

FCC AND IC CERTIFICATION TEST REPORT

FOR

Applicant	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment under Test	:	Wireless Soundbar
Model No.	:	LINK BAR
Trade Mark	:	JBL
FCC ID	:	APIJBLLINKBAR
IC	:	6132A-JBLLINKBAR
Manufacturer	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

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

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan
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REPORT

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TEST REPORT DECLARE

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Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 9 August 2016.

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&IC standards.

Report No:	DDT-R18042603-1E6		
Date of Receipt:	Jun. 20, 2018	Date of Test:	Jun. 20, 2018 ~ Jul. 31, 2018

Prepared By:

Sam Li

Sam Li/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	Jul. 31, 2018	

1. Summary of test results

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	Standard	Results
20dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.215 ANSI C63.10:2013 RSS-210 Issue 9 RSS-Gen Issue 5	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.249 ANSI C63.10:2013 RSS-210 Issue 9 RSS-Gen Issue 5	PASS
Band Edge Compliance	FCC Part 15: 15.205 FCC Part 15: 15.249 ANSI C63.10:2013 RSS-210 Issue 9 RSS-Gen Issue 5	PASS
Power Line Conducted Emission	FCC Part 15: 15.207 ANSI C63.10:2013 RSS-Gen Issue 5	PASS
Antenna requirement	FCC Part 15: 15.203 RSS-Gen Issue 5	PASS

2. General test information

2.1. Description of EUT

EUT* Name	: Wireless Soundbar
Model Number	: LINK BAR
EUT function description	: Please reference user manual of this device
Power supply	: AC 100-240V, 50/60Hz
Operation frequency	: 5740MHz-5840MHz
Modulation	: GFSK
Antenna Type	: Antenna 1: Integral PCB antenna, maximum PK gain: 2.85dBi Antenna 2: Integral PCB antenna, maximum PK gain: 2.85dBi
Sample Type	: Series production

Note: EUT is the ab. of equipment under test.

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
15	5740	53	5778	87	5812
18	5743	54	5779	90	5815
22	5747	58	5783	93	5818
26	5751	62	5787	94	5819
27	5752	65	5790	98	5823
30	5755	66	5791	102	5827
33	5758	67	5792	106	5831
34	5759	70	5795	107	5832
38	5763	73	5798	110	5835
42	5767	74	5799	113	5838
46	5771	78	5803	115	5840
47	5772	82	5807		
50	5775	86	5811		

2.2. Accessories of EUT

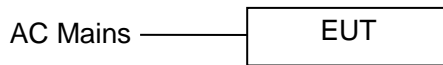
Description of Accessories	Manufacturer	Model number	Serial No.	Other
HDMI cable	harman/kardon	N/A	N/A	Length: 1.5m, shielded
AC cable	harman/kardon	N/A	N/A	Length: 1.8m without core

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
Notebook	DELL	Latitude D610	FCC DOC	00045-534-136-300

2.4. Block diagram of EUT configuration for test

Tx Mode:



Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
GFSK Tx mode	Low	5740
	Middle	5790
	High	5840

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:	86-106kPa

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, E-mail: ddt@dgddt.com, <http://www.dgddt.com>

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

Designation Number: CN1182; Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1

2.8. Measurement uncertainty

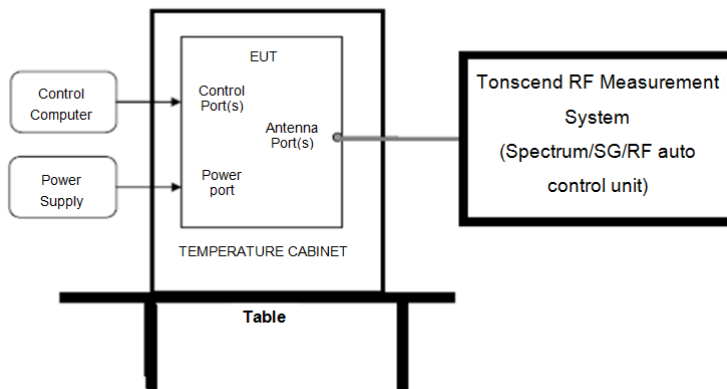
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86dB(10 MHz ≤ f < 3.6GHz);
	1.38dB(3.6GHz ≤ f < 8GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74dB
Power Spectral Density	0.74dB(10 MHz ≤ f < 3.6GHz);
	1.38dB(3.6GHz ≤ f < 8GHz)
Conducted spurious emissions	0.86dB(10 MHz ≤ f < 3.6GHz);
	1.40dB(3.6GHz ≤ f < 8GHz)
	1.66dB(8GHz ≤ f < 22GHz)
Uncertainty for radio frequency (RBW<20kHz)	3×10^{-8}
Temperature	0.4℃
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70dB(Antenna Polarize: V)
	4.84dB(Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-40GHz)	4.10dB(1-6GHz)
	4.40dB(6GHz-18GHz)
	3.54dB(18GHz-26GHz)
	4.30dB(26GHz-40GHz)
Uncertainty for Power line conduction emission test	3.32dB(150kHz-30MHz)
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
RF Connected Test					
Spectrum analyzer	R&S	FSU26	200071	Oct. 23, 2017	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jun. 29, 2018	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Oct. 23, 2017	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jun. 29, 2018	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Oct. 21, 2017	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Oct. 23, 2017	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Aug. 18, 2017	1 Year
Attenuator	Mini-Circuits	BW-S10W2	101109	Aug. 18, 2017	1 Year
RF Cable	Micable	C10-01-01-1	100309	Oct. 21, 2017	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Oct. 21, 2017	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiated Emission Test Chamber 1#					
EMI Test Receiver	R&S	ESU8	100316	Oct. 21, 2017	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 29, 2018	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 09, 2017	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Oct. 17, 2017	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Oct. 17, 2017	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Nov. 09, 2017	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Oct. 21, 2017	1 Year
Pre-amplifier	TERA-MW	TRLA-0040G35	101303	Oct. 21, 2017	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Oct. 21, 2017	1 Year
RF Cable	N/A	SMAJ-SMAJ-1 M+ 11M	17070133+17 070131	Nov. 08, 2017	1 Year
MI Cable	HUBSER	C10-01-01-1M	1091629	Oct. 21, 2017	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test					
Test Receiver	R&S	ESPI	101761	Oct. 21, 2017	1 Year
LISN 1	R&S	ENV216	101109	Oct. 21, 2017	1 Year
LISN 2	R&S	ESH2-Z5	100309	Oct. 21, 2017	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Oct. 21, 2017	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Oct. 21, 2017	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

4. 20dB Bandwidth and 99% Bandwidth

4.1. Block diagram of test setup



4.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3. Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Set the spectrum analyzer as follows:

RBW:	100kHz
VBW:	300kHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

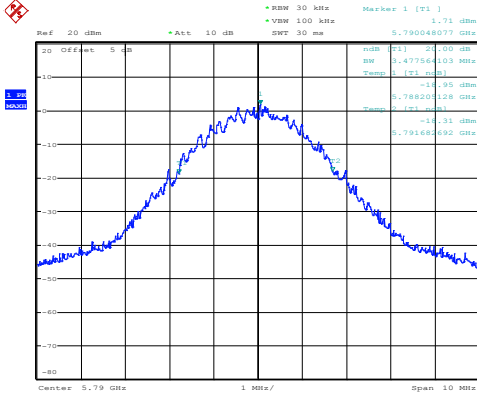
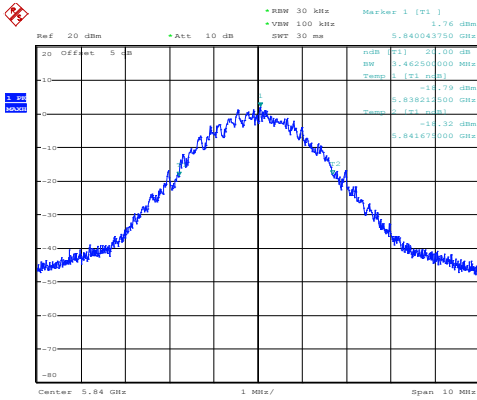
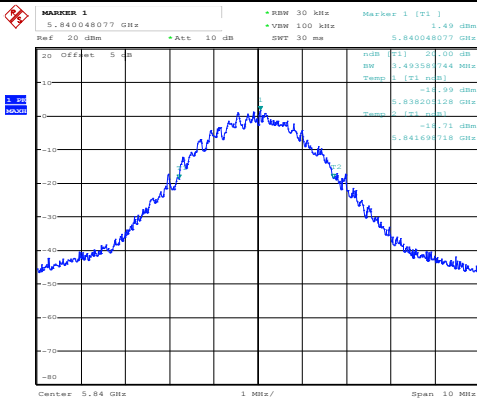
(3) Allow the trace to stabilize, measure the 20dB and 99% bandwidth of signal.

4.4. Test Result

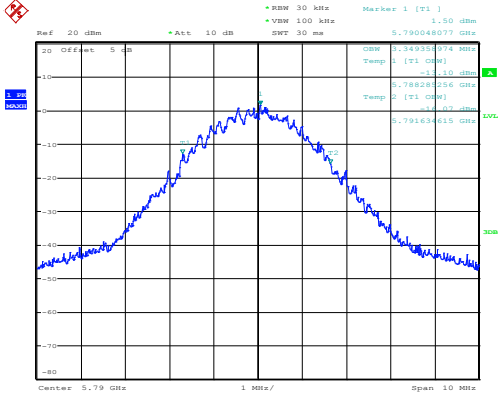
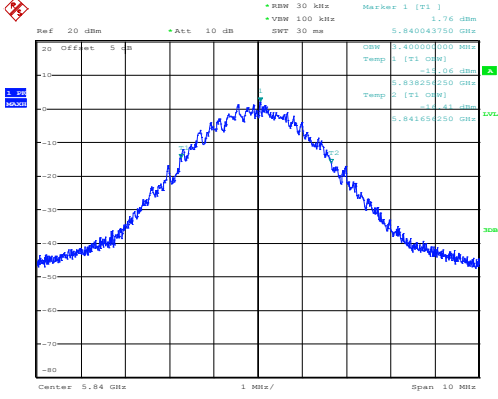
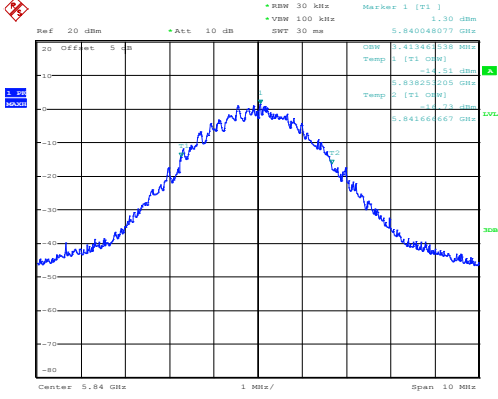
Mode	ANT	Freq (MHz)	20dB bandwidth Result (MHz)	99% bandwidth Result (MHz)	Conclusion
GFSK	ANT1	5740	3.444	3.288	PASS
	ANT2	5740	3.446	3.301	PASS
	ANT1	5790	3.450	3.350	PASS
	ANT2	5790	3.478	3.349	PASS
	ANT1	5840	3.463	3.400	PASS
	ANT2	5840	3.494	3.413	PASS

4.5. Original test data

20 dB Bandwidth																
<p>LCH 5740 ANT1</p>	<p>Ref: 20 dBm * Att: 10 dB * BW: 20 kHz * VSW: 100 kHz * SWF: 30 ms Marker 1 [T1] 5.74037500 GHz 2.69 dBm</p> <table border="1"> <tr><td>dBm</td><td>[1]</td><td>20.00 dBm</td></tr> <tr><td>dB</td><td>[1]</td><td>3.44375000 MHz</td></tr> <tr><td>dBm</td><td>[2]</td><td>-1.70 dBm</td></tr> <tr><td>GHz</td><td>[1]</td><td>5.73821750 GHz</td></tr> <tr><td>GHz</td><td>[2]</td><td>5.741662500 GHz</td></tr> </table> <p>Center: 5.74 GHz 1 MHz/ Span: 10 MHz</p> <p>Date: 12.JUL.2018 20:43:14</p>	dBm	[1]	20.00 dBm	dB	[1]	3.44375000 MHz	dBm	[2]	-1.70 dBm	GHz	[1]	5.73821750 GHz	GHz	[2]	5.741662500 GHz
dBm	[1]	20.00 dBm														
dB	[1]	3.44375000 MHz														
dBm	[2]	-1.70 dBm														
GHz	[1]	5.73821750 GHz														
GHz	[2]	5.741662500 GHz														
<p>LCH 5740 ANT2</p>	<p>MARKER 1 5.740048077 GHz * BW: 30 kHz * VSW: 100 kHz * SWF: 30 ms Marker 1 [T1] 5.740048077 GHz 2.33 dBm</p> <table border="1"> <tr><td>dBm</td><td>[1]</td><td>21.00 dBm</td></tr> <tr><td>dB</td><td>[1]</td><td>-4.18 dBm</td></tr> <tr><td>GHz</td><td>[1]</td><td>5.73820154 GHz</td></tr> <tr><td>GHz</td><td>[2]</td><td>5.741666667 GHz</td></tr> </table> <p>Center: 5.74 GHz 1 MHz/ Span: 10 MHz</p> <p>Date: 12.JUL.2018 20:57:06</p>	dBm	[1]	21.00 dBm	dB	[1]	-4.18 dBm	GHz	[1]	5.73820154 GHz	GHz	[2]	5.741666667 GHz			
dBm	[1]	21.00 dBm														
dB	[1]	-4.18 dBm														
GHz	[1]	5.73820154 GHz														
GHz	[2]	5.741666667 GHz														
<p>MCH 5790 ANT1</p>	<p>Ref: 20 dBm * Att: 10 dB * BW: 30 kHz * VSW: 100 kHz * SWF: 30 ms Marker 1 [T1] 5.790043750 GHz 1.87 dBm</p> <table border="1"> <tr><td>dBm</td><td>[1]</td><td>20.00 dBm</td></tr> <tr><td>dB</td><td>[1]</td><td>3.45000000 MHz</td></tr> <tr><td>dBm</td><td>[2]</td><td>-1.67 dBm</td></tr> <tr><td>GHz</td><td>[1]</td><td>5.78821750 GHz</td></tr> <tr><td>GHz</td><td>[2]</td><td>5.791667500 GHz</td></tr> </table> <p>Center: 5.79 GHz 1 MHz/ Span: 10 MHz</p> <p>Date: 12.JUL.2018 20:42:41</p>	dBm	[1]	20.00 dBm	dB	[1]	3.45000000 MHz	dBm	[2]	-1.67 dBm	GHz	[1]	5.78821750 GHz	GHz	[2]	5.791667500 GHz
dBm	[1]	20.00 dBm														
dB	[1]	3.45000000 MHz														
dBm	[2]	-1.67 dBm														
GHz	[1]	5.78821750 GHz														
GHz	[2]	5.791667500 GHz														

