



Report No.: FCC 1912128
File Reference No.: 2019-12-24

Applicant: Leader Premiums Limited

Product: Bluetooth Speaker

Model No.: AE0127

Trademark: N/A

Test Standards: FCC Part 15.247

Test Result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.10, FCC Part 15.247 for

the evaluation of electromagnetic compatibility

Approved By

# Jack Chung

Jack Chung

Manager

Dated: December 24, 2019

Results appearing herein relate only to the sample tested The technical reports is issued errors and omissions exempt and is subject to withdrawal at

# SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com

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# **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

### **CNAS-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

# Industry Canada (IC) — Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

# **A2LA** (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

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# **Test Report Conclusion**

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#### 1.0 General Details

# 1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.

Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le

Village, Nanshan District, Shenzhen, China

Telephone: (755) 83448688 Fax: (755) 83442996

Site Listed with Federal Communications commission (FCC)

Registration Number:744189 For 3m Anechoic Chamber

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A

For 3m Anechoic Chamber

# 1.2 Applicant Details

Applicant: Leader Premiums Limited

Address: 9/F., Hengfu Mansion, NO.858, Fuming Road, Ningbo, China

Telephone: 0086-574-87723018

Fax: --

# 1.3 Description of EUT

Product: Bluetooth Speaker

Manufacturer: Leader Premiums Limited

Address: 9/F., Hengfu Mansion, NO.858, Fuming Road, Ningbo, China

Brand Name: N/A
Model Number: AE0127
Additional Model Number: N/A

Type of Modulation GFSK, 月/4DQPSK, 8DPSK for Bluetooth

Frequency range 2402-2480MHz for Bluetooth

Channel Spacing 1MHz for Bluetooth

Frequency Selection By software

Channel Number 79 channel for Bluetooth

Antenna: PCB antenna used. The gain of the antennas is 0.58dBi
Rating: Input: DC 5V or Built-in DC3.7V, 450mAh Li-ion battery

1.4 Submitted Sample: 1 Samples

### 1.5 Test Duration

2019-12-12 to 2019-12-24

# 1.6 Test Uncertainty

The report refers only to the sample tested and does not apply to the bulk.

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Conducted Emissions Uncertainty = 3.6dB Radiated Emissions below 1GHz Uncertainty =4.7dB Radiated Emissions above 1GHz Uncertainty =6.0dB Conducted Power Uncertainty =6.0dB Occupied Channel Bandwidth Uncertainty =5%

1.7 Test Engineer

Terry Tang The sample tested by

Print Name: Terry Tang

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2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2019-06-21	2020-06-20
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2019-06-21	2020-06-20
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2019-06-21	2020-06-20
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2019-06-21	2020-06-20
Loop Antenna	EMCO	6507	00078608	2020-06-20	2020-06-20
Spectrum	R&S	FSIQ26	100292	2019-06-21	2020-06-20
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2019-06-21	2020-06-20
Horn Antenna	R&S	BBHA 9120D	9120D-631	2018-07-09	2021-07-08
Power meter	Anritsu	ML2487A	6K00003613	2019-08-22	2020-08-21
Power sensor	Anritsu	MA2491A	32263	2019-08-22	2020-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2018-07-04	2021-07-03
9*6*6 Anechoic			N/A	2018-02-07	2021-02-06
EMI Test Receiver	RS	ESVB	826156/011	2019-06-21	2020-06-20
EMI Test Receiver	RS	ESH3	860904/006	2019-06-21	2020-06-20
Spectrum	HP/Agilent	ESA-L1500A	US37451154	2019-06-21	2020-06-20
Spectrum	HP/Agilent	E4407B	MY50441392	2019-06-21	2020-06-20
Spectrum	RS	FSP	1164.4391.38	2019-01-20	2020-01-19
RF Cable	Zhengdi	ZT26-NJ-NJ-8 M/FA		2019-06-21	2020-06-20
RF Cable	Zhengdi	7m		2019-06-21	2020-06-20
RF Switch	EM	EMSW18	060391	2019-06-21	2020-06-20
Pre-Amplifier	Schwarebeck	BBV9743	#218	2019-06-21	2020-06-20
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2019-06-21	2020-06-20
LISN	SCHAFFNER	NNB42	00012	2019-01-08	2020-01-07

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#### 3.0 **Technical Details**

#### 3.1 **Summary of test results**

The EUT has been tested according to the following specifications:

Requirement	CFR 47 Section	Result	Notes
Antenna Requirement	15.203, 15.247(b)(4)	PASS	Complies
Maximum Peak Out Power	15.247 (b)(1), (4)	PASS	Complies
Carrier Frequency Separation	15.247(a)(1)	PASS	Complies
20dB Channel Bandwidth	15.247 (a)(1)	PASS	Complies
Number of Hopping Channels	15.247(a)(iii), 15.247(b)(1)	PASS	Complies
Time of Occupancy (Dwell Time)	15.247(a)(iii)	PASS	Complies
Spurious Emission, Band Edge, and Restricted bands	15.247(d),15.205(a), 15.209 (a),15.109	PASS	Complies
Conducted Emissions	15.207(a), 15.107	PASS	Complies
RF Exposure	15.247(i), 1.1307(b)(1)	PASS	Complies

#### 3.2 **Test Standards**

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

#### 4.0 **EUT Modification**

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

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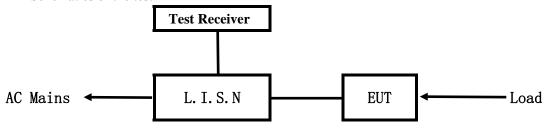
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### 5. Power Line Conducted Emission Test

### 5.1 Schematics of the test

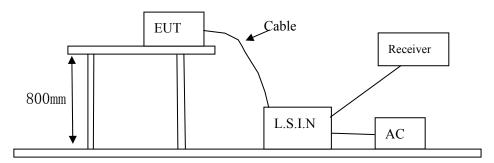


EUT: Equipment Under Test

# 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10-2013.

Test Voltage: 120V~60Hz Block diagram of Test setup



# 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

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### A. EUT

Device	Manufacturer	Model	FCC ID
Bluetooth Speaker	Leader Premiums Limited	AE0127	2APYY-AE0127

#### B. Internal Device

Device	Manufacturer	Model	Rating

#### C. Peripherals

Device	Manufacturer	Model	Rating
Power Supply	h.TV	S012BE80500200	Input: 100-240V~, 50/60Hz, 0.5A;
			Output: DC5V, 2A

#### 5.4 **EUT Operating Condition**

Operating condition is according to ANSI C63.10-2013.

