	A	A
Indicate LED	A	A	A	A	A	A	A	A
Buttons	A	A	A	A	A	A	A	A
Direct Contact Discharge								
Metal Part	A	A	A	A	--	--	--	--

Test Result: Pass



8. Radio Frequency Electromagnetic Field (R/S)

8.1 Test Procedure

Test is conducting under the description of IEC61000-4-3.

Test Performance

Performance Criterion: A for CT, CR

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1010 mbar

8.2 Continuous Radiated Disturbances Test Data

Frequency step: 1% of fundamental

Dwell time: 1 second

Modulation: AM by 1kHz sine wave with 80% modulation depth

Operating Condition: TM1/TM2

Frequency Range(MHz)	Field (V/m)	Front		Rear		Left Side		Right Side	
		VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-1000	3	A	A	A	A	A	A	A	A
1000-3000	3	A	A	A	A	A	A	A	A
3000-6000	3	A	A	A	A	A	A	A	A

Test Result: Pass



9. Fast Transients, Common Mode (EFT)

9.1 Test Procedure

Test is conducting under the description of IEC61000-4-4.

Test Performance

Performance Criterion: B for TT, TR

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

9.2 Electrical Fast Transients Test Data

Operating Condition: TM1/TM2

EN 61000-4-4 Test Points		Test Levels (kV)							
		+0.5	-0.5	+1.0	-1.0	+2.0	-2.0	+4.0	-4.0
Power Supply Power Port of EUT	L1	A	A	B	B	/	/	/	/
	L2	A	A	B	B	/	/	/	/
	PE	/	/	/	/	/	/	/	/
	L1+L2	A	A	B	B	/	/	/	/
	L1 + PE	/	/	/	/	/	/	/	/
	L2 + PE	/	/	/	/	/	/	/	/
	L1+L2+PE	/	/	/	/	/	/	/	/
Signal ports		/	/	/	/	/	/	/	/

Test Result: Pass



10. Surges

10.1 Test Procedure

Test is conducting under the description of IEC 61000-4-5.

Test Performance

Performance Criterion: B for TT, TR

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

10.2 Surge Test Data

Operating Condition: TM1/TM2

Level	Voltage	Poll	Path	Pass	Fail
2	0.5kV	±	L-N	A	/
3	1kV	±	L-N	A	/
/	2kV	±	L-PE, N-PE	/	/
/	4kV	±	L-N, L-PE, N-PE	/	/

Test Result: Pass



11. Radio Frequency, Common Mode (C/S)

11.1 Test Procedure

Test is conducting under the description of IEC 61000-4-6.

Test Performance

Performance Criterion: A for CT, CR

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

11.2 Continuous Conducted Disturbances Test Data

Sweep frequency range: 150kHz~80MHz

Frequency step: 1% of fundamental

Dwell time: 1 second

Operating Condition: TM1/TM2

Level	Voltage (V) (rms, unmodulated)	Modulation:	Pass	Fail
1	1	AM 80%, 1kHz sinewave	/	/
2	3	AM 80%, 1kHz sinewave	A	/
3	10	AM 80%, 1kHz sinewave	/	/
X	Special	/	/	/

Test Result: Pass



12. Voltage Dips and Interruptions

12.1 Test Procedure

Test is conducting under the description of IEC 61000-4-11.

Test Performance

Performance Criterion: B/C

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

12.2 Voltage Dips And Interruptions Test Data

U: Vlotage dips in % U_T (U_T is rated voltage for the EUT)

T: Test duration

Operating Condition: TM1/TM2

Level	U	T	Phase Angle	N	Pass	Fail
1	100%	10ms	0/90/180/270	3	A	/
2	100%	20ms	0/90/180/270	3	A	/
3	30%	500ms	0/90/180/270	3	B	/
4	100%	5000ms	0/90/180/270	3	C	/

Test Result: Pass



EXHIBIT A - LABEL

Label Information



Remark: Text is Black in color and is justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened onto the EUT or shall be affixed at a conspicuous location on the EUT. The 'CE' marking must be affixed to the EUT or to its data plate. Where this is not possible or not warranted on account of the nature of the apparatus, it must be affixed to the packaging, if any, and to the accompanying documents. The 'CE' marking must have a height of at least 5 mm. If the 'CE' marking is reduced or enlarged the proportions given in the above graduated drawing must be respected.