<p>MCH 5790 ANT2</p>	 <p>Ref: 20 dBm, Att: 10 dB, RBW: 30 kHz, VBW: 100 kHz, Span: 10 MHz, Center: 5.79 GHz</p> <p>Date: 12.JUL.2018 20:57:40</p>
<p>HCH 5840 ANT1</p>	 <p>Ref: 20 dBm, Att: 10 dB, RBW: 30 kHz, VBW: 100 kHz, Span: 10 MHz, Center: 5.84 GHz</p> <p>Date: 12.JUL.2018 20:42:00</p>
<p>HCH 5840 ANT2</p>	 <p>Ref: 20 dBm, Att: 10 dB, RBW: 30 kHz, VBW: 100 kHz, Span: 10 MHz, Center: 5.84 GHz</p> <p>Date: 12.JUL.2018 20:58:32</p>

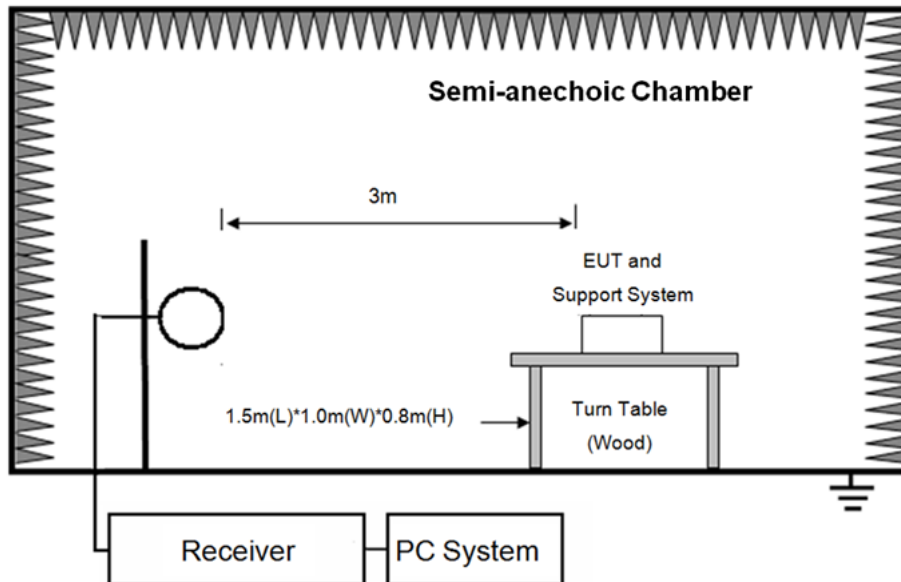
Occupied Bandwidth	
<p>LCH 5740 ANT1</p>	<p style="text-align: center;">Date: 12.JUL.2018 20:40:00</p>
<p>LCH 5740 ANT2</p>	<p style="text-align: center;">Date: 12.JUL.2018 20:56:41</p>
<p>MCH 5790 ANT1</p>	<p style="text-align: center;">Date: 12.JUL.2018 20:41:10</p>

<p>MCH 5790 ANT2</p>	 <p>Date: 12.JUL.2018 20:57:49</p>
<p>HCH 5840 ANT1</p>	 <p>Date: 12.JUL.2018 20:41:43</p>
<p>HCH 5840 ANT2</p>	 <p>Date: 12.JUL.2018 20:58:21</p>

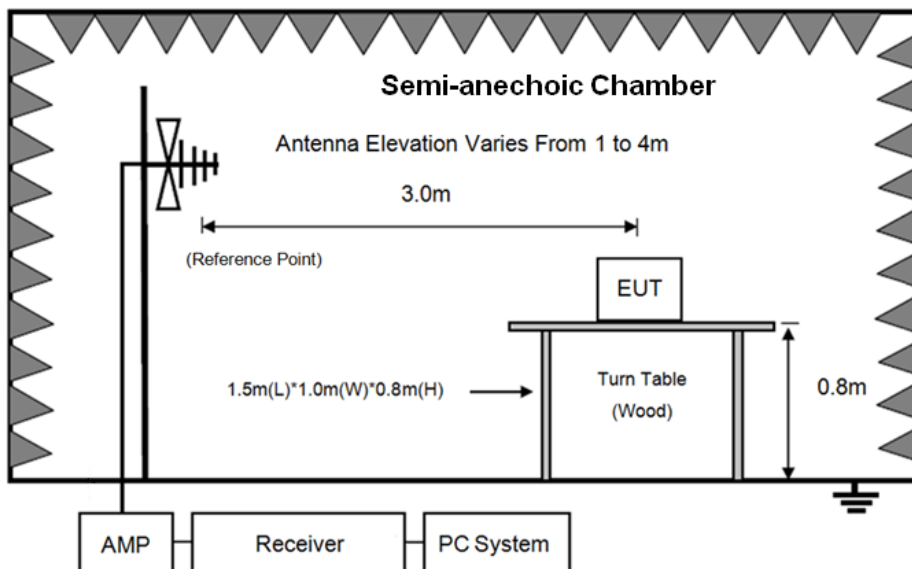
5. Radiated emission

5.1. Block diagram of test setup

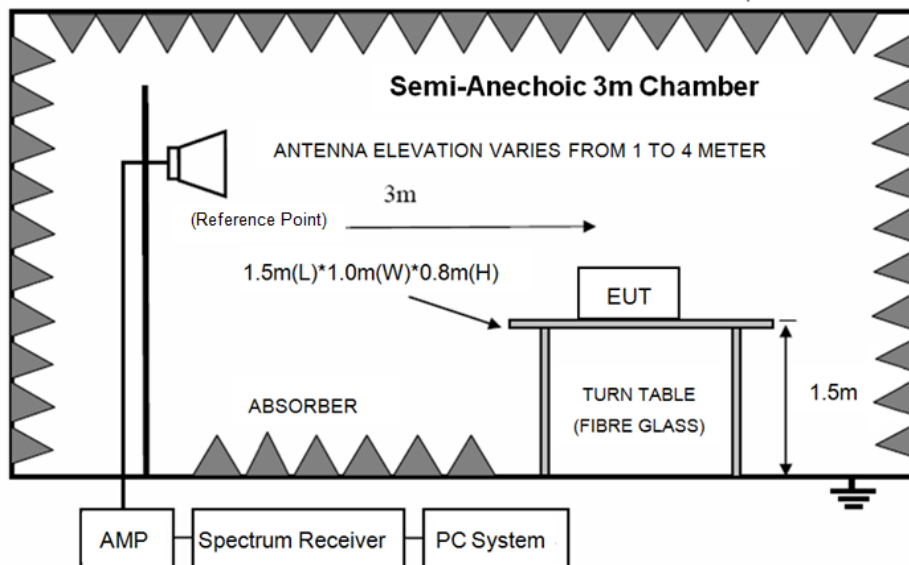
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

5.2. Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Field Strength of Fundamental emission for 5725MHz-5875MHz	3	94.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average) 114.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak)	
Field Strength of Harmonics	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Remark:

- (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V}/\text{m}$
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.
- (4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

5.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 5.1
- (3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
 - (a) Change work frequency or channel of device if practicable.
 - (b) Change modulation type of device if practicable.
 - (c) Change power supply range from 85% to 115% of the rated supply voltage
 - (d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
- (4) Spectrum frequency from 9kHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9kHz to 30MHz and 18GHz to 25GHz, so below final test was performed with frequency range from 30MHz to 18GHz.
- (5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.
- (6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.
- (7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure. Peak detector is used for both PK and AV test.
- (8) For fundamental frequency test, set spectrum analyzer's RBW=10MHz, VBW=30MHz. peak detector for PK, RMS detector for AV, Read the Level in spectrum analyzer and record.

5.4. Test result

PASS. (See below detailed test result)

All the emissions except fundamental emission from 9kHz to 25GHz were comply with 15.209 limit.
Note1: According exploratory test no any obvious emission was detected from 9kHz to 30MHz and 18GHz to 25GHz, so the final test was performed with frequency range from 30MHz to 18GHz and recorded in below.