- Α Setup the EUT and simulators as shown on follow
- В Enable AF signal and confirm EUT active to normal condition

#### Power line conducted Emission Limit according to Paragraph 15.107, 15.207 5.5

Frequency	Class A Lim	its (dB µ V)	Class B Limits (dB \( \mu \)			
(MHz)	Quasi-peak Level	asi-peak Level Average Level		Average Level		
$0.15 \sim 0.50$	79.0 66.0		66.0~56.0*	56.0~46.0*		
$0.50 \sim 5.00$	5.00 73.0 60.0		56.0	46.0		
5.00 ~ 30.00	73.0	60.0	60.0	50.0		

Notes:

- 1. \*Decreasing linearly with logarithm of frequency.
- 2. The tighter limit shall apply at the transition frequencies

#### 5.6 **Test Results**

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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#### A: Conducted Emission on Live Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

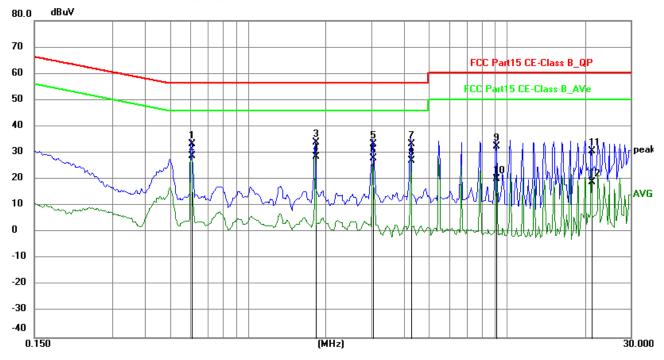
Temperature: 26℃ Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Keep Bluetooth Transmitting** 

**Equipment Level: Class B** 

**Results: PASS** 

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.6063	33.49	0.00	33.49	56.00	-22.51	QP	Р
2	0.6063	28.99	0.00	28.99	46.00	-17.01	AVG	Р
3	1.8192	33.83	0.00	33.83	56.00	-22.17	QP	Р
4	1.8192	28.63	0.00	28.63	46.00	-17.37	AVG	Р
5	3.0350	33.31	0.00	33.31	56.00	-22.69	QP	Р
6	3.0350	27.84	0.00	27.84	46.00	-18.16	AVG	Р
7	4.2480	33.42	0.00	33.42	56.00	-22.58	QP	Р
8	4.2480	27.03	0.00	27.03	46.00	-18.97	AVG	Р
9	9.1035	32.38	0.00	32.38	60.00	-27.62	QP	Р
10	9.1035	20.13	0.00	20.13	50.00	-29.87	AVG	Р
11	21.2325	30.60	0.00	30.60	60.00	-29.40	QP	Р
12	21.2325	18.92	0.00	18.92	50.00	-31.08	AVG	Р

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#### B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

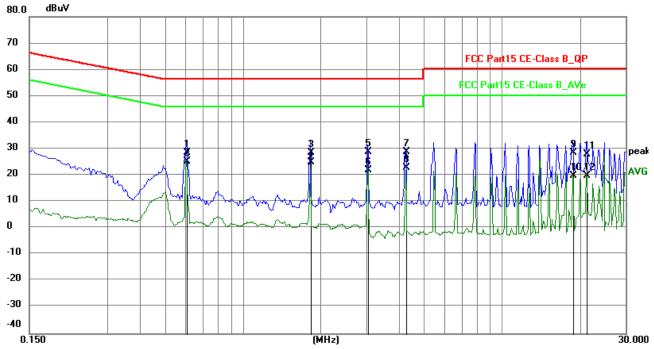
Humidity: 65%RH Atmospheric Pressure: 101 KPa Temperature: 26°C

**EUT set Condition: Keep Bluetooth Transmitting** 

**Equipment Level: Class B** 

**Results: Pass** 

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.6063	28.69	0.00	28.69	56.00	-27.31	QP	Р
2	0.6063	25.25	0.00	25.25	46.00	-20.75	AVG	Р
3	1.8192	28.69	0.00	28.69	56.00	-27.31	QP	Р
4	1.8192	24.93	0.00	24.93	46.00	-21.07	AVG	Р
5	3.0350	28.88	0.00	28.88	56.00	-27.12	QP	Р
6	3.0350	21.96	0.00	21.96	46.00	-24.04	AVG	Р
7	4.2480	28.87	0.00	28.87	56.00	-27.13	QP	Р
8	4.2480	22.89	0.00	22.89	46.00	-23.11	AVG	Р
9	18.8106	28.61	0.00	28.61	60.00	-31.39	QP	Р
10	18.8106	19.97	0.00	19.97	50.00	-30.03	AVG	Р
11	21.2403	27.91	0.00	27.91	60.00	-32.09	QP	Р
12	21.2403	19.74	0.00	19.74	50.00	-30.26	AVG	Р

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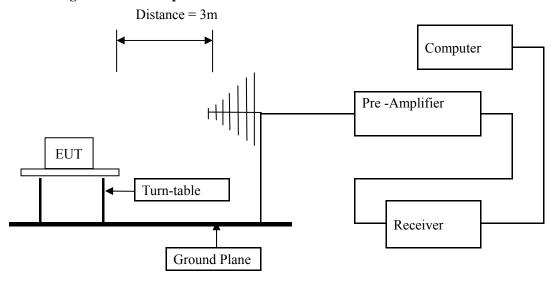
Date: 2019-12-24



### 6 Radiated Emission Test

- 6.1 Test Method and test Procedure:
- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**OP**" in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

# **Block diagram of Test setup**



- 6.2 Configuration of The EUT
  Same as section 5.3 of this report
- 6.3 EUT Operating Condition
  Same as section 5.4 of this report.

The report refers only to the sample tested and does not apply to the bulk.

