Report No.: DDT-R19032112-5E6

Issued Date: Jan. 05, 2020

FCC AND IC CERTIFICATION TEST REPORT

FOR

Applicant	:	Harman International Industries, Inc.
Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment under Test	:	Portable Bluetooth Speaker
Model No.	:	PULSE4
Trade Mark	:	JBL
FCC ID	:	APIJBLPULSE4
IC	:	6132A-JBLPULSE4
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 City, Guangdong Province, China, 523808

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REPORT

TABLE OF CONTENTS

Test report declares....4
1. Summary of test results 5
2. General test information 6
2.1. Description of EUT 6
2.2. Accessories of EUT 7
2.3. Assistant equipment used for test 7
2.4. Block diagram of EUT configuration for test 7
2.5. Test environment conditions 8
2.6. Deviations of test standard 8
2.7. Test laboratory 8
2.8. Measurement uncertainty 8
3. Equipment used during test 10
4. 20dB Bandwidth and 99% Bandwidth 11
4.1. Block diagram of test setup 11
4.2. Limits 11
4.3. Test Procedure 11
4.4. Test Result 11
4.5. Original test data 12
5. Radiated emission 15
5.1. Block diagram of test setup 15
5.2. Limit 16
5.3. Test Procedure 17
5.4. Test result 18
6. Band Edge Compliance 30
6.1. Block diagram of test setup 30
6.2. Limit 30
6.3. Test Procedure 30
6.4. Test result 30
7. Power Line Conducted Emission 43
7.1. Block diagram of test setup 43
7.2. Power Line Conducted Emission Limits 43
7.3. Test Procedure 43
7.4. Test Result 44
8. Antenna Requirements 53
8.1. Limit 53
8.2. Result 53

TEST REPORT DECLARE

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Trade mark	:	JBL
Manufacturer	:	Harman International Industries, Inc.
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-R19032112-5E6		
Date of Receipt:	Mar. 25, 2019 and Nov 21, 2019	**Date of Test:**	Mar. 25, 2019 ~ Jun. 05, 2019 and Nov 21, 2019 ~ Jan 05, 2020

Prepared By: ***Approved By:***

Talent Zhang

Talent Zhang /Engineer ***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. 01, 2019	Sam Li
Rev.01	Added two new battery model based on the original report. The data of the new battery model is added in this report.	Jan. 05, 2020	Talent Zhang

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
Note 1: There are two kinds of products for two factories in this report, the main PCB of the products, Battery Model, software and hardware versions are different, but antenna type and RF module are the same, so only radiated emission and Power Line Conducted Emissions were tested respectively and recorded in this report. Note 2: This report added two battery factory based on the original report, this change don't influence the RF performance, so the original test data was retained in this report.		

2. General test information

2.1. Description of EUT

EUT* Name	:	Portable Bluetooth Speaker
Model Number	:	PULSE4
EUT function description	:	Please reference user manual of this device
Power supply	:	DC 5 V from external AC Adapter DC 3.6 V Polymer Li-ion built-in battery
Operation frequency	:	2407MHz-2475MHz
Modulation	:	GFSK, π/4-DQPSK, 8DPSK
Antenna Type	:	Dedicated FPCB antenna, maximum PK gain: 3.25 dBi
Sample Type	:	Series production

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

EUT channels and frequencies list:

Channel information					
Channel	Frequency	Channel	Frequency	Channel	Frequency
5	2407MHz	28	2430MHz	51	2453MHz
6	2408MHz	29	2431MHz	52	2454MHz
7	2409MHz	30	2432MHz	53	2455MHz
8	2410MHz	31	2433MHz	54	2456MHz
9	2411MHz	32	2434MHz	55	2457MHz
10	2412MHz	33	2435MHz	56	2458MHz
11	2413MHz	34	2436MHz	57	2459MHz
12	2414MHz	35	2437MHz	58	2460MHz
13	2415MHz	36	2438MHz	59	2461MHz
14	2416MHz	37	2439MHz	60	2462MHz
15	2417MHz	38	2440MHz	61	2463MHz
16	2418MHz	39	2441MHz	62	2464MHz
17	2419MHz	40	2442MHz	63	2465MHz
18	2420MHz	41	2443MHz	64	2466MHz
19	2421MHz	42	2444MHz	65	2467MHz
20	2422MHz	43	2445MHz	66	2468MHz
21	2423MHz	44	2446MHz	67	2469MHz
22	2424MHz	45	2447MHz	68	2470MHz
23	2425MHz	46	2448MHz	69	2471MHz
24	2426MHz	47	2449MHz	70	2472MHz
25	2427MHz	48	2450MHz	71	2473MHz
26	2428MHz	49	2451MHz	72	2474MHz
27	2429MHz	50	2452MHz	73	2475MHz

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Description	Remark
USB cable	Harman	N/A	Length: 1.2m, unshielded	N/A
Battery Pack	ICON ENERGY SYSTEM (SHENZHEN) CO., LTD	IY1091	3.6V, 7260mAh, 26.136Wh	Alternative for factory 1
Battery Pack	SUNWODA Electronic Co., Ltd	SUN-INTE-168	3.6V, 7260mAh, 26.14Wh	Alternative for factory 2

New Battery information：

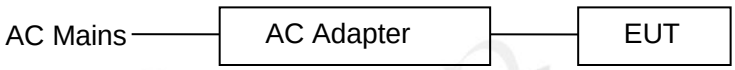
Description of Accessories	Manufacturer	Model number	Description	Remark
Battery Pack	ICON ENERGY SYSTEM (SHENZHEN) CO., LTD	IAA033NA	3.6V, 7260mAh	Alternative for factory 1
Battery Pack	SUNWODA Electronic Co., Ltd	SUN-INTE-277	1S3P 3.6V 7260mAh Lithium-ion Battery	Alternative for factory 2

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
Adapter	SAMSUNG	EP-TA200	N/A	Input: 100-240~, 50/60Hz, 0.5A; Output: 9V/1.67A or 5V/2A

2.4. Block diagram of EUT configuration for test

Tx Mode:



Test software: FCCTool.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	Channel	Frequency (MHz)
GFSK Tx mode	CH5	2407
	CH39	2441
	CH73	2475
π/4-DQPSK Tx mode	CH5	2407
	CH39	2441
	CH73	2475
8DPSK Tx mode	CH5	2407
	CH39	2441
	CH73	2475

2.5. Test environment conditions

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

Temperature range:	21-25℃
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, http://www.dgddt.com, Email: ddt@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 (10MHz ≤ f < 3.6GHz);
	1.38dB (3.6GHz≤ f < 8GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74dB
Power Spectral Density	0.74dB (10MHz ≤ f < 3.6GHz);
	1.38dB (3.6GHz≤ f < 8GHz)
Conducted spurious emissions	0.86dB (10MHz ≤ f < 3.6GHz);
	1.40dB (3.6GHz≤ f < 8GHz)

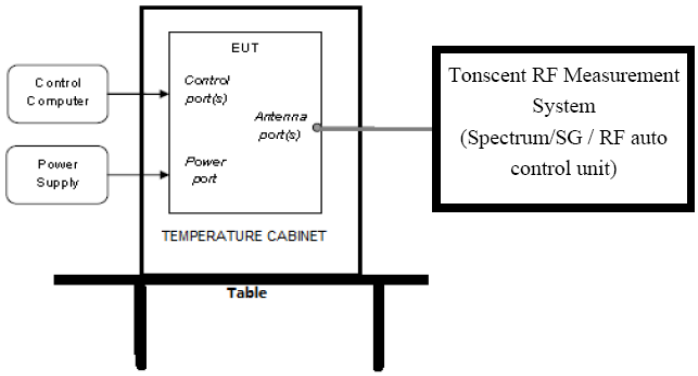
	1.66dB (8GHz≤ f < 22GHz)
Uncertainty for radio frequency (RBW<20kHz)	3×10^{-8}
Temperature	0.4℃
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70dB (Antenna Polarize: V)
	4.84dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-18GHz)	4.10dB (1-6GHz)
	4.40dB (6GHz-18GHz)
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 (Tonscend RF Measurement System)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 29, 2019	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jun. 25, 2019	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 29, 2019	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jun. 25, 2019	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jun. 28, 2019	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jun. 28, 2019	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Jun. 25, 2019	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 29, 2019	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Oct. 21, 2019	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 29, 2019	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 25, 2019	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 15, 2019	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Sep. 29, 2019	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 15, 2019	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Sep. 29, 2019	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 29, 2019	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	101303	Sep. 29, 2019	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 29, 2019	1 Year
RF Cable	N/A	5m+6m+1m	06270619	Sep. 29, 2019	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 29, 2019	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test					
EMI Test Receiver	R&S	ESU8	100316	Sep. 29, 2019	1 Year
LISN 1	R&S	ENV216	101109	Sep. 29, 2019	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 29, 2019	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 29, 2019	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 29, 2019	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:

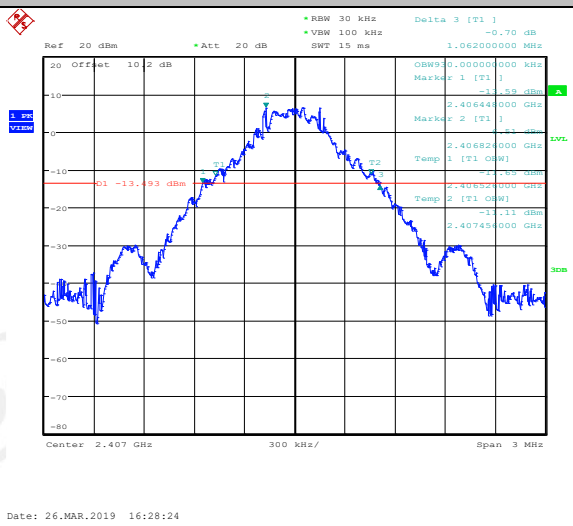
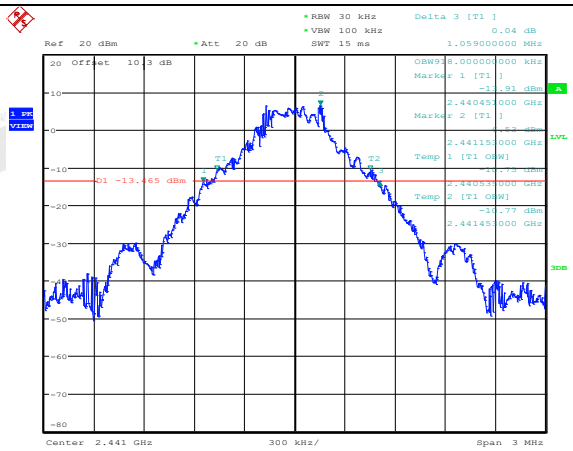
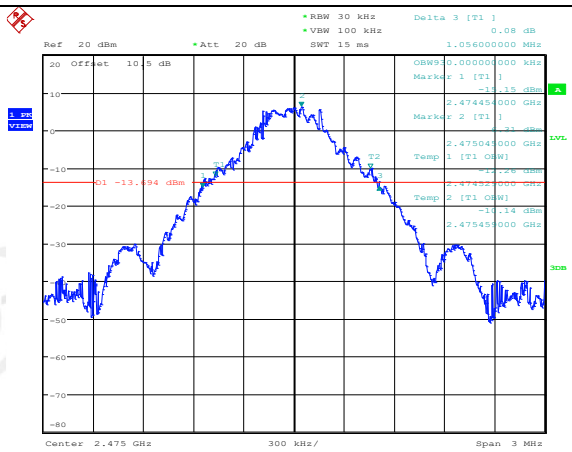
RBW:	30kHz
VBW:	100kHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

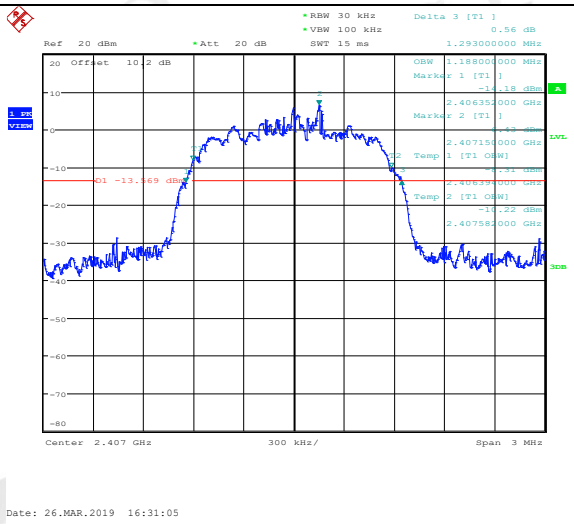
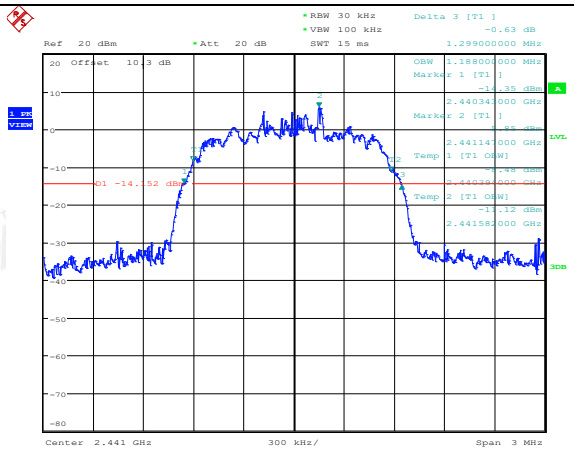
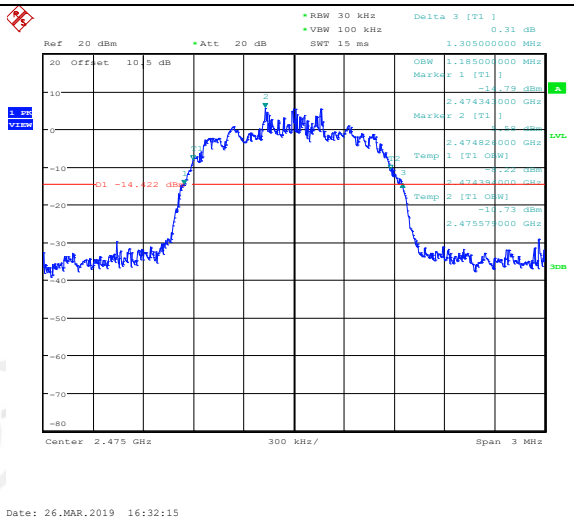
(3) Allow the trace to stabilize, measure the 20dB and 99% bandwidth of signal.

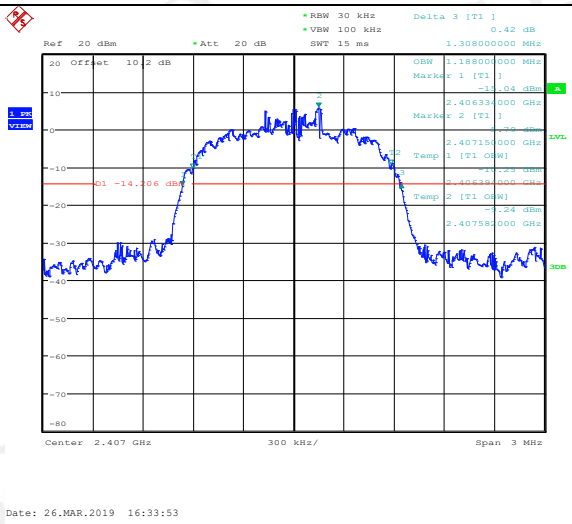
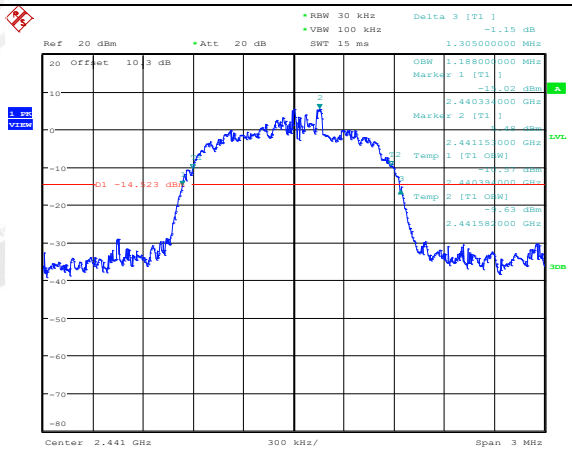
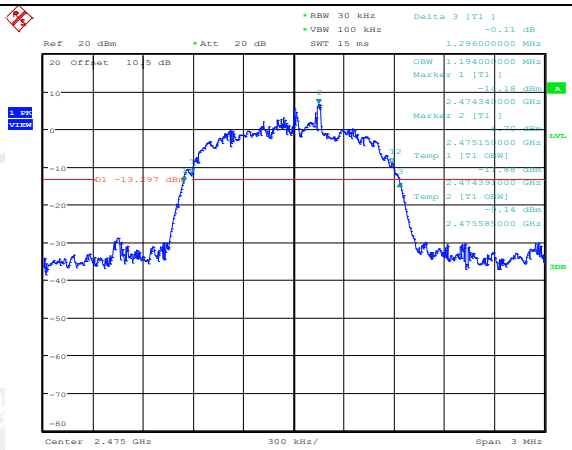
4.4. Test Result