Note2: For emissions below 1GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1GHz, the final test was only performed with EUT working in GFSK, Tx 5790MHz mode.

Note3: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

Field Strength Of The Fundamental Signal

Peak value:

Freq. (MHz)	Read level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector type	Polarization
5740.00	103.02	35.60	43.36	8.05	103.31	114.00	-10.69	Peak	HORIZONTAL
5740.00	100.84	35.60	43.36	8.05	101.13	114.00	-12.87	Peak	VERTICAL
5790.00	105.47	35.62	43.33	8.08	105.84	114.00	-8.16	Peak	HORIZONTAL
5790.00	103.04	35.62	43.33	8.08	103.41	114.00	-10.59	Peak	VERTICAL
5840.00	103.39	35.64	43.30	8.11	103.84	114.00	-10.16	Peak	HORIZONTAL
5840.00	100.11	35.64	43.30	8.11	100.56	114.00	-13.44	Peak	VERTICAL
Result: Pass									

Average value:

Freq. (MHz)	Read level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector type	Polarization
5740.00	91.82	35.60	43.36	8.05	92.11	94.00	-1.89	Average	HORIZONTAL
5740.00	88.11	35.60	43.36	8.05	88.40	94.00	-5.60	Average	VERTICAL
5790.00	91.44	35.62	43.33	8.08	91.81	94.00	-2.19	Average	HORIZONTAL
5790.00	87.43	35.62	43.33	8.08	87.80	94.00	-6.20	Average	VERTICAL
5840.00	91.62	35.64	43.30	8.11	92.07	94.00	-1.93	Average	HORIZONTAL
5840.00	87.50	35.64	43.30	8.11	87.95	94.00	-6.05	Average	VERTICAL
Result: Pass									

Note: Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

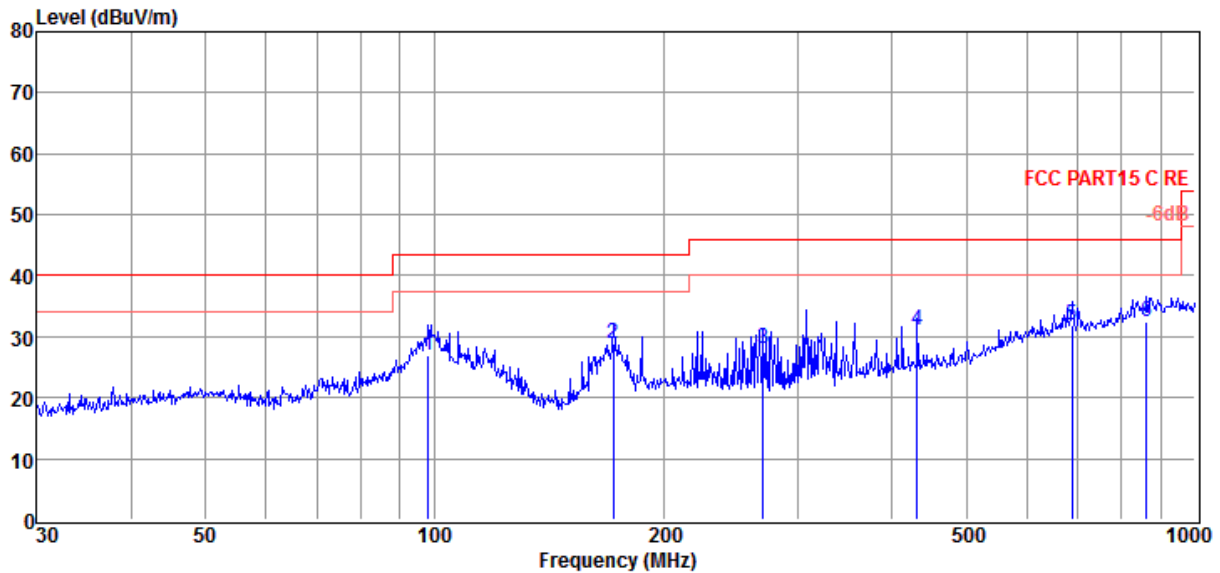
Radiated Emission test (below 1GHz)

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#
Test Date : 2018-07-18
EUT : Wireless Soundbar
Power Supply : AC 120V/60Hz
Condition : Temp:24.5'C, Humi:55.5%,
 Press:100.1kPa
Memo :

D:\2018 RE1# Test Data\Y\Ya nan\JBL LinkBar-30M-1G
 20180628.EM6
Tested By : Sunny
Model Number : LINK BAR
Test Mode : Tx mode
Antenna/Distance : 2017 VULB 9163 1#/3m/HORIZONTAL

Data: 18



Item (Mark)	Freq. (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	98.14	11.37	11.13	4.40	26.90	43.50	-16.60	QP	HORIZONTAL
2	172.00	14.67	9.28	4.89	28.84	43.50	-14.66	QP	HORIZONTAL
3	270.38	9.87	12.84	5.39	28.10	46.00	-17.90	QP	HORIZONTAL
4	431.03	9.36	15.97	5.74	31.07	46.00	-14.93	QP	HORIZONTAL
5	689.56	5.17	19.67	6.98	31.82	46.00	-14.18	QP	HORIZONTAL
6	863.06	2.89	22.14	7.50	32.53	46.00	-13.47	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

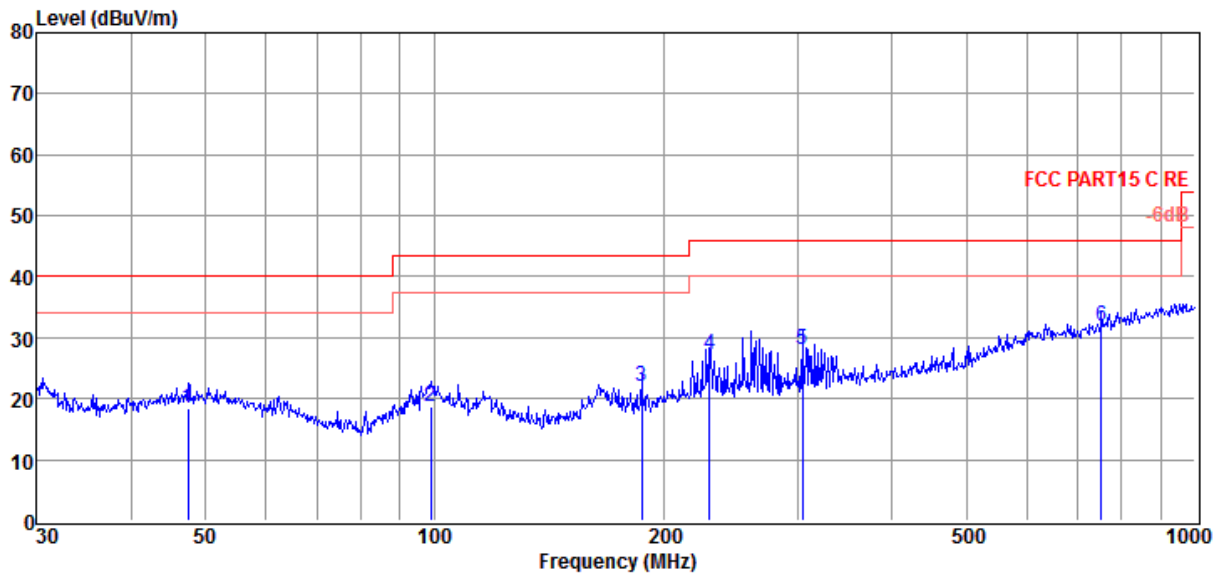
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#
Test Date : 2018-07-18
EUT : Wireless Soundbar
Power Supply : AC 120V/60Hz
Condition : Temp:24.5'C, Humi:55.5%,
 Press:100.1kPa
Memo :

