

# FCC AND ISED CERTIFICATION TEST REPORT

## FOR

<b>Applicant</b>	:	Harman International Industries, Inc.
<b>Address</b>	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
<b>Equipment under Test</b>	:	PORTABLE BLUETOOTH SPEAKER
<b>Model No.</b>	:	ONYX STUDIO 7
<b>Trade Mark</b>	:	harman/kardon
<b>FCC ID</b>	:	APIHKONYXST7
<b>IC</b>	:	6132A-HKONYXST7
<b>Manufacturer</b>	:	Harman International Industries, Inc.
<b>Address</b>	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

**Issued By: Dongguan Dongdian Testing Service Co., Ltd.**

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# REPORT

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## Test Report Declare

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<b>Manufacturer</b>	:	Harman International Industries, Inc.
<b>Address</b>	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

### Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-247 Issue 2 February 2017.

### Test procedure used:

ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018

### We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

**After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC&ISED standards.**

<b>Report No:</b>	DDT-Q20083110-1E5 Rev.01		
<b>Date of Receipt:</b>	Jan. 14, 2021	<b>Date of Test:</b>	Jan. 14, 2021 ~ Jan. 26, 2021

### Prepared By:

*Bobo Chen*

**Bobo Chen/Engineer**

### Approved By:



**Damon Hu/EMC Manager**

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

## Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Oct. 13, 2020	Jacky Huang
Rev.01	This report added AC adapter on the basis of the original report, this change doesn't influence the RF performance, so only power line conducted was tested and updated in this report.	Jan. 26, 2021	Bobo Chen

## 1. Summary of Test Results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
Power Line Conducted Emission	FCC Part 15: 15.207 ANSI C63.10: 2013 RSS-Gen Issue 5	Pass

## 2. General Test Information

### 2.1. Description of EUT

EUT* Name	: PORTABLE BLUETOOTH SPEAKER
Model Number	: ONYX STUDIO 7
EUT Function Description	: Please reference user manual of this device
Power Supply	: DC 19V from external AC Adapter : DC 3.6V Polymer Li-ion built-in battery
Radio Specification	: Bluetooth V4.2
Operation Frequency	: 2402 MHz - 2480 MHz
Modulation	: GFSK
Data Rate	: 1 Mbps
Antenna Type	: FPC antenna, maximum PK gain: 2.79 dBi
Serial number	: GG0991-KK0000075 for radiation test

Note: EUT is the abbreviation of equipment under test.

Channel Information					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

### 2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Description	Remark
AC cable	Harman	N/A	Length: 1.0m, unshielded	N/A
Adapter	Group Intellect Power Technology Limited	DT19V-2C-DC	Input: 100-240~, 50/60Hz, 1.5A; Output: 19V/2A	N/A
Rechargeable Li-ion Battery	Guangzhou Great Power Energy & Technology Co., Ltd.	GSP-1S1P-OS 7A	Rated Capacity: 3.6V 3250mAh 70Wh	N/A

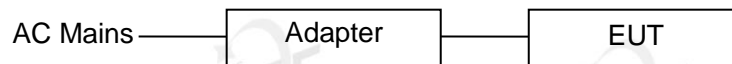
New AC Adapter:

Description of Accessories	Manufacturer	Model number	Description	Remark
AC Adapter	Shenzhen JingQuanHua & Everrise Intelligent Electric Co., Ltd.	NSA40ED-190 200	Input: 100-240V~ 50/60Hz 1.0A Output: 19Vdc, 0.01-2.0A	N/A

### 2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Notebook	Lenovo Beijing Co. Ltd.	ThinkPad	FCC/CE	TP00015A

### 2.4. Block diagram of EUT configuration for test



Test software: BQB.EXE

The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table:

Tested Mode, Channel, Information			
Mode	Setting Tx Power	Channel	Frequency (MHz)
GFSK	/	CH0	2402
	/	CH19	2440
	/	CH39	2480

### 2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 °C
Humidity range:	40-75%
Pressure range:	86-106 kPa

### 2.6. Deviations of test standard

No deviation.