Test Mode	Freq. (MHz)	99% bandwidth Result (MHz)	20dB bandwidth Result (MHz)	Conclusion
GFSK	2407	0.930	1.062	PASS
	2441	0.918	1.059	PASS
	2475	0.930	1.056	PASS
π/4-DQPSK	2407	1.188	1.293	PASS
	2441	1.188	1.299	PASS
	2475	1.185	1.305	PASS
8DPSK	2407	1.188	1.308	PASS
	2441	1.188	1.305	PASS
	2475	1.194	1.296	PASS

4.5. Original test data

Bandwidth	
GFSK 2407 MHz	
GFSK 2441 MHz	
GFSK 2475 MHz	

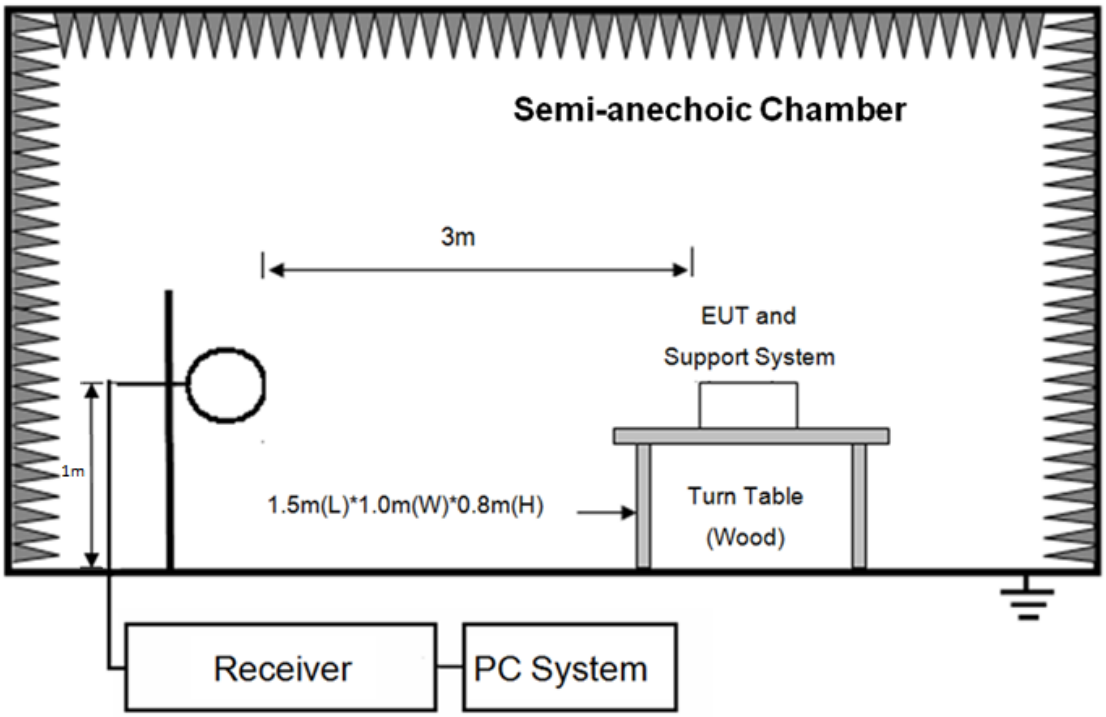
π/4-DQPSK 2407 MHz	
π/4-DQPSK 2441 MHz	
π/4-DQPSK 2475 MHz	

8DPSK 2407 MHz	
8DPSK 2441 MHz	
8DPSK 2475 MHz	

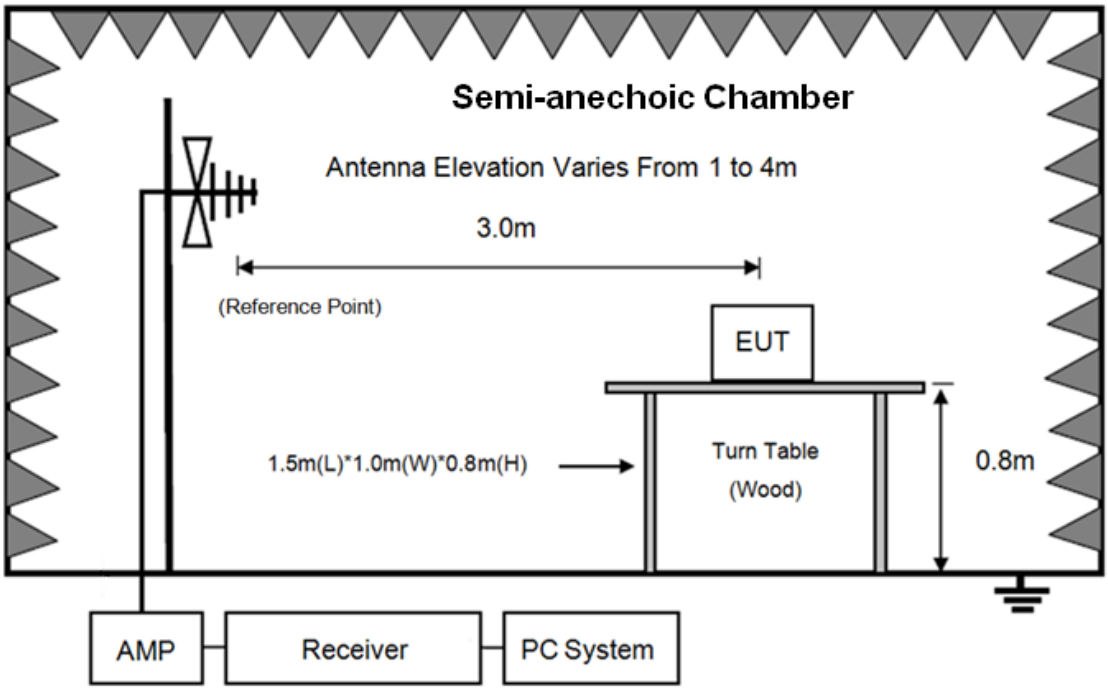
5. Radiated emission

5.1. Block diagram of test setup

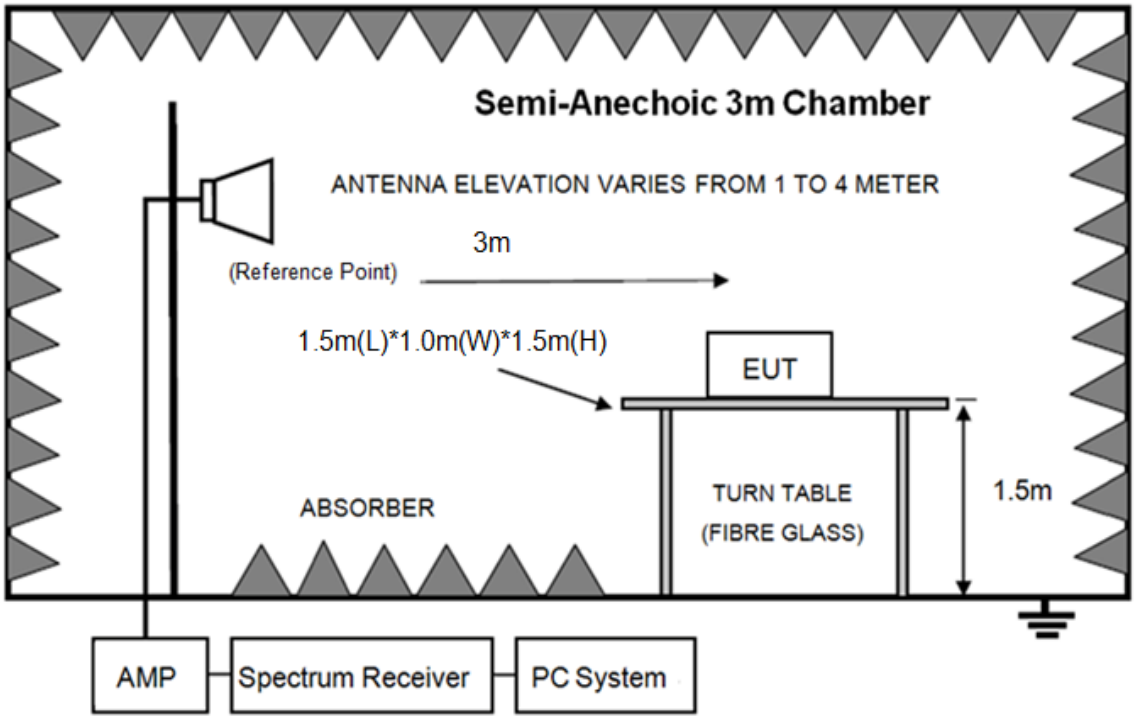
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz



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	
		μV/m	dB(μV)/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 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	
Field Strength of Fundamental emission for 2.4GHz-2.4835GHz	3	94.0 dB(μV)/m (Average) 114.0 dB(μV)/m(Peak)	
Field Strength of Harmonics	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark:

(1) Emission level dBμV = 20 log Emission level μV/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 1000MHz, 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 2.3 and 4.2

(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=3MHz, VBW=10MHz. peak detector for PK, RMS detector for AV, Read the Level in spectrum analyzer and record.