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### 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

# Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109 and RSS-210

Frequency Range (MHz)	Distance (m)	Field strength (dB $\mu$ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
- 2. In the Above Table, the higher limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 4. 8DPSK was the worse case because it has highest output power
- 5. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
- 6. Battery fully charged

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### Test result

# General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal/Vertical (30MHz----1000MHz)

EUT set Condition: Keep Bluetooth Transmitting

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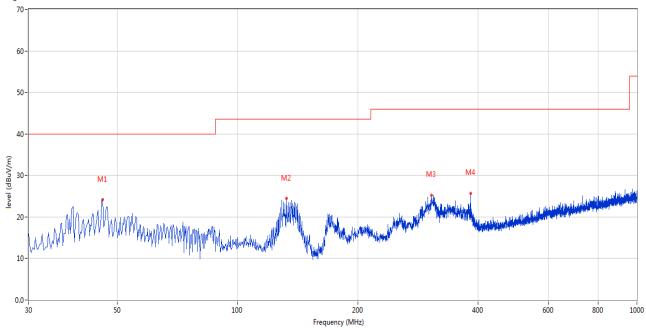
Date: 2019-12-24



Test Figure:

H





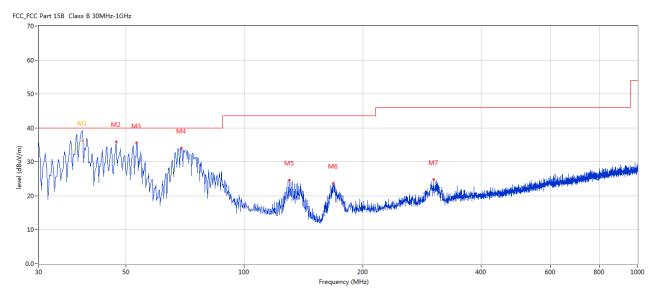
No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table (o)	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)			(cm)		
1	46.001	24.18	-11.40	40.0	-15.82	Peak	360.00	100	Н	Pass
2	132.794	24.48	-17.01	43.5	-19.02	Peak	1.00	200	Н	Pass
3	305.896	25.31	-10.93	46.0	-20.69	Peak	233.00	100	Н	Pass
4	383.962	25.73	-9.16	46.0	-20.27	Peak	173.00	100	Н	Pass

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# Test Figure:



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	38.750	37.53	-12.63	40.0	-2.47	Peak	31.00	100	V	Pass
1*	38.750	36.19	-12.63	40.0	-3.81	QP	31.00	100	V	Pass
2	47.213	35.96	-11.41	40.0	-4.04	Peak	263.00	100	V	Pass
3	53.274	35.56	-11.51	40.0	-4.44	Peak	323.00	100	V	Pass
4	69.275	34.07	-15.38	40.0	-5.93	Peak	0.00	200	V	Pass
5	130.370	24.62	-16.75	43.5	-18.88	Peak	21.00	100	V	Pass
6	168.433	23.73	-16.13	43.5	-19.77	Peak	360.00	100	V	Pass
7	303.229	24.72	-10.98	46.0	-21.28	Peak	217.00	200	V	Pass

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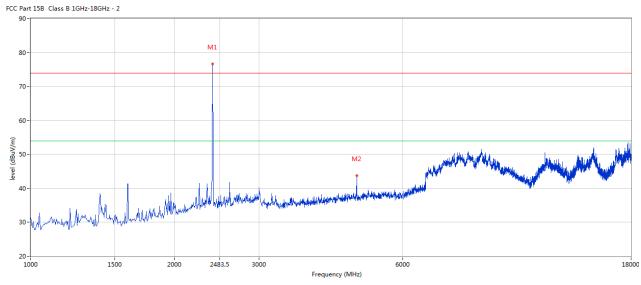
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# Test Figures above 1GHz:

Please refer to the following test plots for details:

### **Low Channel: Vertical**



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table (o)	Height (cm)	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)					
2	4802.799	43.76	3.12	54.0	-10.24	Peak	360.00	100	V	Pass

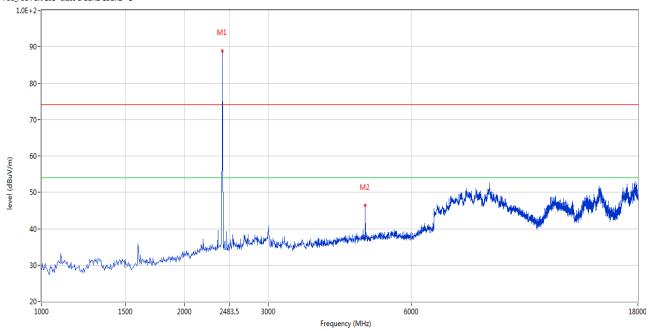
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# **Low Channel: Horizontal**

FCC\_FCC Part 15B Class B 1GHz-18GHz - 2



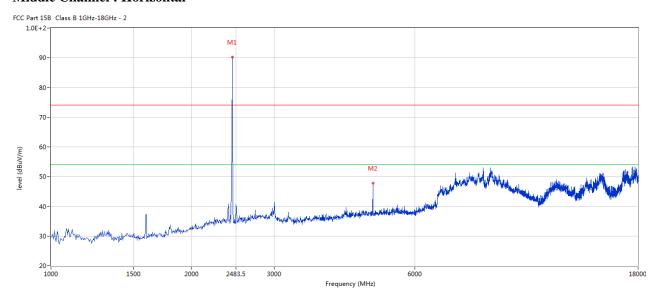
No.	Frequency	Results	Factor (dB)	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)		(dBuV/m)	(dB)		(o)	(cm)		
2	4802.799	46.44	3.12	54.0	-7.56	Peak	270.00	100	Н	Pass

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# **Middle Channel: Horizontal**



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
2	4883.529	47.79	3.20	54.0	-6.21	Peak	139.00	100	Н	Pass

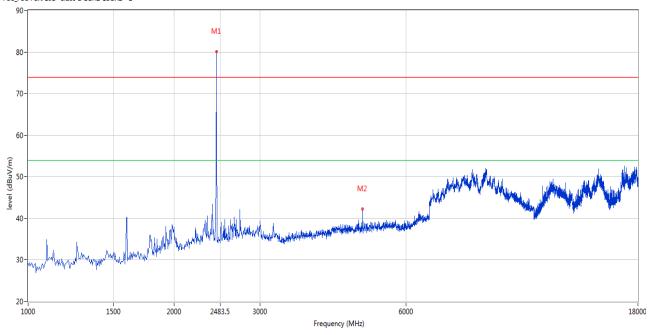
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### Middle Channel: Vertical

FCC\_FCC Part 15B Class B 1GHz-18GHz - 2



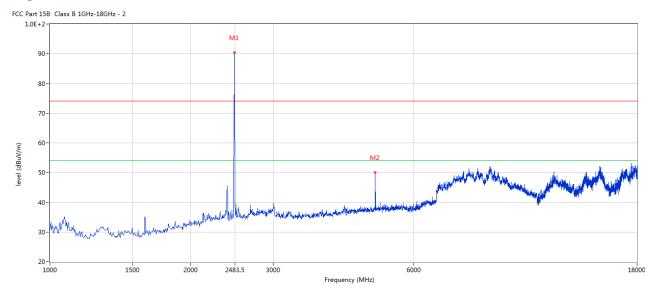
No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
2	4883.529	42.18	3.20	54.0	-11.82	Peak	360.00	100	V	Pass