## 2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: [ddt@dgddt.com](mailto:ddt@dgddt.com)

CNAS Registration No. CNAS L6451; A2LA Certificate Number: 3870.01;

FCC Designation Number: CN1182; FCC Test Firm Registration Number: 540522

Industry Canada Site Registration Number: 10288A-1

## 2.8. Measurement uncertainty

Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74 dB
Power Spectral Density	0.74 dB (10 MHz ≤ f < 3.6 GHz);
	1.38 dB (3.6 GHz ≤ f < 8 GHz)
Frequencies Stability	6.7 x 10 <sup>-8</sup> (Antenna couple method)
	5.5 x 10 <sup>-8</sup> (Conducted method)
Conducted Spurious Emissions	0.86 dB (10 MHz ≤ f < 3.6 GHz);
	1.40 dB (3.6 GHz ≤ f < 8 GHz)
	1.66 dB (8 GHz ≤ f < 22 GHz)
Uncertainty for Radio Frequency (RBW < 20 kHz)	3x10 <sup>-8</sup>
Temperature	0.4 °C
Humidity	2 %
Uncertainty for Radiation Emission Test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission Test (1 GHz - 40 GHz)	4.10 dB (1-6 GHz)
	4.40 dB (6 GHz - 18 GHz)
	3.54 dB (18 GHz - 26 GHz)
	4.30 dB (26 GHz - 40 GHz)
Uncertainty for Power Line Conduction Emission Test	3.32 dB (150 kHz - 30 MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	



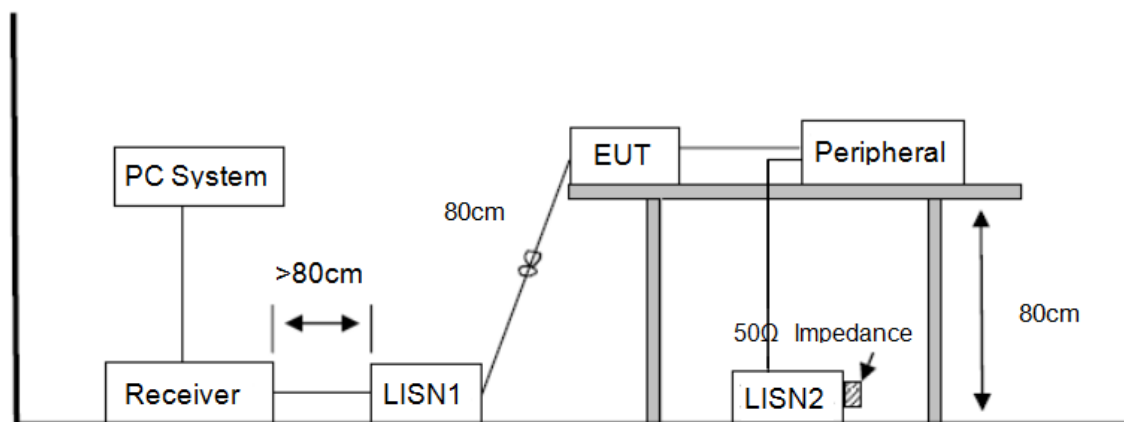
### 3. Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input type="checkbox"/> RF Connected Test (Tonscend RF Measurement System 1#)					
Spectrum analyzer	R&S	FSU26	101272	Jul. 01, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 24, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
<input type="checkbox"/> RF Connected Test (Tonscend RF Measurement System 2#)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 25, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	Jul. 01, 2020	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC01449	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
<input type="checkbox"/> Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 18, 2020	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 13, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 28, 2020	1 Year
RF Cable	HUBSER	CP-X2+	W11.03+	Sep. 24, 2020	1 Year

		CP-X1	W12.02		
RF Cable	N/A	5m+6m+1m	06270619	Sep. 30, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 30, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
<input type="checkbox"/> <b>Radiation 2#chamber</b>					
EMI Test Receiver	R&S	ESCI	101364	Sep. 28, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	9163-994	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 18, 2020	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02108	Jul. 11, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	1013 03	Sep. 28, 2020	1 Year
RF Cable	N/A	14+1.5m	06270619	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
<input checked="" type="checkbox"/> <b>Power Line Conducted Emissions Test 1#</b>					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101109	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 24, 2020	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
<input type="checkbox"/> <b>Power Line Conducted Emissions Test 2#</b>					
Test Receiver	R&S	ESPI	101761	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101170	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	KH43101	43101180156 8-12#	Jul. 01, 2020	1 Year
CE Cable 2	HUBSER	N/A	W11.02	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

## 4. Power Line Conducted Emission

### 4.1. Block diagram of test setup



### 4.2. Power line conducted emission limits

Frequency	Quasi-Peak Level dB( $\mu$ V)	Average Level dB( $\mu$ V)
150 kHz ~ 500 kHz	66 ~ 56*	56 ~ 46*
500 kHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50