(9) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.

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 2407MHz 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:

Mode	Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
GFSK	2407.00	113.06	29.13	44.18	4.59	102.60	114.00	-11.40	HORIZONTAL
GFSK	2407.00	109.73	29.13	44.18	4.59	99.27	114.00	-14.73	VERTICAL
GFSK	2441.00	110.45	29.19	44.20	4.72	100.16	114.00	-13.84	HORIZONTAL
GFSK	2441.00	105.16	29.19	44.20	4.72	94.87	114.00	-19.13	VERTICAL
GFSK	2475.00	107.82	29.25	44.21	4.86	97.72	114.00	-16.28	HORIZONTAL
GFSK	2475.00	100.69	29.25	44.21	4.86	90.59	114.00	-23.41	VERTICAL
π/4-DQPSK	2407.00	113.16	29.13	44.18	4.59	102.70	114.00	-11.30	HORIZONTAL
π/4-DQPSK	2407.00	109.58	29.13	44.18	4.59	99.12	114.00	-14.88	VERTICAL
π/4-DQPSK	2441.00	110.58	29.19	44.20	4.72	100.29	114.00	-13.71	HORIZONTAL
π/4-DQPSK	2441.00	107.80	29.19	44.20	4.72	97.51	114.00	-16.49	VERTICAL
π/4-DQPSK	2475.00	107.82	29.25	44.21	4.86	97.72	114.00	-16.28	HORIZONTAL
π/4-DQPSK	2475.00	101.03	29.25	44.21	4.86	90.93	114.00	-23.07	VERTICAL
8DPSK	2407.00	113.20	29.13	44.18	4.59	102.74	114.00	-11.26	HORIZONTAL
8DPSK	2407.00	109.71	29.13	44.18	4.59	99.25	114.00	-14.75	VERTICAL
8DPSK	2441.00	110.76	29.19	44.20	4.72	100.47	114.00	-13.53	HORIZONTAL
8DPSK	2441.00	105.87	29.19	44.20	4.72	95.58	114.00	-18.42	VERTICAL
8DPSK	2475.00	108.08	29.25	44.21	4.86	97.98	114.00	-16.02	HORIZONTAL
8DPSK	2475.00	101.26	29.25	44.21	4.86	91.16	114.00	-22.84	VERTICAL

Average value:

Mode	Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
GFSK	2407.00	97.81	29.13	44.18	4.59	87.35	94.00	-6.65	HORIZONTAL
GFSK	2407.00	95.15	29.13	44.18	4.59	84.69	94.00	-9.31	VERTICAL
GFSK	2441.00	95.64	29.19	44.20	4.72	85.35	94.00	-8.65	HORIZONTAL
GFSK	2441.00	91.46	29.19	44.20	4.72	81.17	94.00	-12.83	VERTICAL
GFSK	2475.00	93.54	29.25	44.21	4.86	83.44	94.00	-10.56	HORIZONTAL
GFSK	2475.00	88.00	29.25	44.21	4.86	77.90	94.00	-16.10	VERTICAL
π/4-DQPSK	2407.00	95.66	29.13	44.18	4.59	85.20	94.00	-8.80	HORIZONTAL
π/4-DQPSK	2407.00	92.73	29.13	44.18	4.59	82.27	94.00	-11.73	VERTICAL
π/4-DQPSK	2441.00	92.42	29.19	44.20	4.72	82.13	94.00	-11.87	HORIZONTAL
π/4-DQPSK	2441.00	92.11	29.19	44.20	4.72	81.82	94.00	-12.18	VERTICAL
π/4-DQPSK	2475.00	91.22	29.25	44.21	4.86	81.12	94.00	-12.88	HORIZONTAL
π/4-DQPSK	2475.00	85.35	29.25	44.21	4.86	75.25	94.00	-18.75	VERTICAL
8DPSK	2407.00	95.71	29.13	44.18	4.59	85.25	94.00	-8.75	HORIZONTAL
8DPSK	2407.00	92.83	29.13	44.18	4.59	82.37	94.00	-11.63	VERTICAL
8DPSK	2441.00	93.37	29.19	44.20	4.72	83.08	94.00	-10.92	HORIZONTAL
8DPSK	2441.00	89.40	29.19	44.20	4.72	79.11	94.00	-14.89	VERTICAL
8DPSK	2475.00	91.02	29.25	44.21	4.86	80.92	94.00	-13.08	HORIZONTAL
8DPSK	2475.00	85.81	29.25	44.21	4.86	75.71	94.00	-18.29	VERTICAL
Result: Pass									

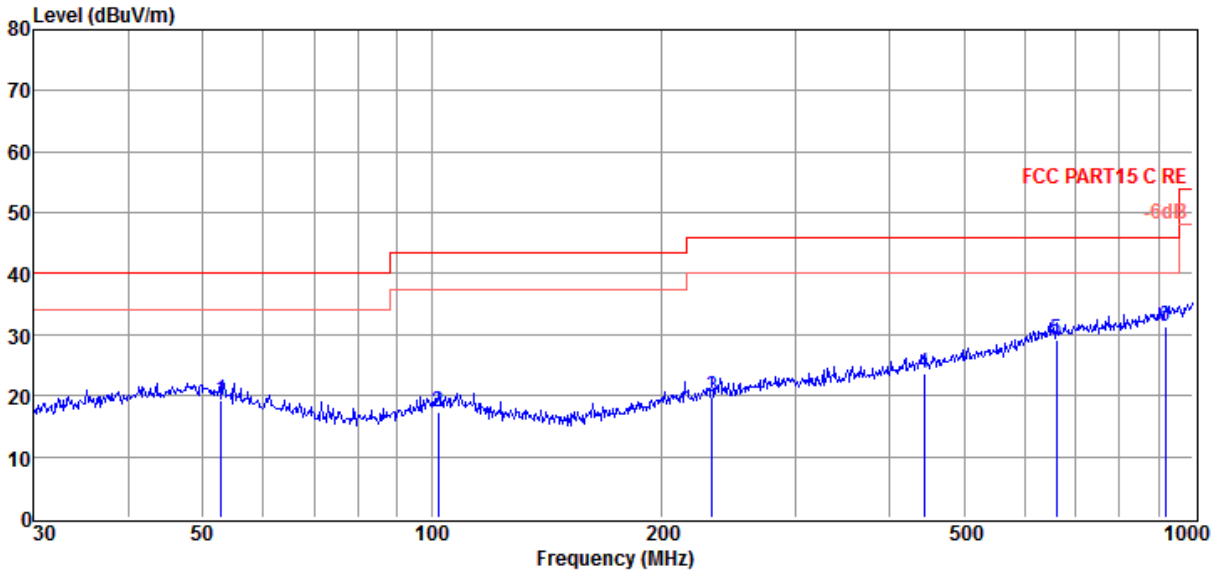
Note: Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

Radiated Emission test (below 1GHz)
Original data:

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q18121103-1E Y400Wireless\FCC BELOW1G.EM6	
Test Date	: 2019-06-05	**Tested By**	: Talent
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: Battery	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C, Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/HORIZONTAL
Memo	: Factory 1		