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# **High Channel: Horizontal**



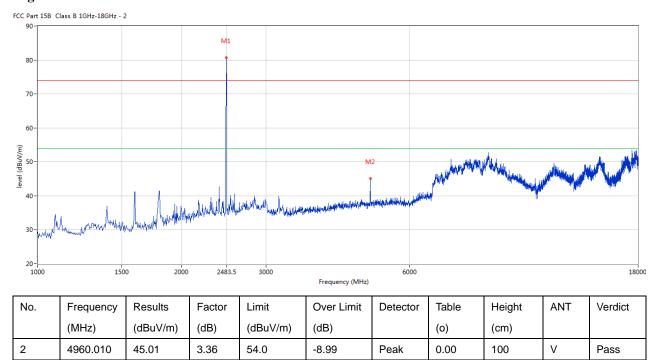
No.	Frequency	Results	Factor	Limit	Over	Detector	Table (o)	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	Limit (dB)			(cm)		
2	4960.010	49.98	3.36	54.0	-4.02	Peak	119.00	100	Н	Pass

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# **High Channel: Vertical**



Note: 1. Level = Reading + AF + Cable - Preamp

- 2. For the radiated emissions above 18G, it is the floor noise.
- 3. The measured PK value less than the AV limit, no necessary to take down the AV measurement result.

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# 7.0 20dB Bandwidth Measurement

# 7.1 Regulation

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 20 dB 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.

# 7.2 Limits of 20dB Bandwidth Measurement

N/A

# 7.3 Test Procedure.

- 1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span =3MHz, RBW =30 kHz, VBW=100 kHz, Sweep = auto Detector function = peak, Trace = max hold
- 3. Measure the highest amplitude appearing on spectral display and record the level to calculate results. 6. Repeat above procedures until all frequencies measured were complete.

# 7.4 Test Result

### **Type of Modulation: GFSK**

Type of Modulation. Grox										
EUT	Blı	uetooth Speaker	Model	AE0127						
Mode	Ke	ep Transmitting	Input Voltage	DC3.7V						
Temperat	ure	24 deg. C,	Humidity	56% RH						
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass/ Fail						
Low	2402	885		Pass						
Middle	2441	885		Pass						
High	2480 885			Pass						

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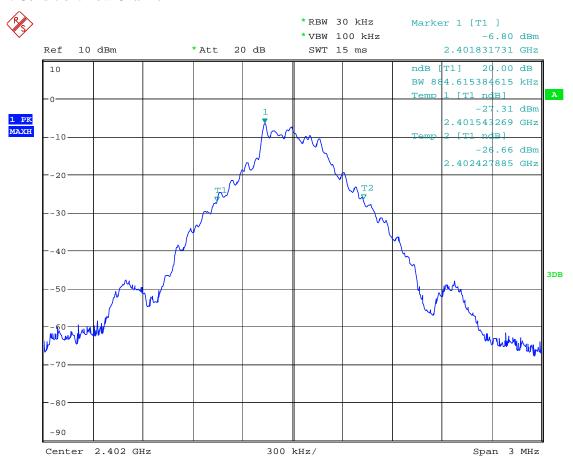
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# Test Figure:

# 1. Condition: Low Channel



Date: 23.DEC.2019 13:45:50

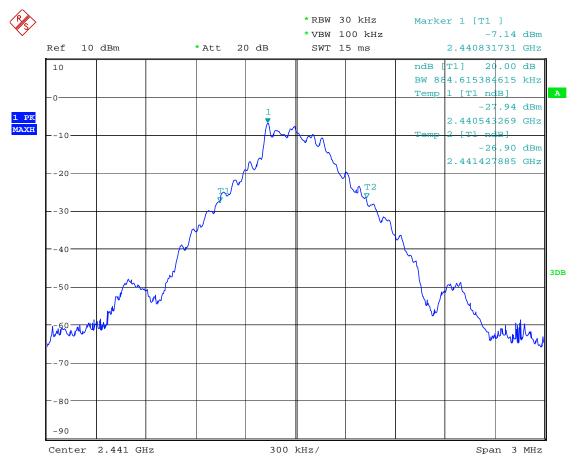
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# 2. Condition: Middle Channel



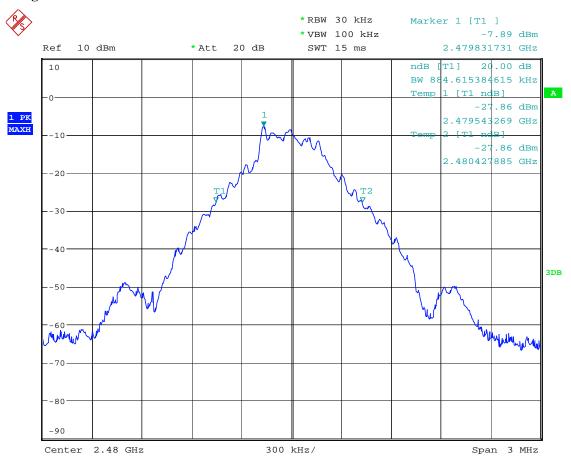
Date: 23.DEC.2019 13:47:28

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# 3. High Channel



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# **Test Result**

Type of Modulation: JI/4DQPSK

EUT	В	luetooth Speaker	Model	AE0127
Mode	K	eep Transmitting	Input Voltage	DC3.7V
Temperat	ure	24 deg. C,	Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/ Fail
Low	2402	1258		Pass
Middle	2441	2441 1258		Pass
High	2480	1258		Pass

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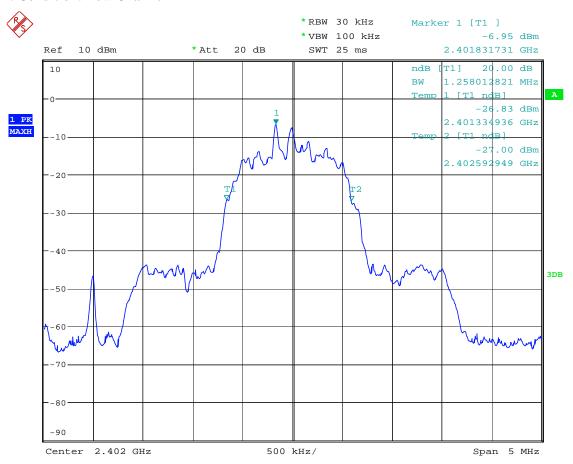
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# Test Figure:

# 1. Condition: Low Channel



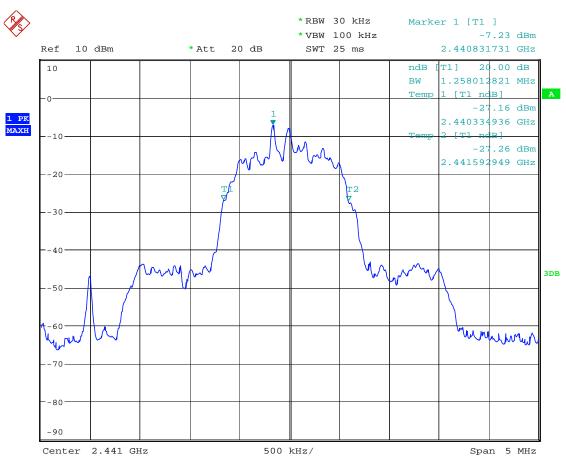
Date: 24.DEC.2019 17:41:47

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# 2. Condition: Middle Channel



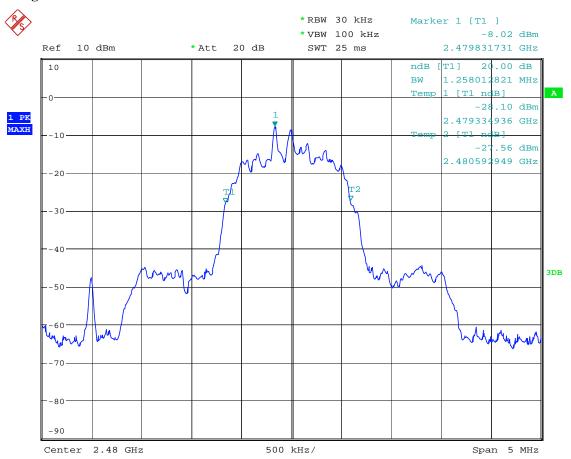
Date: 24.DEC.2019 17:38:50

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# 3. High Channel



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# **Test Result**

# **Type of Modulation: 8DPSK**

EUT	Bl	uetooth Speaker	Model	AE0127
Mode	Ko	eep Transmitting	Input Voltage	DC3.7V
Temperat	ure	24 deg. C,	Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/ Fail
Low	2402	1274		Pass
Middle	2441	1274		Pass
High	2480	1274		Pass

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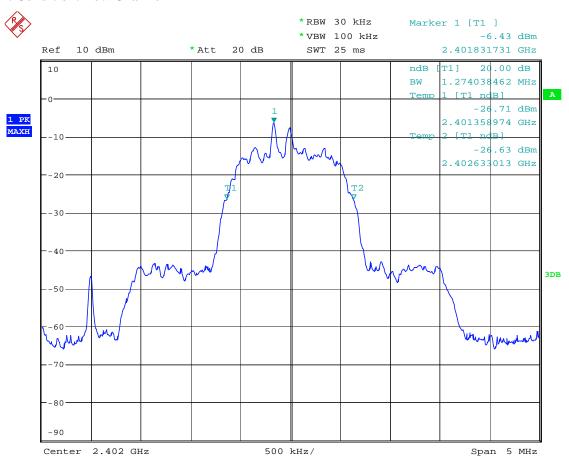
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# Test Figure:

# 1. Condition: Low Channel



Date: 24.DEC.2019 17:40:54

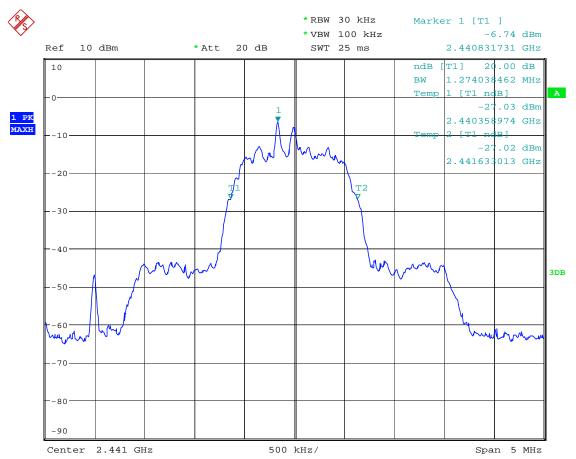
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# 2. Condition: Middle Channel



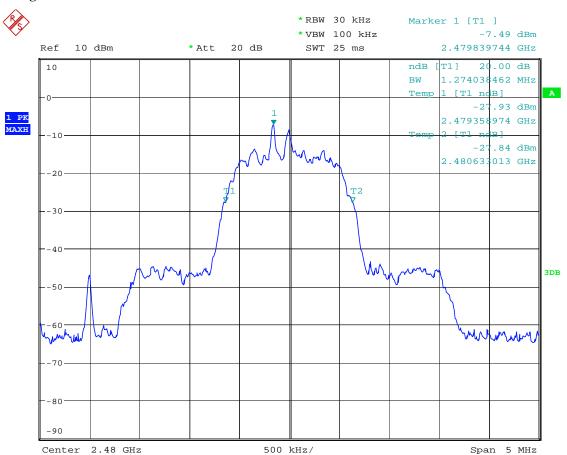
Date: 24.DEC.2019 17:39:55

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# 3. High Channel



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# 8. Maximum Output Power

# 8.1 Regulation

According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band:0.125 watts. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

# **8.2 Limits of Maximum Output Power**

The Maximum Output Power Measurement is 30dBm.

### 8.3 Test Procedure

- 1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; VBW = RBW=3MHz; Sweep = 60s; Detector function = PK; Trace = max hold
- 3. Measure the highest amplitude appearing on spectral display and record the level to calculate results.
- 4. Repeat above procedures until all frequencies measured were complete.