EXHIBIT B - EUT PHOTOS

EUT View 1

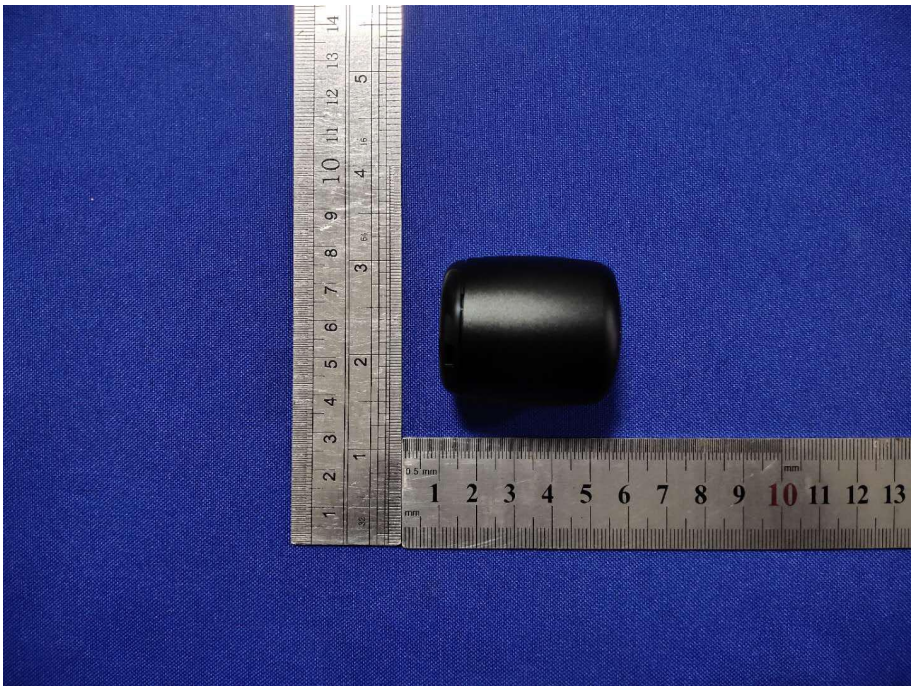


EUT View 2





EUT View 3

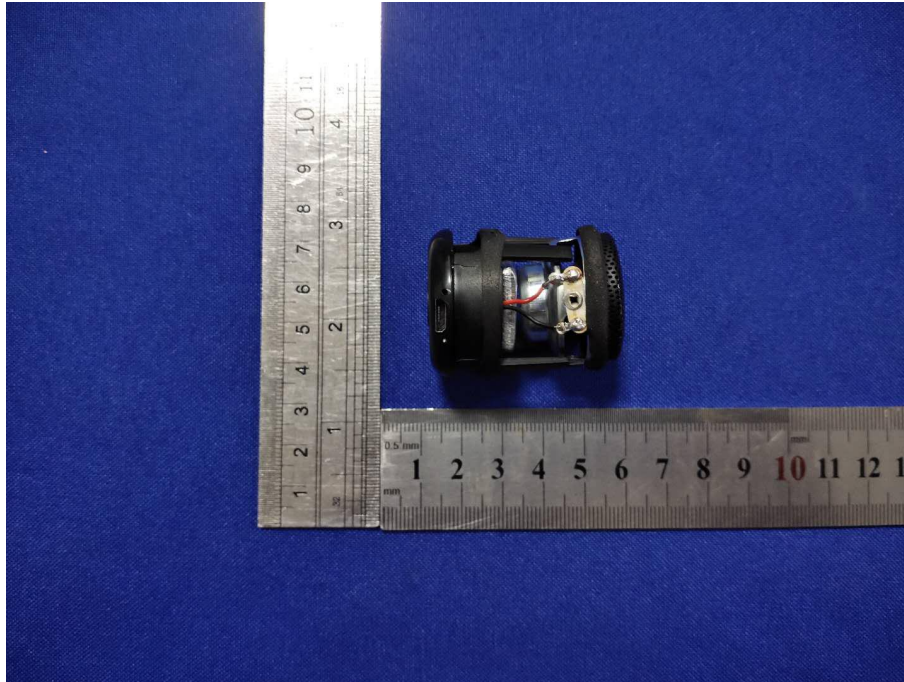


EUT View 4





EUT View 5



EUT View 6



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