Data: 18



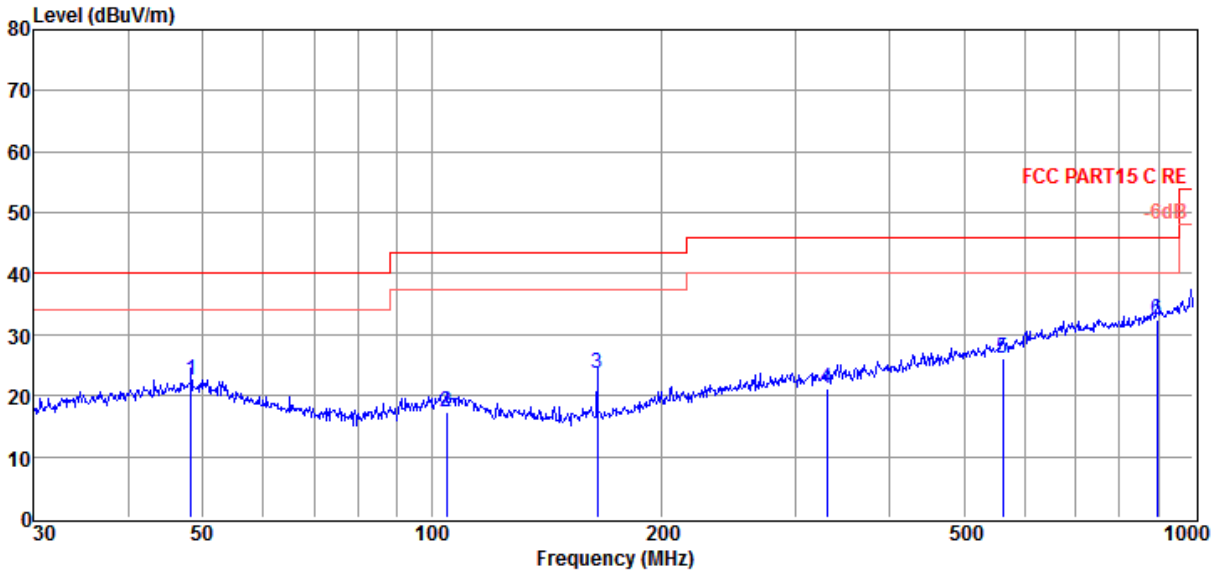
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	52.95	1.68	13.60	3.89	19.17	40.00	-20.83	QP	HORIZONTAL
2	102.00	1.47	11.72	4.22	17.41	43.50	-26.09	QP	HORIZONTAL
3	233.35	2.56	12.39	4.93	19.88	46.00	-26.12	QP	HORIZONTAL
4	443.29	1.77	16.29	5.65	23.71	46.00	-22.29	QP	HORIZONTAL
5	661.15	3.24	19.51	6.27	29.02	46.00	-16.98	QP	HORIZONTAL
6	919.29	2.48	21.92	7.01	31.41	46.00	-14.59	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#	D:\2019 RE1# Report Data\Q18121103-1E Y400Wireless\FCC BELOW1G.EM6	
Test Date	: 2019-06-05	**Tested By**	: Talent
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: Battery	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C, Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/VERTICAL
Memo	: Factory 1		

Data: 17



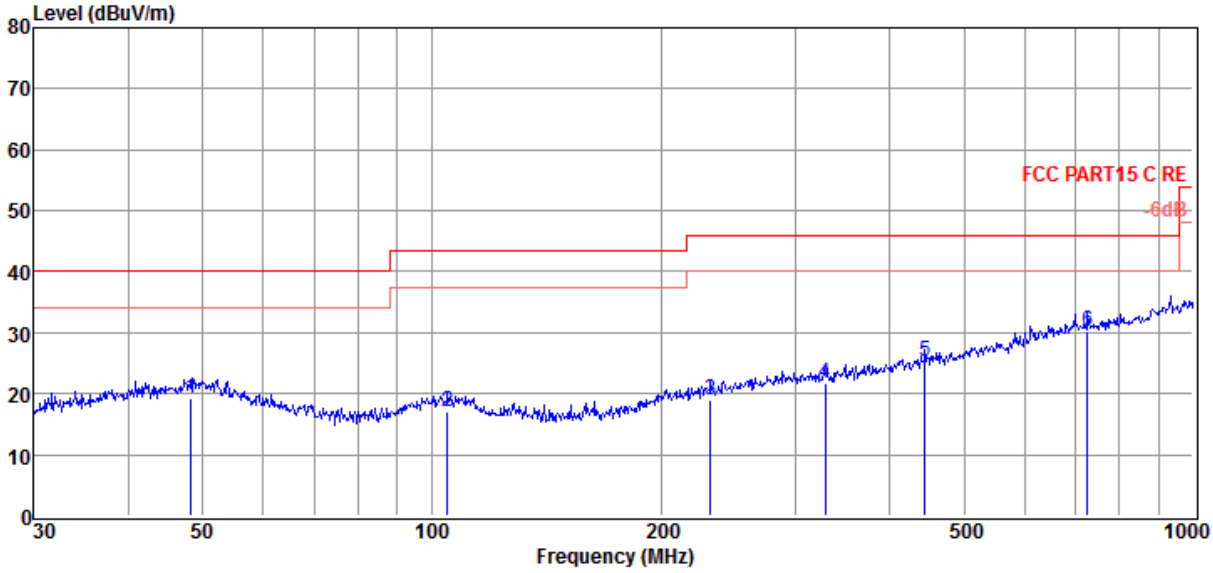
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	48.33	4.31	14.42	3.85	22.58	40.00	-17.42	QP	VERTICAL
2	104.54	1.24	11.75	4.23	17.22	43.50	-26.28	QP	VERTICAL
3	164.91	10.14	8.85	4.63	23.62	43.50	-19.88	QP	VERTICAL
4	330.20	1.25	14.53	5.29	21.07	46.00	-24.93	QP	VERTICAL
5	562.66	2.03	18.01	5.99	26.03	46.00	-19.97	QP	VERTICAL
6	897.00	3.78	21.67	6.90	32.35	46.00	-13.65	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.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q18121103-1E Y400Wireless\FCC BELOW1G.EM6	
Test Date	: 2019-06-05	**Tested By**	: Talent
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: battery	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C, Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/HORIZONTAL
Memo	: Factory 2		

Data: 10



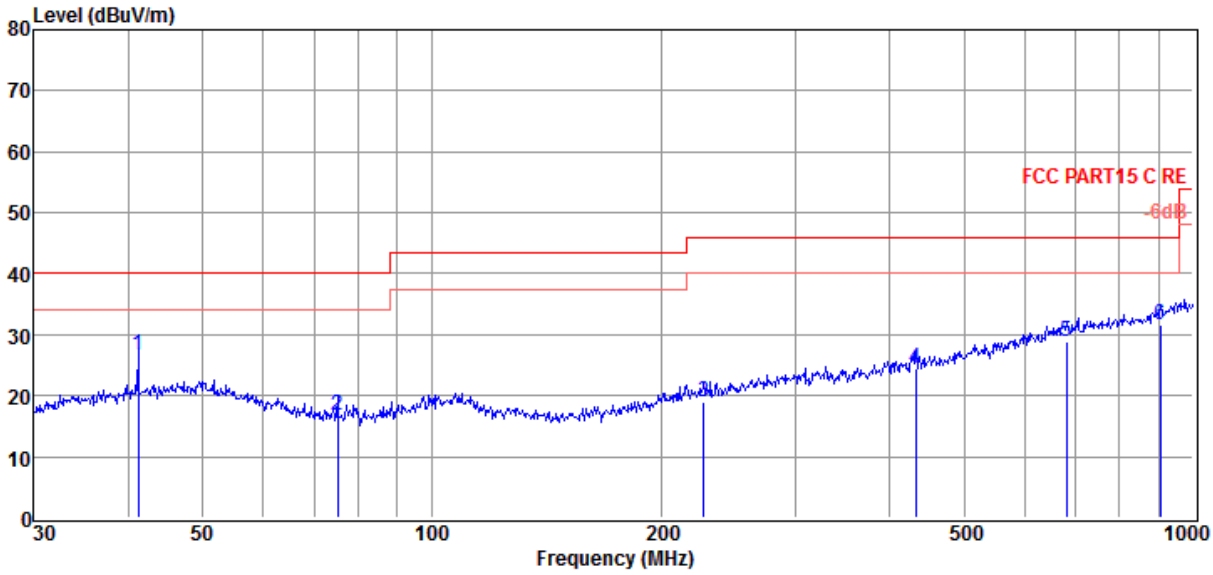
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	48.33	1.03	14.42	3.85	19.30	40.00	-20.70	QP	HORIZONTAL
2	104.90	1.00	11.75	4.23	16.98	43.50	-26.52	QP	HORIZONTAL
3	232.53	1.76	12.37	4.93	19.06	46.00	-26.94	QP	HORIZONTAL
4	329.04	1.96	14.51	5.29	21.76	46.00	-24.24	QP	HORIZONTAL
5	444.85	3.31	16.31	5.66	25.28	46.00	-20.72	QP	HORIZONTAL
6	726.81	3.44	20.27	6.45	30.16	46.00	-15.84	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#	D:\2019 RE1# Report Data\Q18121103-1E Y400Wireless\FCC BELOW1G.EM6	
Test Date	: 2019-06-05	**Tested By**	: Talent
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: battery	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C, Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/VERTICAL
Memo	: Factory 2		