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### **8.4Test Results**

# Type of Modulation: GFSK

EUT		Blı	uetooth Speaker	N	Model	AE0127
Mode		Keep Transmitting			Voltage	120V~
Temperature	e	24 deg. C,			idity	56% RH
Channel	Channel Frequency (MHz)  Low 2402		Max. Power Output (dBm	Max. Power Output (dBm)		Pass/ Fail
Low			-4.05		(dBm) 30	Pass
Middle		2441 -4.40			30	Pass
High		2480	-5.12		30	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

# 

EUT		Blı	uetooth Speaker	l	Model	AE0127
Mode		Keep Transmitting			Voltage	120V~
Temperature		24 deg. C,			idity	56% RH
Channel	Cł	nannel Frequency	Max. Power Output (dBm)  Peak		Peak Power	Pass/ Fail
Chamier		(MHz)			Limit (dBm)	
Low		2402	-3.55		30	Pass
Middle		2441	-3.95		30	Pass
High 2480		2480	-4.55		30	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

The report refers only to the sample tested and does not apply to the bulk.

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#### **Type of Modulation: 8DPSK**

EUT	Blu	Bluetooth Speaker		Model	AE0127
Mode	Ke	ep Transmitting	Input Voltage		120V~
Temperature	e	24 deg. C, Hu		umidity	56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)  Peak		Peak Power Limit (dBm)	Pass/ Fail
Low	2402	-3.31		30	Pass
Middle	2441	-3.57		30	Pass
High	2480	-4.32		30	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

- 2. The worse case was recorded
- 3. The Peak power was measured

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### 9. Carrier Frequency Separation

#### 9.1 Regulation

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

## 9.2 Limits of Carrier Frequency Separation

The Maximum Power Spectral Density Measurement is 25kHz or two-thirds of the 20dB bandwidth of the hopping Channel which is great.

#### 9.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span; Video (or Average) Bandwidth (VBW)  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.

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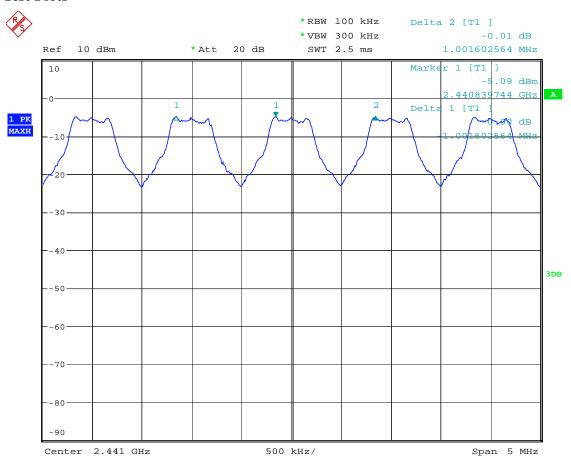


#### 9.4Test Result

#### Type of Modulation: GFSK

EUT	Bluetooth Speaker		Model		AE0127
Mode	Hopping On In		Input Voltage		DC3.7V
Temperature	24 deg. C,	Humidity			56% RH
Carrier Frequency Separation		Limit		Pass/ Fail	
1.002MHz		≥ 25 kHz or 2/3 of the 20 dB bandwidth		Pass	

#### **Test Plots**



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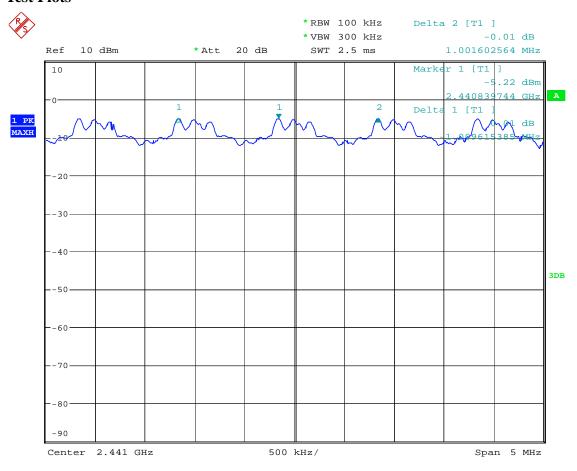
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### Type of Modulation: Л/4DQPSK

EUT	Bluetooth Speaker		Model		AE0127
Mode	Hopping On In		Input Voltage		DC3.7V
Temperature	24 deg. C,		Humidity	56% RH	
Carrier Frequency Separation		Limit			Pass/ Fail
1.002MHz		≥ 25 kHz or 2/3 of 20 dB bandwidth		vidth	Pass

#### **Test Plots**



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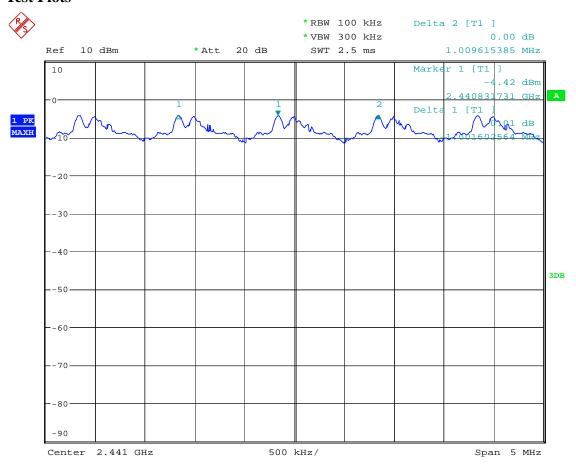
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#### **Type of Modulation: 8DPSK**

EUT	Bluetooth Speaker		Model		AE0127
Mode	Hopping On In		Input Voltage		DC3.7V
Temperature	24 deg. C,		Humidity	56% RH	
Carrier Frequency Separation			Limit		Pass/ Fail
1.002MHz		≥ 25 kHz or 2	2/3 of 20 dB bandy	width	Pass

#### **Test Plots**



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### 10. Number of Hopping Channels

#### 10.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

#### 10.2 Limits of Number of Hopping Channels

The frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

#### **10.3 Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW=100 kHz, VBW=300 kHz; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Record the number of hopping channels.