D:\2018 RE1# Test Data\Y\Ya nan\JBL LinkBar-30M-1G
 20180628.EM6
Tested By : Sunny
Model Number : LINK BAR
Test Mode : Tx mode
Antenna/Distance : 2017 VULB 9163 1#/3m/VERTICAL

Data: 17



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	47.49	0.97	13.52	3.96	18.45	40.00	-21.55	QP	VERTICAL
2	98.83	3.10	11.27	4.40	18.77	43.50	-24.73	QP	VERTICAL
3	187.10	6.72	10.36	4.96	22.04	43.50	-21.46	QP	VERTICAL
4	230.10	9.98	12.12	5.19	27.29	46.00	-18.71	QP	VERTICAL
5	304.61	9.09	13.40	5.54	28.03	46.00	-17.97	QP	VERTICAL
6	752.74	4.22	20.57	7.17	31.96	46.00	-14.04	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

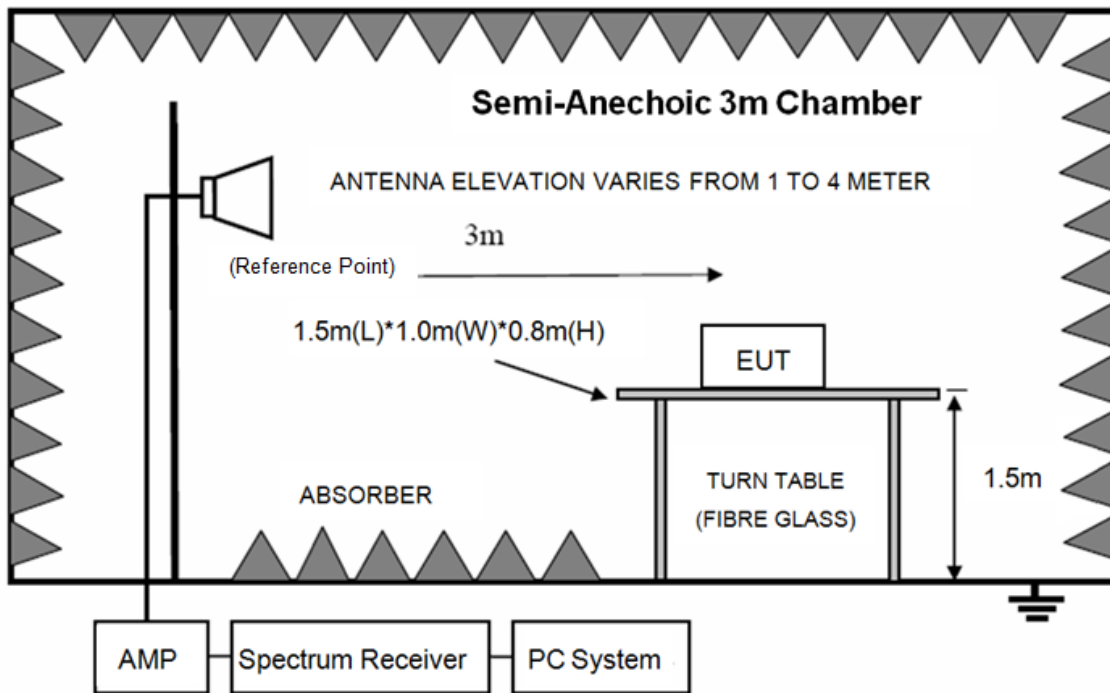
Radiated Emission test (above 1GHz)

Freq. (MHz)	Read level (dB μ V)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 5740MHz									
6304.00	46.25	35.70	43.29	8.25	46.91	74.00	-27.09	Peak	HORIZONTAL
7001.00	44.45	36.80	43.50	8.33	46.08	74.00	-27.92	Peak	HORIZONTAL
7953.00	45.61	37.18	43.79	9.19	48.19	74.00	-25.81	Peak	HORIZONTAL
9058.00	43.93	37.52	44.12	10.40	47.73	74.00	-26.27	Peak	HORIZONTAL
10622.00	47.86	38.57	44.31	11.00	53.12	74.00	-20.88	Peak	HORIZONTAL
12951.00	44.50	39.25	44.34	11.33	50.74	74.00	-23.26	Peak	HORIZONTAL
6746.00	45.31	36.24	43.42	8.30	46.43	74.00	-27.57	Peak	VERTICAL
8242.00	43.14	37.25	43.87	9.51	46.03	74.00	-27.97	Peak	VERTICAL
9534.00	45.56	37.73	44.26	10.65	49.68	74.00	-24.32	Peak	VERTICAL
11863.00	43.29	38.82	44.12	10.98	48.97	74.00	-25.03	Peak	VERTICAL
12645.00	44.58	38.94	44.26	11.22	50.48	74.00	-23.52	Peak	VERTICAL
14226.00	42.91	40.68	44.52	12.48	51.55	74.00	-22.45	Peak	VERTICAL
GFSK Tx mode 5790MHz									
6644.00	43.81	36.02	43.39	8.29	44.73	74.00	-29.27	Peak	HORIZONTAL
9075.00	45.10	37.53	44.12	10.41	48.92	74.00	-25.08	Peak	HORIZONTAL
10350.00	46.83	38.41	44.35	10.95	51.84	74.00	-22.16	Peak	HORIZONTAL
12220.00	44.87	38.86	44.15	11.05	50.63	74.00	-23.37	Peak	HORIZONTAL
13342.00	45.91	39.64	44.44	11.70	52.81	74.00	-21.19	Peak	HORIZONTAL
14022.00	43.48	40.07	44.59	12.37	51.33	74.00	-22.67	Peak	HORIZONTAL
6270.00	47.05	35.70	43.28	8.24	47.71	74.00	-26.29	Peak	VERTICAL
7205.00	44.34	36.88	43.56	8.51	46.17	74.00	-27.83	Peak	VERTICAL
8701.00	44.19	37.38	44.01	10.03	47.59	74.00	-26.41	Peak	VERTICAL
10112.00	46.61	38.27	44.38	10.91	51.41	74.00	-22.59	Peak	VERTICAL
11540.00	43.65	38.62	44.17	11.01	49.11	74.00	-24.89	Peak	VERTICAL
12798.00	43.76	39.10	44.30	11.27	49.83	74.00	-24.17	Peak	VERTICAL
GFSK Tx mode 5840MHz									
6253.00	45.54	35.70	43.28	8.24	46.20	74.00	-27.80	Peak	HORIZONTAL
7511.00	44.68	37.00	43.65	8.79	46.82	74.00	-27.18	Peak	HORIZONTAL
8395.00	45.35	37.28	43.92	9.68	48.39	74.00	-25.61	Peak	HORIZONTAL
9500.00	46.51	37.70	44.25	10.63	50.59	74.00	-23.41	Peak	HORIZONTAL
12237.00	44.54	38.85	44.16	11.06	50.29	74.00	-23.71	Peak	HORIZONTAL
13223.00	46.11	39.52	44.41	11.58	52.80	74.00	-21.20	Peak	HORIZONTAL
6270.00	47.00	35.70	43.28	8.24	47.66	74.00	-26.34	Peak	VERTICAL
6831.00	45.31	36.43	43.45	8.31	46.60	74.00	-27.40	Peak	VERTICAL
7477.00	45.05	36.99	43.64	8.76	47.16	74.00	-26.84	Peak	VERTICAL
9755.00	44.65	37.96	44.33	10.76	49.04	74.00	-24.96	Peak	VERTICAL
12084.00	45.30	38.88	44.12	11.00	51.06	74.00	-22.94	Peak	VERTICAL
14090.00	43.16	40.27	44.57	12.41	51.27	74.00	-22.73	Peak	VERTICAL
Result: Pass									

Note: Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

6. Band Edge Compliance

6.1. Block diagram of test setup



6.2. Limit

All the other emissions outside operation frequency band 5725MHz to 5875MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

6.3. Test Procedure

Same with clause 5.3 except change investigated frequency range from 5700MHz to 5750MHz and 5830MHz to 5900MHz.