Data: 9



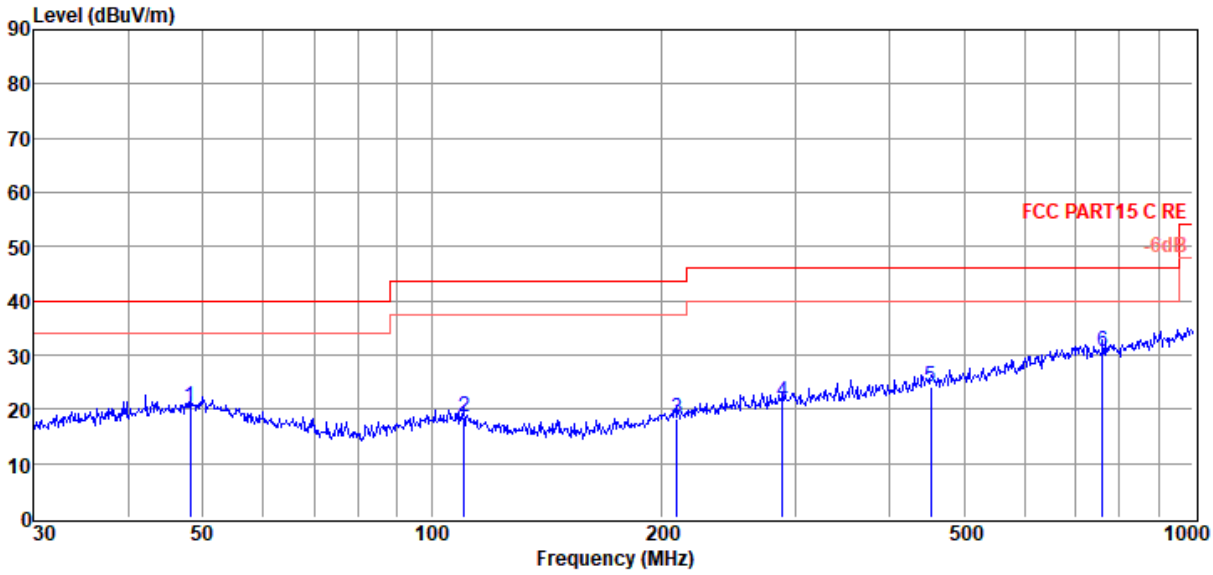
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	41.13	9.47	13.55	3.78	26.80	40.00	-13.20	QP	VERTICAL
2	75.18	3.60	9.18	4.05	16.83	40.00	-23.17	QP	VERTICAL
3	227.69	1.86	12.23	4.91	19.00	46.00	-27.00	QP	VERTICAL
4	432.55	2.80	16.13	5.62	24.55	46.00	-21.45	QP	VERTICAL
5	682.35	2.63	19.83	6.33	28.79	46.00	-17.21	QP	VERTICAL
6	906.48	2.95	21.77	6.95	31.67	46.00	-14.33	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.

Battery: IAA033NA:

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19103115-1E PULSE4\FCC BELOW1G.EM6	
Test Date	: 2019-11-25	**Tested By**	: Talent
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/HORIZONTAL
Memo	:		

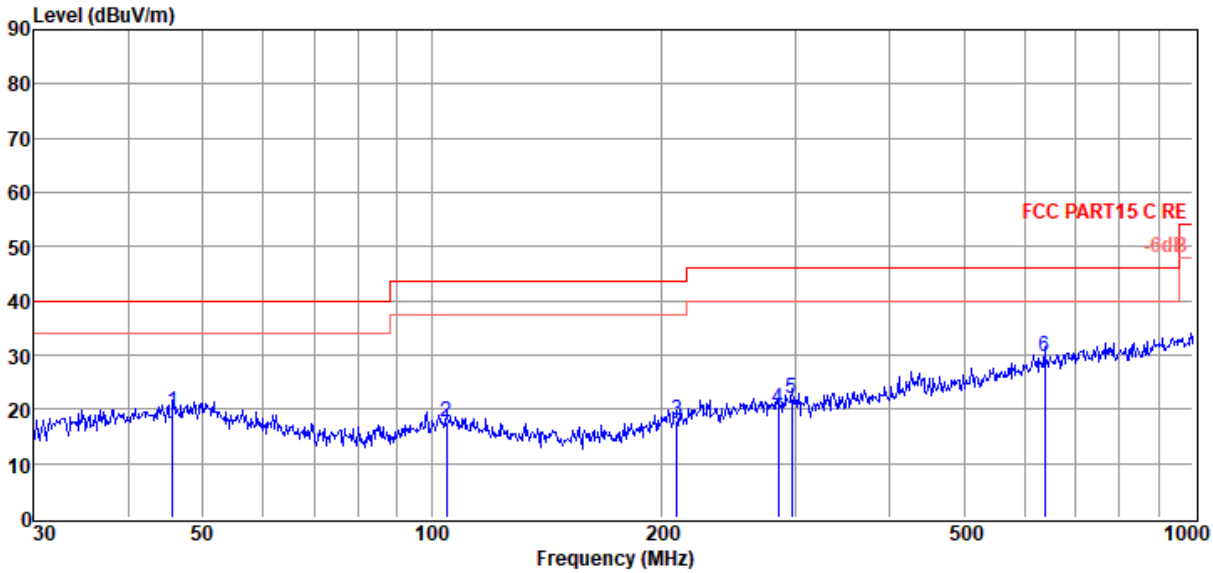


Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	48.16	2.09	14.40	3.85	20.34	40.00	-19.66	Peak	HORIZONTAL
2	110.18	2.52	11.76	4.26	18.54	43.50	-24.96	Peak	HORIZONTAL
3	210.05	1.83	11.71	4.85	18.39	43.50	-25.11	Peak	HORIZONTAL
4	289.00	2.40	13.76	5.14	21.30	46.00	-24.70	Peak	HORIZONTAL
5	452.72	2.15	16.43	5.68	24.26	46.00	-21.74	Peak	HORIZONTAL
6	760.70	3.65	20.47	6.52	30.64	46.00	-15.36	Peak	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#	D:\2019 RE1# Report Data\Q19103115-1E PULSE4\FCC BELOW1G.EM6	
Test Date	: 2019-11-25	**Tested By**	: Talent
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/VERTICAL
Memo	:		



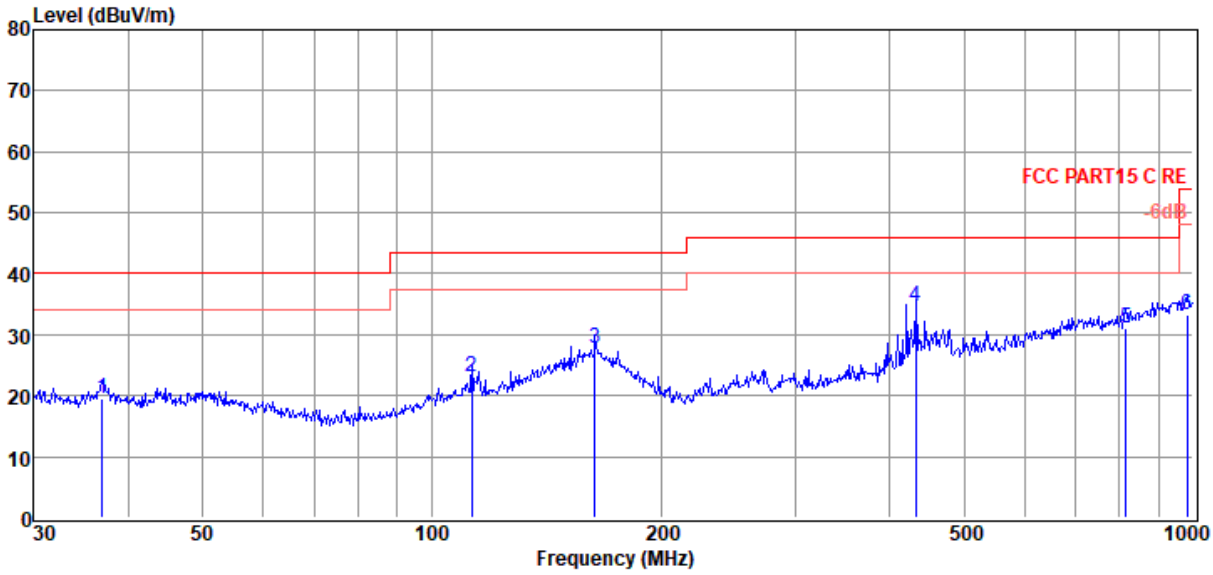
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	45.70	1.68	14.12	3.83	19.63	40.00	-20.37	Peak	VERTICAL
2	104.54	1.68	11.75	4.23	17.66	43.50	-25.84	Peak	VERTICAL
3	210.05	1.38	11.71	4.85	17.94	43.50	-25.56	Peak	VERTICAL
4	284.98	1.29	13.67	5.13	20.09	46.00	-25.91	Peak	VERTICAL
5	297.22	2.71	13.94	5.18	21.83	46.00	-24.17	Peak	VERTICAL
6	638.37	4.25	19.14	6.20	29.59	46.00	-16.41	Peak	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.