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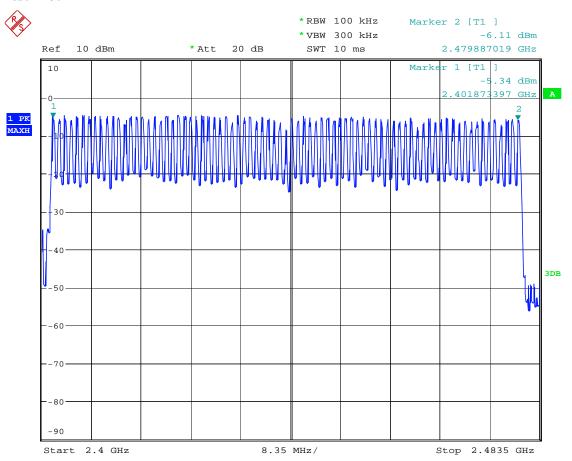


#### 10.4Test Result

#### Type of Modulation: GFSK

EUT	Bluetooth Speaker		Model	AE0127	
Mode	Hopping On		Input Voltage	DC3.7V	
Temperature	24 deg. C,		Humidity	56% RH	
Operating Frequency		Number of hopping channels		Limit	Pass/ Fail
2402-2480MHz		79	1	≥ 15	Pass

#### **Test Plot**



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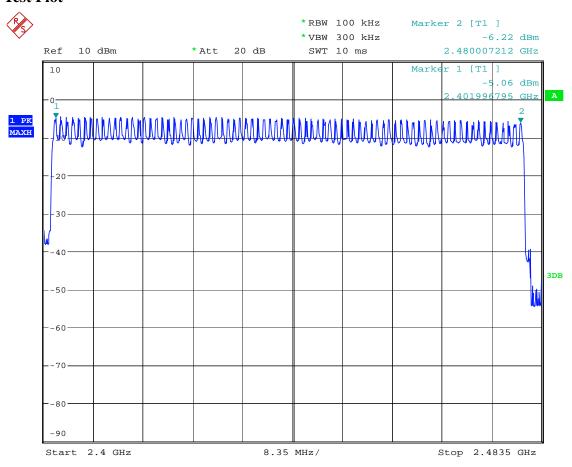
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### Type of Modulation: $\sqrt{1/4}$ DQPSK

EUT	Bluetooth Speaker		Model		AE0127
Mode	Hopping On		Input Voltage		DC3.7V
Temperature		24 deg. C,	Humidity		56% RH
Operating Frequency		Number of hopping channels	Limit		Pass/ Fail
2402-2480MHz		79	≥ 15		Pass

#### **Test Plot**



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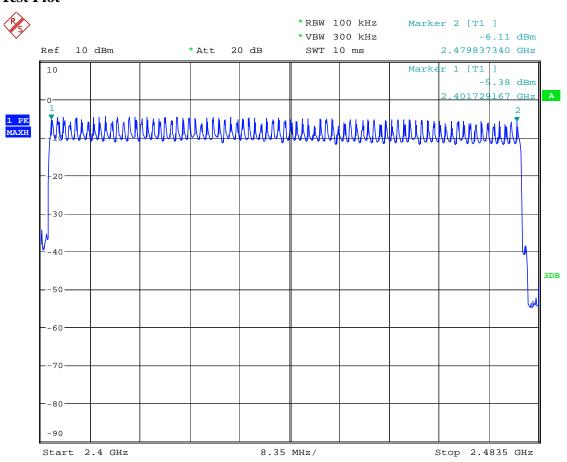
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### **Type of Modulation: 8DPSK**

EUT	Bluetooth Speaker		M	odel		AE0127
Mode	Hopping On		Input	Voltage		DC3.7V
Temperature		24 deg. C,		dity	56% RH	
Operating Frequency		Number of hopping channels		Liı	mit	Pass/ Fail
2402-2480MHz		79		≥ 15		Pass

#### **Test Plot**



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### 11. Time of Occupancy (Dwell Time)

#### 11.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

#### 11.2 Limits of Carrier Frequency Separation

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

#### 11.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW  $\geq$  RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold
- 3. Measure the dwell time using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.
- 5. Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

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#### 11.4 Test Result

#### **Type of Modulation: GFSK**

EUT	Bluetoo	Bluetooth Speaker		AE0127			
Mode	Keep Tr	Keep Transmitting		DC3.7V			
Temperatur	e 24 d	eg. C, Humidity		56% RH			
Channel	Reading	Hoping Rate		Actual	Limit		
	DH5						
Middle	2.965ms	266.667 hop/s		0.316s	0.4s		

Actual = Reading  $\times$  (Hopping rate / Number of channels)  $\times$  Test period, Test period = 0.4 [seconds / channel]  $\times$  79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625 $\mu$ s with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

Note: DH5 was the worst case.

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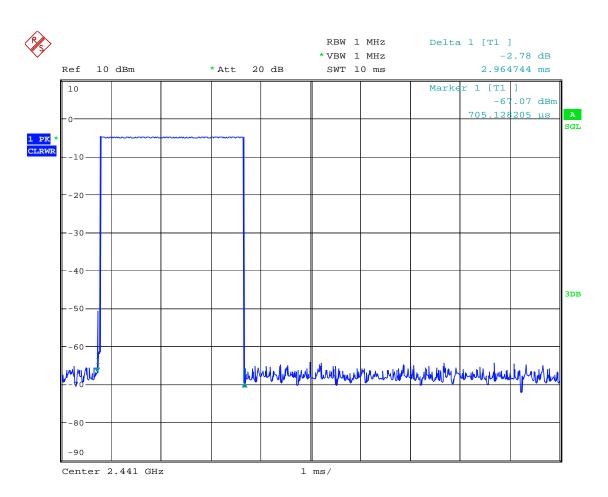
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Test Plots:

DH5



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#### **Test Result**

### Type of Modulation: J1/4DQPSK

EUT	Bluetoo	Bluetooth Speaker		AE0127			
Mode	Keep Tr	Keep Transmitting		DC3.7V			
Temperatur	re 24 c	leg. C,	C, Humidity		56% RH		
Channel	Reading	Hoping	g Rate	Actual	Limit		
	DH5						
Middle	2.981ms	266.66	7 hop/s	0.318s	0.4s		

Actual = Reading  $\times$  (Hopping rate / Number of channels)  $\times$  Test period, Test period = 0.4 [seconds / channel]  $\times$  79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625 $\mu$ s with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

Note: 2DH5 was the worst case.

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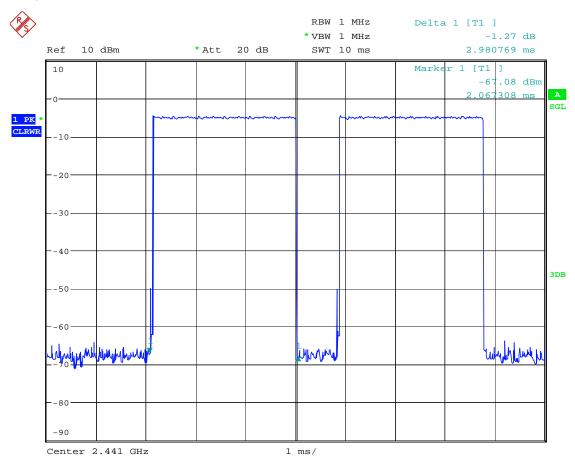
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## Test Plots:

#### **2DH5**



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#### Type of Modulation: 8DPSK

EUT	Bluetoo	Bluetooth Speaker		AE0127			
Mode	Keep Tr	Keep Transmitting		DC3.7V			
Temperatur	e 24 d	leg. C,	Humidity	5	56% RH		
Channel	Reading	Hoping	g Rate	Actual	Limit		
	DH5						
Middle	2.981ms	266.667 hop/s		0.318s	0.4s		

Actual = Reading  $\times$  (Hopping rate / Number of channels)  $\times$  Test period, Test period = 0.4 [seconds / channel]  $\times$  79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625 $\mu$ s with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

Note: 3DH5 was the worst case.