Note 1: \* Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

### 4.3. Test procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

#### 4.4. Test result

PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

Note2: "-----" means Peak detection; "-----" means Average detection

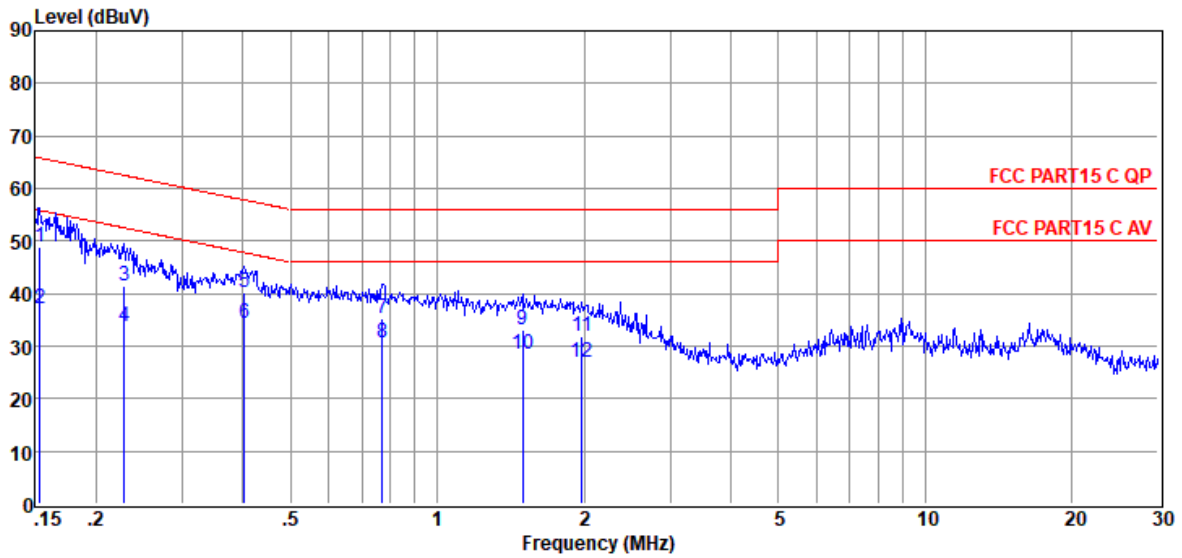
Note3: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/50Hz, recorded worse case.

# TR-4-E-010 Conducted Emission Test Result

**Test Site** : DDT 1# Shield Room D:\2021 CE report date\Q21011314-1E\RF CE.EM6  
**Test Date** : 2021-01-15 **Tested By** : Vic Xie  
**EUT** : PORTABLE BLUETOOTH SPEAKER **Model Number** : ONYX STUDIO 7  
**Power Supply** : AC 120V/60Hz **Test Mode** : Tx mode  
**Condition** : Temp:24.5°C,Humi:55%,Press:100.1kPa **LISN** : 2020 ENV 216 1#/LINE

**Memo** :

Data: 11



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.15	29.67	9.39	0.02	9.86	48.94	65.82	-16.88	QP	LINE
2	0.15	17.96	9.39	0.02	9.86	37.23	55.82	-18.59	Average	LINE
3	0.23	22.27	9.40	0.02	9.86	41.55	62.52	-20.97	QP	LINE
4	0.23	14.57	9.40	0.02	9.86	33.85	52.52	-18.67	Average	LINE
5	0.40	20.89	9.41	0.02	9.86	40.18	57.81	-17.63	QP	LINE
6	0.40	15.04	9.41	0.02	9.86	34.33	47.81	-13.48	Average	LINE
7	0.77	15.96	9.42	0.03	9.86	35.27	56.00	-20.73	QP	LINE
8	0.77	11.23	9.42	0.03	9.86	30.54	46.00	-15.46	Average	LINE
9	1.50	13.72	9.42	0.04	9.86	33.04	56.00	-22.96	QP	LINE
10	1.50	9.00	9.42	0.04	9.86	28.32	46.00	-17.68	Average	LINE
11	1.98	12.64	9.42	0.05	9.87	31.98	56.00	-24.02	QP	LINE
12	1.98	7.55	9.42	0.05	9.87	26.89	46.00	-19.11	Average	LINE