Battery: SUN-INTE-277:

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19103115-4E 三诺 pulse4\FCC BELOW 1G.EM6	
Test Date	: 2019-12-19	**Tested By**	: Jacky
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: battery	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:55%,Press:101.4kPa	**Antenna/Distance**	: 2018 VULB 9161/3m/VERTICAL
Memo	:		

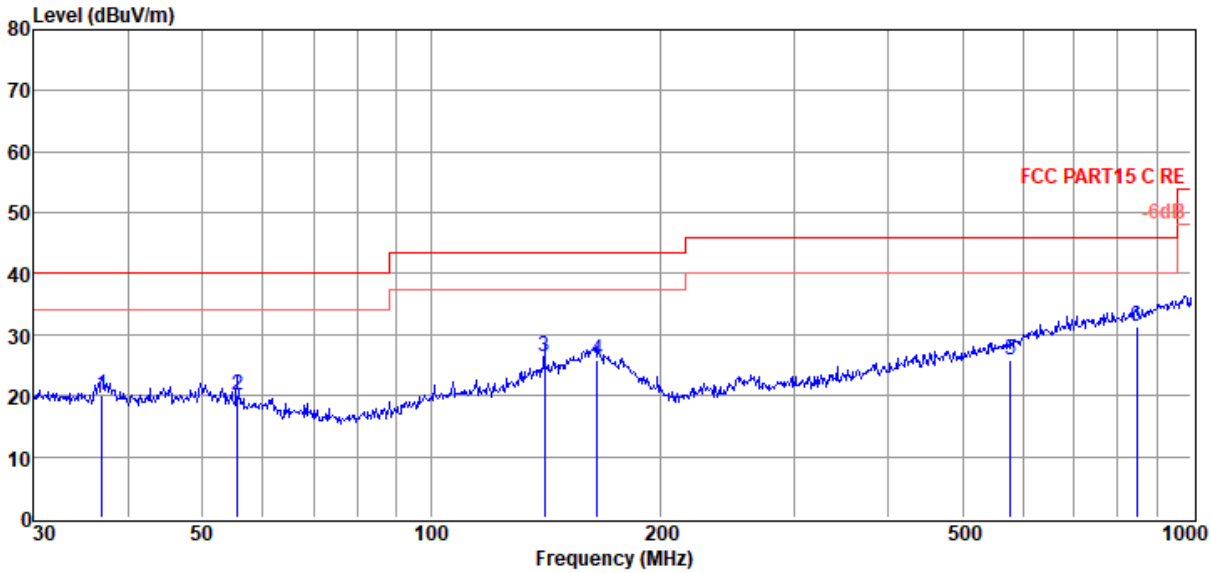


Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	36.90	3.25	12.56	3.73	19.54	40.00	-20.46	QP	VERTICAL
2	112.92	5.64	13.12	4.27	23.03	43.50	-20.47	QP	VERTICAL
3	163.76	4.29	18.90	4.62	27.81	43.50	-15.69	QP	VERTICAL
4	432.55	13.02	16.10	5.62	34.74	46.00	-11.26	QP	VERTICAL
5	815.97	2.84	21.52	6.64	31.00	46.00	-15.00	QP	VERTICAL
6	982.62	3.04	23.15	7.06	33.25	54.00	-20.75	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.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19103115-4E 三诺 pulse4\FCC BELOW 1G.EM6	
Test Date	: 2019-12-19	**Tested By**	: Jacky
EUT	: Portable Bluetooth Speaker	**Model Number**	: PULSE4
Power Supply	: Battery	**Test Mode**	: Tx mode
Condition	: Temp:24.5'C,Humi:55%,Press:101.4kPa	**Antenna/Distance**	: 2018 VULB 9161/3m/HORIZONTAL
Memo	:		



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	36.90	3.82	12.56	3.73	20.11	40.00	-19.89	QP	HORIZONTAL
2	55.61	4.64	11.50	3.92	20.06	40.00	-19.94	QP	HORIZONTAL
3	140.84	5.75	16.12	4.44	26.31	43.50	-17.19	QP	HORIZONTAL
4	165.49	2.42	18.90	4.63	25.95	43.50	-17.55	QP	HORIZONTAL
5	578.67	1.71	18.16	6.03	25.90	46.00	-20.10	QP	HORIZONTAL
6	848.06	2.74	21.84	6.73	31.31	46.00	-14.69	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.

Radiated Emission test (above 1GHz)

Factory 1:

Freq. (MHz)	Read level (dBµV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 2407MHz									
6100.00	45.42	34.82	43.95	11.26	47.55	74.00	-26.45	Peak	HORIZONTAL
7783.00	43.64	36.13	43.19	13.43	50.01	74.00	-23.99	Peak	HORIZONTAL
9432.00	45.55	37.07	43.84	14.80	53.58	74.00	-20.42	Peak	HORIZONTAL
10656.00	42.74	37.64	43.91	15.81	52.28	74.00	-21.72	Peak	HORIZONTAL
12764.00	37.80	38.21	43.38	18.62	51.25	74.00	-22.75	Peak	HORIZONTAL
15110.00	33.28	40.66	42.83	20.31	51.42	74.00	-22.58	Peak	HORIZONTAL
4808.00	46.32	33.79	44.24	11.23	47.10	74.00	-26.90	Peak	VERTICAL
6831.00	45.21	35.50	43.59	12.35	49.47	74.00	-24.53	Peak	VERTICAL
8888.00	44.44	36.80	43.57	13.97	51.64	74.00	-22.36	Peak	VERTICAL
10673.00	42.56	37.63	43.91	15.83	52.11	74.00	-21.89	Peak	VERTICAL
12832.00	38.19	38.23	43.36	18.69	51.75	74.00	-22.25	Peak	VERTICAL
14107.00	33.49	40.22	43.08	20.20	50.83	74.00	-23.17	Peak	VERTICAL
GFSK Tx mode 2441MHz									
5743.00	45.50	34.50	44.05	11.30	47.25	74.00	-26.75	Peak	HORIZONTAL
7460.00	44.63	35.88	43.32	13.13	50.32	74.00	-23.68	Peak	HORIZONTAL
9415.00	45.05	37.06	43.83	14.85	53.13	74.00	-20.87	Peak	HORIZONTAL
11812.00	39.60	38.22	43.61	17.53	51.74	74.00	-22.26	Peak	HORIZONTAL
13495.00	36.60	38.99	43.21	19.53	51.91	74.00	-22.09	Peak	HORIZONTAL
15127.00	33.87	40.65	42.82	20.35	52.05	74.00	-21.95	Peak	HORIZONTAL
4808.00	45.71	33.79	44.24	11.23	46.49	74.00	-27.51	Peak	VERTICAL
7392.00	44.14	35.84	43.35	13.05	49.68	74.00	-24.32	Peak	VERTICAL
9296.00	44.34	36.98	43.77	14.62	52.17	74.00	-21.83	Peak	VERTICAL
10656.00	42.33	37.64	43.91	15.81	51.87	74.00	-22.13	Peak	VERTICAL
12764.00	38.02	38.21	43.38	18.62	51.47	74.00	-22.53	Peak	VERTICAL
15110.00	34.78	40.66	42.83	20.31	52.92	74.00	-21.08	Peak	VERTICAL
GFSK Tx mode 2475MHz									
6848.00	44.86	35.51	43.59	12.34	49.12	74.00	-24.88	Peak	HORIZONTAL
8327.00	44.96	36.63	43.28	13.41	51.72	74.00	-22.28	Peak	HORIZONTAL
9976.00	46.62	37.39	44.09	15.51	55.43	74.00	-18.57	Peak	HORIZONTAL
11778.00	38.77	38.26	43.62	17.48	50.89	74.00	-23.11	Peak	HORIZONTAL
13461.00	36.40	38.95	43.22	19.49	51.62	74.00	-22.38	Peak	HORIZONTAL
15178.00	33.71	40.63	42.79	20.47	52.02	74.00	-21.98	Peak	HORIZONTAL
5709.00	45.93	34.47	44.05	11.22	47.57	74.00	-26.43	Peak	VERTICAL
7443.00	45.11	35.87	43.33	13.11	50.76	74.00	-23.24	Peak	VERTICAL
9398.00	45.12	37.05	43.82	14.89	53.24	74.00	-20.76	Peak	VERTICAL
10673.00	42.42	37.63	43.91	15.83	51.97	74.00	-22.03	Peak	VERTICAL
12645.00	38.21	38.16	43.41	18.49	51.45	74.00	-22.55	Peak	VERTICAL
14175.00	33.85	40.24	43.07	20.19	51.21	74.00	-22.79	Peak	VERTICAL
Result: Pass									