Remark: All restriction band have been tested, and only the worst case is shown in report.

6.4. Test result

PASS. (See below detailed test result)

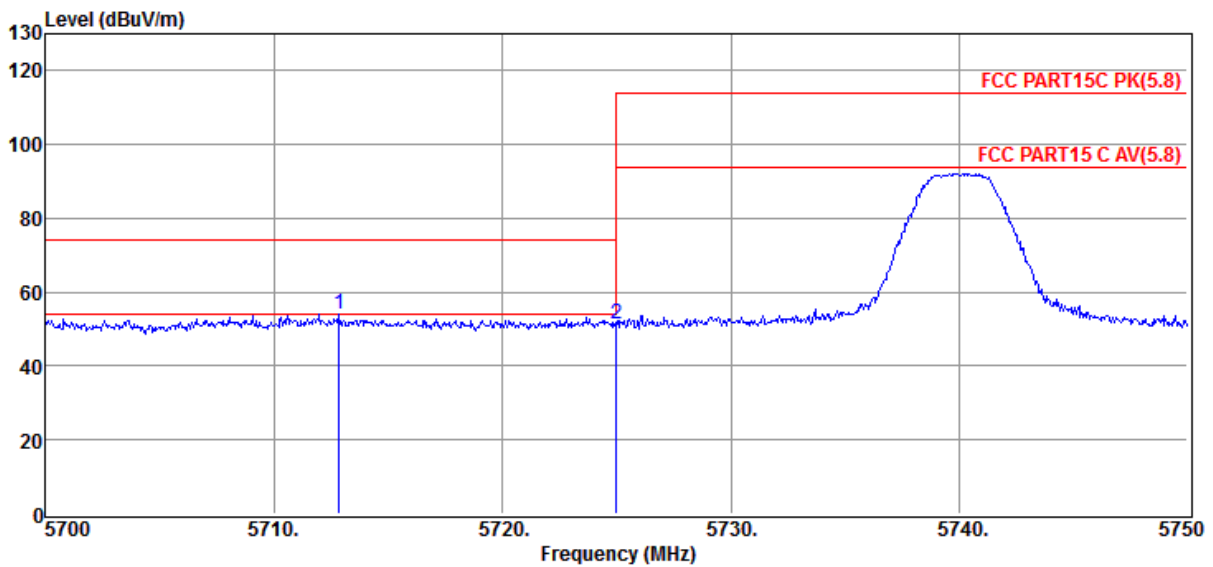
TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#
Test Date : 2018-08-03
EUT : Wireless Soundbar
Power Supply : AC 120V/60Hz
Condition : Temp:24.5°C, Humi:55.5%, Press:100.1kPa
Memo : 5740MHz

Tested By : Sunny
Model Number : LINK BAR
Test Mode : Tx mode
Antenna/Distance : 2017 HF907/3m/HORIZONTAL

D:\2018 RE1# Test Data\Y\Ya nan\JBL LinkBar-20180621.EM6

Data: 361



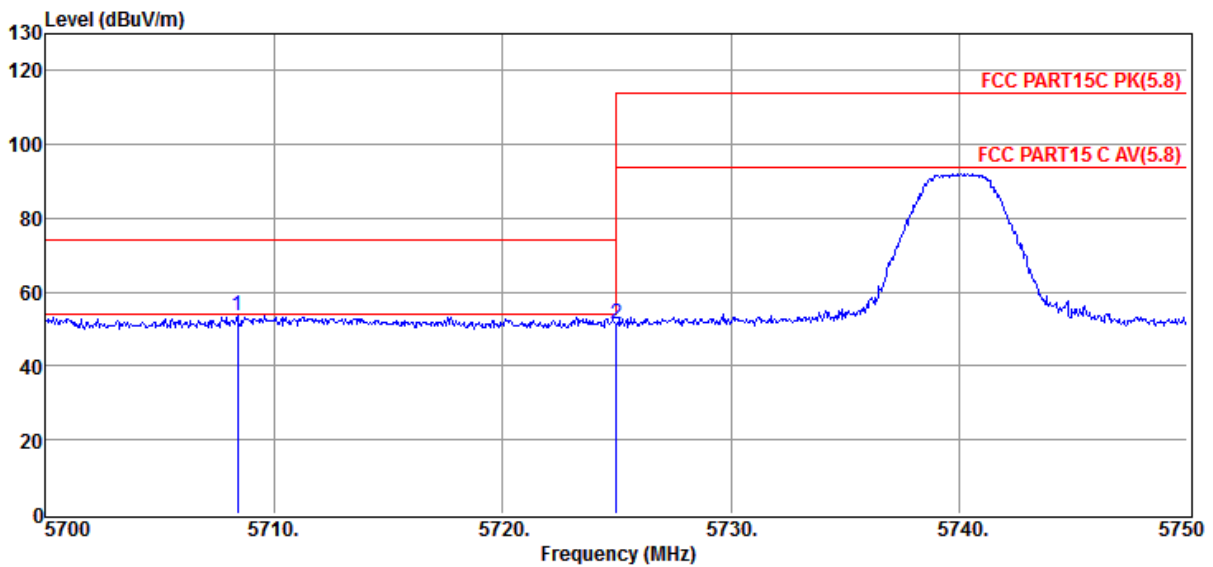
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV /m)	Over Limit (dB)	Detector	Polarization
1	5712.85	53.75	35.59	43.37	8.03	54.00	74.00	-20.00	Peak	HORIZONTAL
2	5725.00	51.06	35.59	43.37	8.04	51.32	74.00	-22.68	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2018 RE1# Test Data\Y\Ya nan\JBL LinkBar-20180621.EM6
Test Date	: 2018-08-03	Tested By : Sunny
EUT	: Wireless Soundbar	Model Number : LINK BAR
Power Supply	: AC 120V/60Hz	Test Mode : Tx mode
Condition	: Temp:24.5°C, Humi:55.5%, Press:100.1kPa	Antenna/Distance : 2017 HF907/3m/VERTICAL
Memo	: 5740MHz	

Data: 362



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV /m)	Over Limit (dB)	Detector	Polarization
1	5708.40	53.41	35.58	43.37	8.03	53.65	74.00	-20.35	Peak	VERTICAL
2	5725.00	51.19	35.59	43.37	8.04	51.45	74.00	-22.55	Peak	VERTICAL