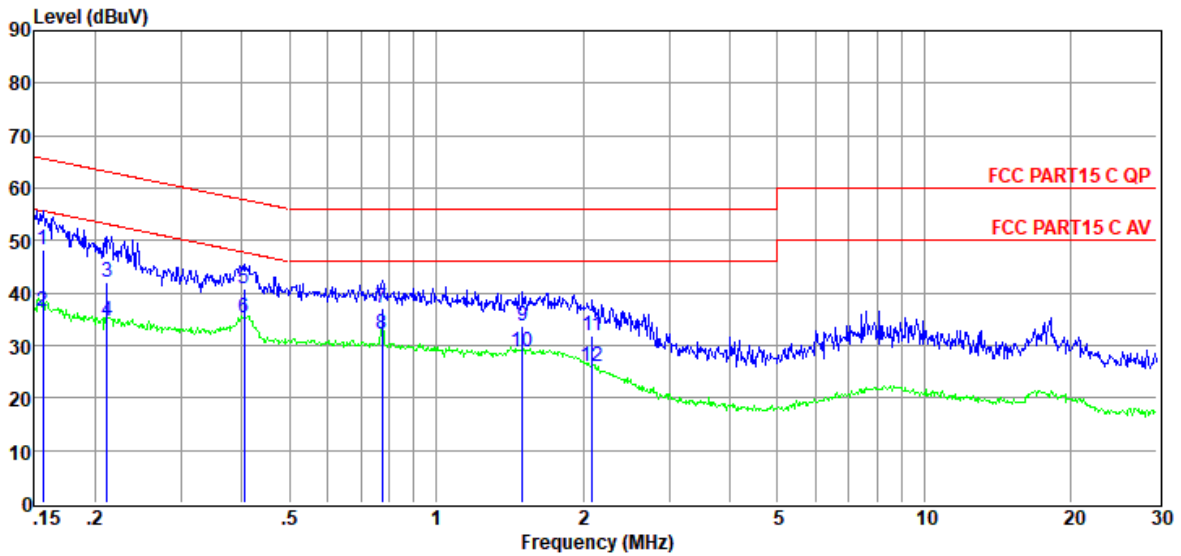
- Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.  
 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).  
 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

# TR-4-E-010 Conducted Emission Test Result

**Test Site** : DDT 1# Shield Room D:\2021 CE report date\Q21011314-1E\RF CE.EM6  
**Test Date** : 2021-01-15 **Tested By** : Vic Xie  
**EUT** : PORTABLE BLUETOOTH SPEAKER **Model Number** : ONYX STUDIO 7  
**Power Supply** : AC 120V/60Hz **Test Mode** : Tx mode  
**Condition** : Temp:24.5°C,Humi:55%,Press:100.1kPa **LISN** : 2020 ENV 216 1#/NEUTRAL

**Memo** :

Data: 13



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.16	29.08	9.38	0.02	9.86	48.34	65.65	-17.31	QP	NEUTRAL
2	0.16	17.31	9.38	0.02	9.86	36.57	55.65	-19.08	Average	NEUTRAL
3	0.21	22.89	9.37	0.02	9.86	42.14	63.14	-21.00	QP	NEUTRAL
4	0.21	15.44	9.37	0.02	9.86	34.69	53.14	-18.45	Average	NEUTRAL
5	0.40	21.68	9.39	0.02	9.86	40.95	57.77	-16.82	QP	NEUTRAL
6	0.40	15.89	9.39	0.02	9.86	35.16	47.77	-12.61	Average	NEUTRAL
7	0.78	17.78	9.39	0.03	9.86	37.06	56.00	-18.94	QP	NEUTRAL
8	0.78	12.89	9.39	0.03	9.86	32.17	46.00	-13.83	Average	NEUTRAL
9	1.50	14.34	9.40	0.04	9.86	33.64	56.00	-22.36	QP	NEUTRAL
10	1.50	9.50	9.40	0.04	9.86	28.80	46.00	-17.20	Average	NEUTRAL
11	2.09	12.48	9.40	0.05	9.87	31.80	56.00	-24.20	QP	NEUTRAL
12	2.09	6.67	9.40	0.05	9.87	25.99	46.00	-20.01	Average	NEUTRAL

- Note: 1. Result Level = Read Level + LISN Factor + Pulse Limiter Factor + Cable loss.  
 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.  
 3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).  
 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

**END OF REPORT**