Factory 2:

Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 2407MHz									
6508.00	41.92	35.30	43.75	11.92	45.39	74.00	-28.61	Peak	HORIZONTAL
8157.00	40.21	36.46	43.19	13.42	46.90	74.00	-27.10	Peak	HORIZONTAL
10061.00	42.85	37.44	44.08	15.49	51.70	74.00	-22.30	Peak	HORIZONTAL
11438.00	38.05	38.47	43.70	16.94	49.76	74.00	-24.24	Peak	HORIZONTAL
13597.00	37.73	39.24	43.19	19.67	53.45	74.00	-20.55	Peak	HORIZONTAL
15603.00	32.63	40.65	42.53	21.47	52.22	74.00	-21.78	Peak	HORIZONTAL
5624.00	44.90	34.40	44.07	11.18	46.41	74.00	-27.59	Peak	VERTICAL
8650.00	39.46	36.80	43.45	14.32	47.13	74.00	-26.87	Peak	VERTICAL
10809.00	42.68	37.58	43.87	16.00	52.39	74.00	-21.61	Peak	VERTICAL
12067.00	39.72	38.01	43.54	17.90	52.09	74.00	-21.91	Peak	VERTICAL
13172.00	38.04	38.54	43.28	19.09	52.39	74.00	-21.61	Peak	VERTICAL
14600.00	34.50	40.38	42.98	20.12	52.02	74.00	-21.98	Peak	VERTICAL
GFSK Tx mode 2441MHz									
5165.00	44.10	34.04	44.16	10.38	44.36	74.00	-29.64	Peak	HORIZONTAL
7307.00	42.03	35.79	43.38	12.71	47.15	74.00	-26.85	Peak	HORIZONTAL
9313.00	42.01	36.99	43.78	14.65	49.87	74.00	-24.13	Peak	HORIZONTAL
11234.00	39.59	38.02	43.76	16.61	50.46	74.00	-23.54	Peak	HORIZONTAL
13019.00	37.96	38.33	43.32	18.89	51.86	74.00	-22.14	Peak	HORIZONTAL
14209.00	34.56	40.24	43.06	20.18	51.92	74.00	-22.08	Peak	HORIZONTAL
6236.00	43.42	34.99	43.88	12.12	46.65	74.00	-27.35	Peak	VERTICAL
6984.00	39.81	35.59	43.52	12.59	44.47	74.00	-29.53	Peak	VERTICAL
8225.00	40.77	36.53	43.22	13.38	47.46	74.00	-26.54	Peak	VERTICAL
10350.00	42.48	37.61	44.00	15.42	51.51	74.00	-22.49	Peak	VERTICAL
12560.00	37.81	38.12	43.43	18.41	50.91	74.00	-23.09	Peak	VERTICAL
15348.00	33.75	40.56	42.68	20.87	52.50	74.00	-21.50	Peak	VERTICAL
GFSK Tx mode 2475MHz									
6134.00	41.85	34.87	43.93	11.61	44.40	74.00	-29.60	Peak	HORIZONTAL
7783.00	41.10	36.13	43.19	13.43	47.47	74.00	-26.53	Peak	HORIZONTAL
9296.00	42.21	36.98	43.77	14.62	50.04	74.00	-23.96	Peak	HORIZONTAL
11047.00	40.26	37.61	43.81	16.31	50.37	74.00	-23.63	Peak	HORIZONTAL
13665.00	35.87	39.40	43.18	19.76	51.85	74.00	-22.15	Peak	HORIZONTAL
15297.00	33.97	40.58	42.72	20.75	52.58	74.00	-21.42	Peak	HORIZONTAL
5964.00	42.00	34.67	44.01	11.38	44.04	74.00	-29.96	Peak	VERTICAL
7460.00	43.02	35.88	43.32	13.13	48.71	74.00	-25.29	Peak	VERTICAL
8973.00	42.87	36.80	43.61	14.26	50.32	74.00	-23.68	Peak	VERTICAL
10775.00	41.70	37.59	43.88	15.96	51.37	74.00	-22.63	Peak	VERTICAL
11795.00	38.10	38.24	43.61	17.50	50.23	74.00	-23.77	Peak	VERTICAL
12883.00	37.26	38.25	43.35	18.74	50.90	74.00	-23.10	Peak	VERTICAL
Result: Pass									

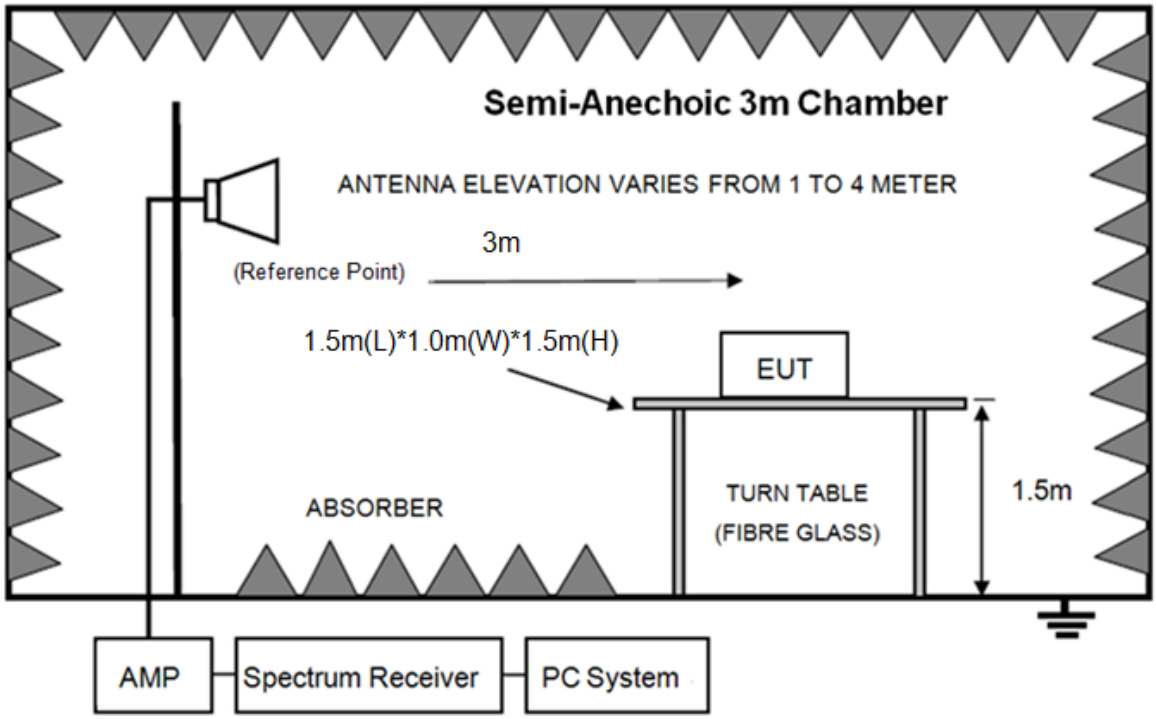
Note: 1. 30MHz~25GHz: (Scan with GFSK, π/4-DQPSK, 8DPSK, the worst case is GFSK Mode)

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

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

6. Band Edge Compliance

6.1. Block diagram of test setup



6.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz and 5725MHz to 5850MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

6.3. Test Procedure

Same with clause 8.3 except change investigated frequency range from 2310MHz to 2415MHz and 2472MHz to 2500MHz.

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)