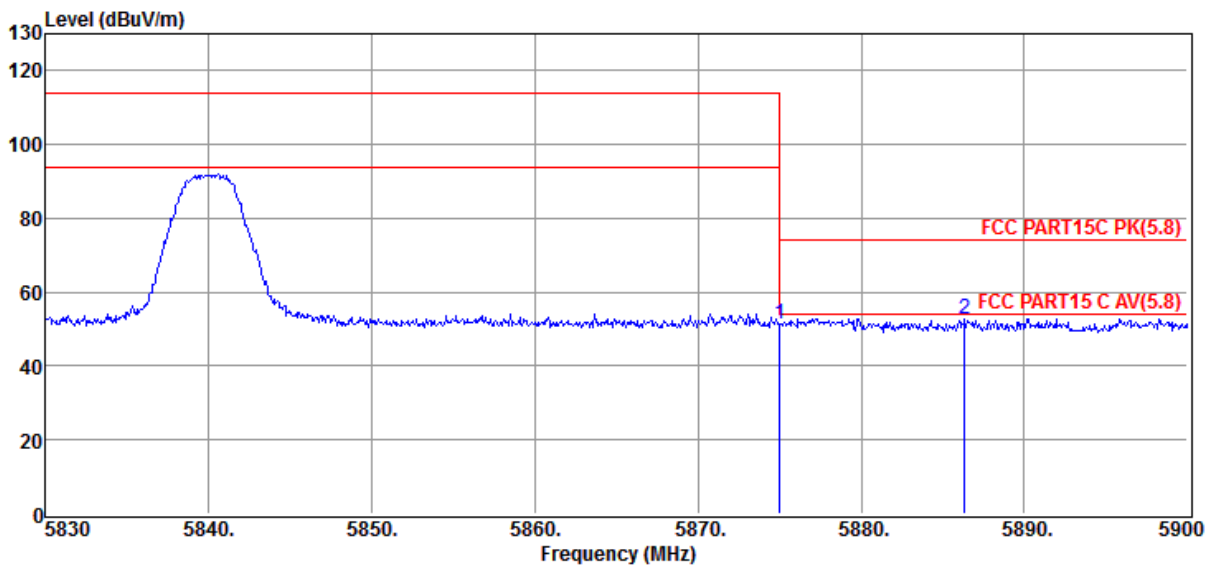
- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 1#
Test Date : 2018-08-03
EUT : Wireless Soundbar
Power Supply : AC 120V/60Hz
Condition : Temp:24.5°C, Humi:55.5%,
 Press:100.1kPa
Memo : 5840MHz

D:\2018 RE1# Test Data\Y\Ya nan\JBL
 LinkBar-20180621.EM6
Tested By : Sunny
Model Number : LINK BAR
Test Mode : Tx mode
Antenna/Distance : 2017 HF907/3m/HORIZONTAL

Data: 359



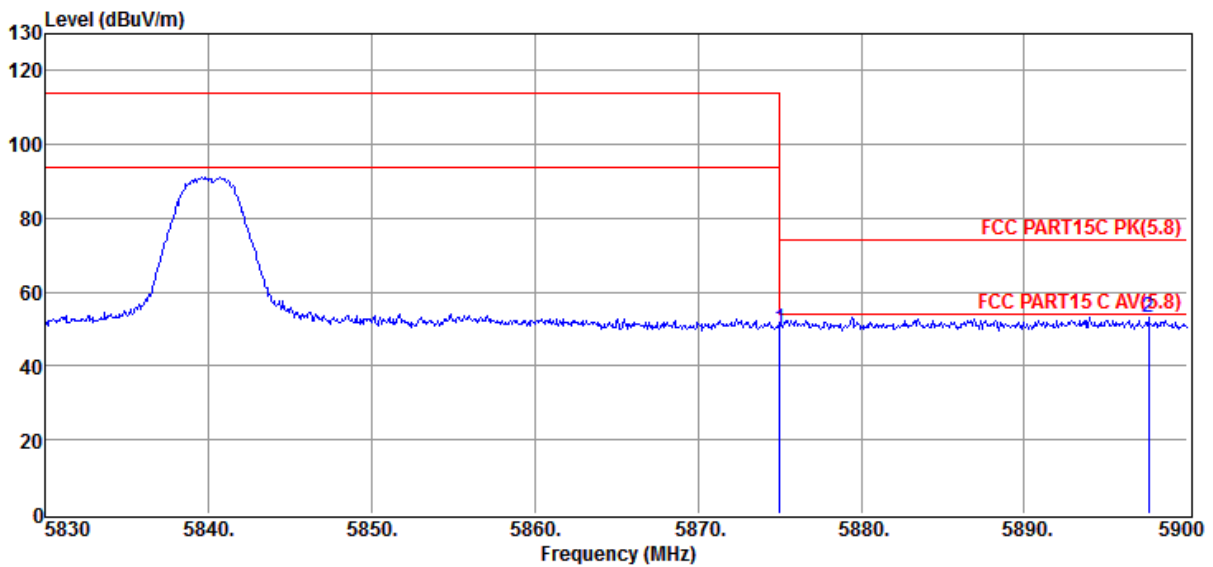
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV /m)	Over Limit (dB)	Detector	Polarization
1	5875.01	50.91	35.65	43.27	8.13	51.42	74.00	-22.58	Peak	HORIZONTAL
2	5886.35	52.41	35.65	43.27	8.14	52.93	74.00	-21.07	Peak	HORIZONTAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2018 RE1# Test Data\Y\Ya nan\JBL LinkBar-20180621.EM6
Test Date	: 2018-08-03	Tested By : Sunny
EUT	: Wireless Soundbar	Model Number : LINK BAR
Power Supply	: AC 120V/60Hz	Test Mode : Tx mode
Condition	: Temp:24.5°C, Humi:55.5%, Press:100.1kPa	Antenna/Distance : 2017 HF907/3m/VERTICAL
Memo	: 5840MHz	

Data: 360

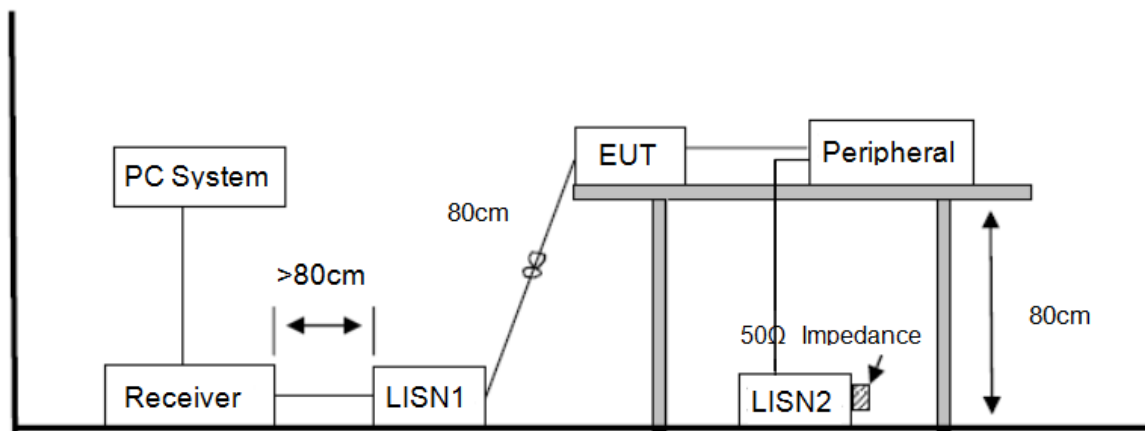


Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV /m)	Over Limit (dB)	Detector	Polarization
1	5875.01	49.74	35.65	43.27	8.13	50.25	74.00	-23.75	Peak	VERTICAL
2	5897.62	52.54	35.66	43.26	8.15	53.09	74.00	-20.91	Peak	VERTICAL

- Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

7. Power Line Conducted Emission

7.1. Block diagram of test setup



7.2. Power Line Conducted Emission Limits

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

Note 1: * Decreasing linearly with logarithm of frequency.

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

7.3. 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 30MHz 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.

7.4. Test Result

PASS. (See below detailed test result)

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

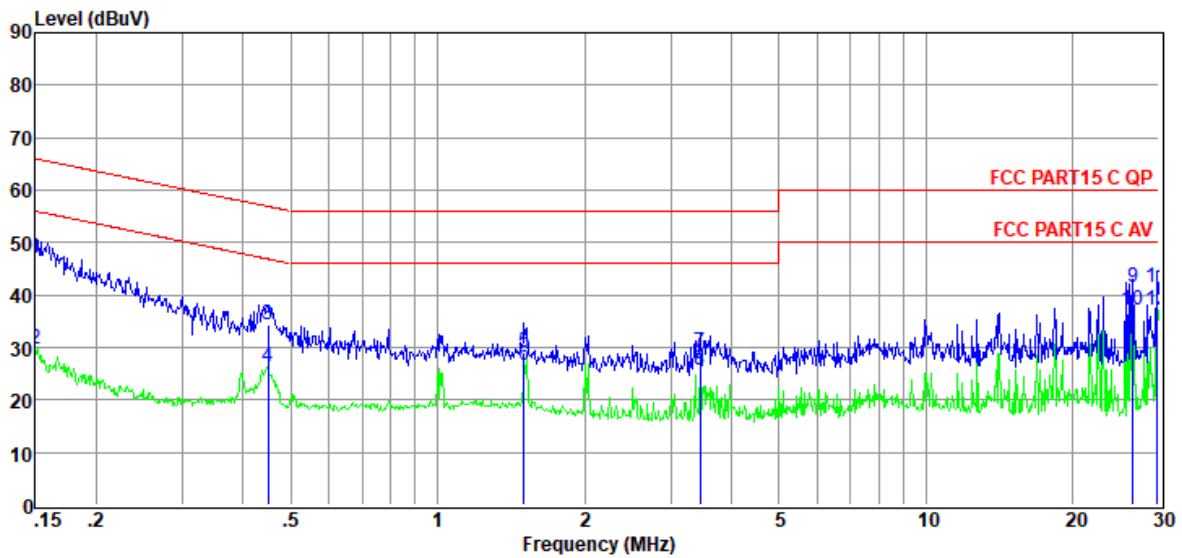
Note2: "----" means Peak detection; "----" means Average detection

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

TR-4-E-010 Conducted Emission Test Result

Test Site : DDT 1# Shield Room D:\2018 CE report data\Q18042603-1E\CE.EM6
Test Date : 2018-07-20 **Tested By** : WEN
EUT : Wireless Soundbar **Model Number** : LINK BAR
Power Supply : AC 120V/60Hz **Test Mode** : Tx mode
Condition : Temp:24.5°C, Humi:55.5%,
LISN : 2017 ENV216/LINE
 Press:100.1kPa
Memo :

Data: 46



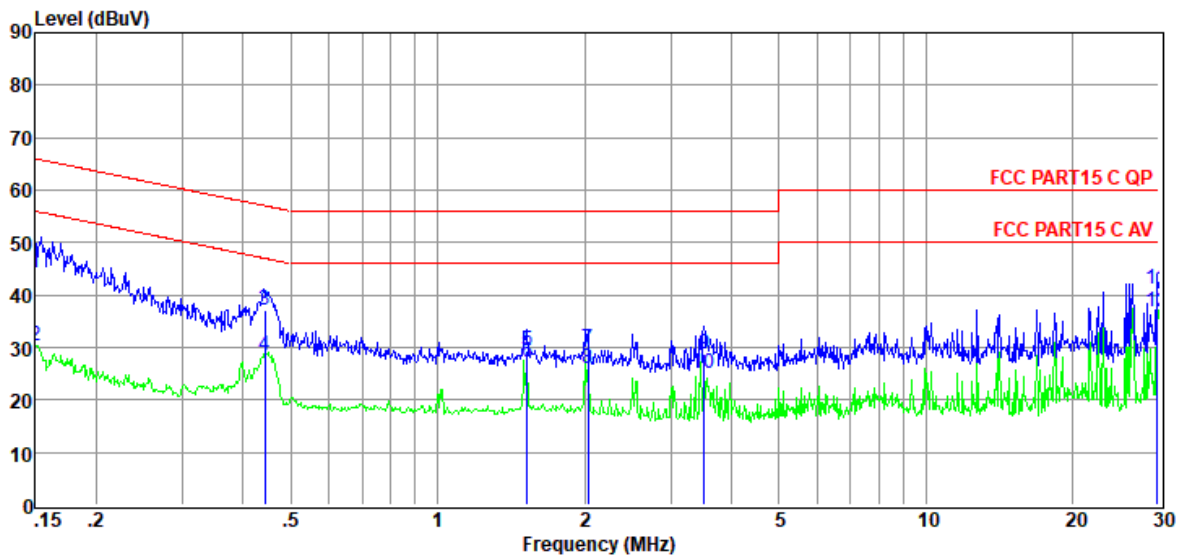
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBμV)	Limit Line (dBμV)	Over Limit (dB)	Detector	Phase
1	0.15	27.59	9.52	0.04	9.86	47.01	66.00	-18.99	QP	LINE
2	0.15	10.17	9.52	0.04	9.86	29.59	56.00	-26.41	Average	LINE
3	0.45	14.85	9.54	0.04	9.81	34.24	56.89	-22.65	QP	LINE
4	0.45	6.79	9.54	0.04	9.81	26.18	46.89	-20.71	Average	LINE
5	1.50	9.52	9.59	0.13	9.86	29.10	56.00	-26.90	QP	LINE
6	1.50	7.11	9.59	0.13	9.86	26.69	46.00	-19.31	Average	LINE
7	3.45	9.40	9.62	0.11	9.87	29.00	56.00	-27.00	QP	LINE
8	3.45	5.95	9.62	0.11	9.87	25.55	46.00	-20.45	Average	LINE
9	26.56	21.32	10.03	0.11	9.98	41.44	60.00	-18.56	QP	LINE
10	26.56	16.86	10.03	0.11	9.98	36.98	50.00	-13.02	Average	LINE
11	29.68	21.11	10.08	0.11	10.01	41.31	60.00	-18.69	QP	LINE
12	29.68	16.91	10.08	0.11	10.01	37.11	50.00	-12.89	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:\2018 CE report data\Q18042603-1E\CE.EM6
Test Date : 2018-07-20 **Tested By** : WEN
EUT : Wireless Soundbar **Model Number** : LINK BAR
Power Supply : AC 120V/60Hz **Test Mode** : Tx mode
Condition : Temp:24.5°C, Humi:55.5%,
LISN : 2017 ENV216/NEUTRAL
 Press:100.1kPa
Memo :

Data: 48



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	24.99	9.49	0.04	9.86	44.38	66.00	-21.62	QP	NEUTRAL
2	0.15	11.00	9.49	0.04	9.86	30.39	56.00	-25.61	Average	NEUTRAL
3	0.44	17.80	9.36	0.04	9.81	37.01	57.02	-20.01	QP	NEUTRAL
4	0.44	9.36	9.36	0.04	9.81	28.57	47.02	-18.45	Average	NEUTRAL
5	1.53	10.07	9.28	0.13	9.86	29.34	56.00	-26.66	QP	NEUTRAL
6	1.53	8.03	9.28	0.13	9.86	27.30	46.00	-18.70	Average	NEUTRAL
7	2.03	10.28	9.29	0.12	9.87	29.56	56.00	-26.44	QP	NEUTRAL
8	2.03	6.57	9.29	0.12	9.87	25.85	46.00	-20.15	Average	NEUTRAL
9	3.51	9.45	9.27	0.11	9.87	28.70	56.00	-27.30	QP	NEUTRAL
10	3.51	5.71	9.27	0.11	9.87	24.96	46.00	-21.04	Average	NEUTRAL
11	29.68	21.30	9.69	0.11	10.01	41.11	60.00	-18.89	QP	NEUTRAL
12	29.68	17.04	9.69	0.11	10.01	36.85	50.00	-13.15	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.

8. Antenna Requirements

8.1. Limit

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2. Result

The antennas used for this product are dedicated Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 2.85dBi.

END OF REPORT