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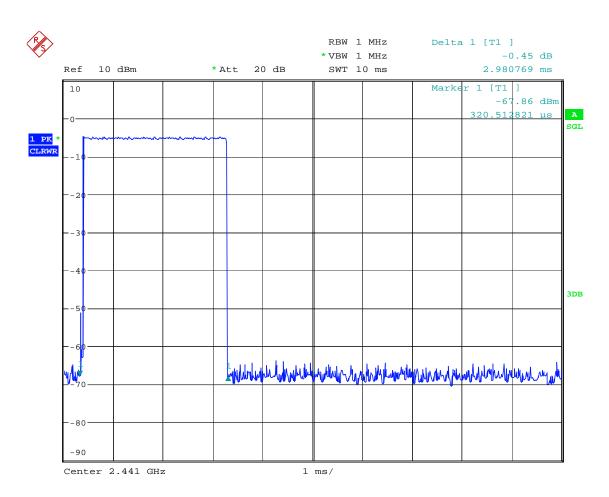
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Test Plots:

#### **3DH5**



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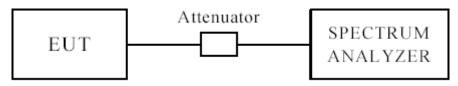
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#### 12 Out of Band Measurement

## 12.1 Test Setup



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

#### 12.2 Limits of Out of Band Emissions Measurement

- 1. Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
- 2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

#### 12.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test. Peak values with RBW=VBW=1MHz and PK detector.

For bandage test, the spectrum set as follows: RBW=100 kHz, VBW=300 kHz. A conducted measurement used

Note: 1. For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule. 2. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

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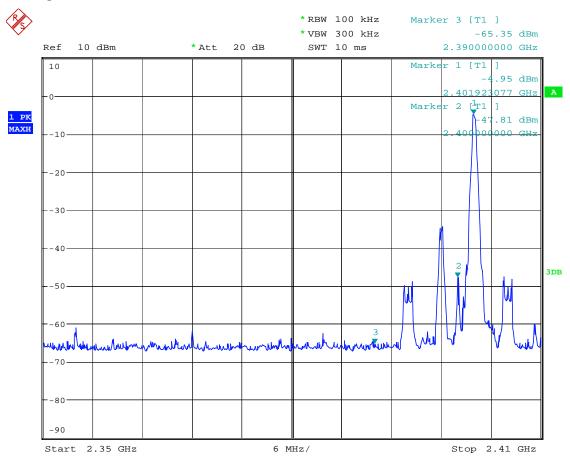


### Type of Modulation: GFSK

#### Band Edge Test Result 12.4

Product:	Bluetooth Speaker	Test Mode:	Low Channel
Mode	Keeping Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



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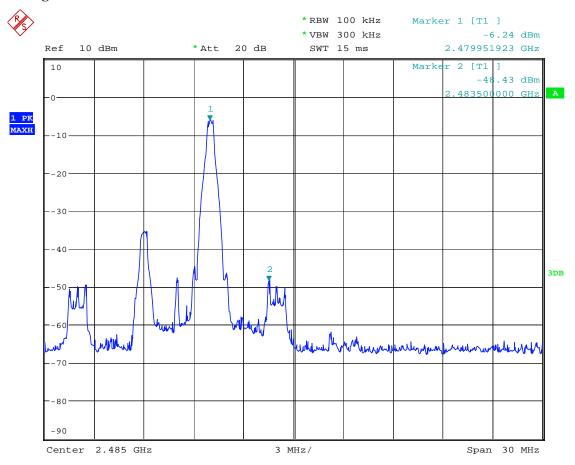


#### Type of Modulation: GFSK

#### Band Edge Test Result 12.4

Product:	Bluetooth Speaker	Test Mode:	High Channel
Mode	Keeping Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



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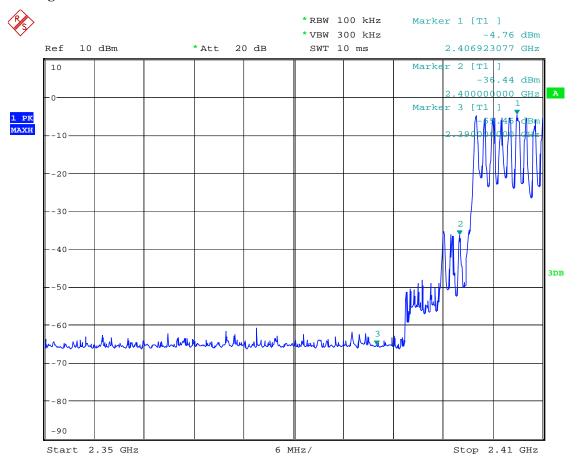


#### Type of Modulation: GFSK

#### Band Edge Test Result

Product:	Bluetooth Speaker	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 14:43:39

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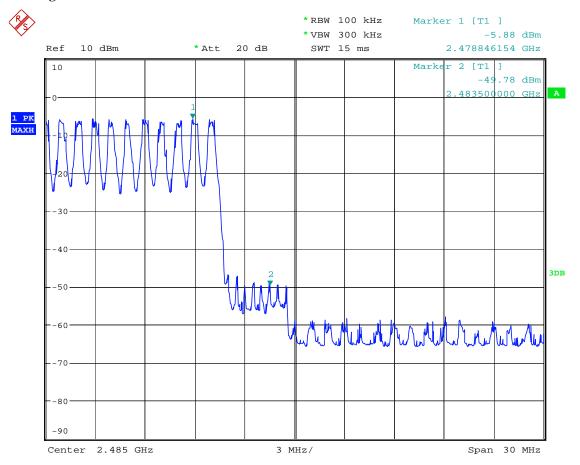


#### Type of Modulation: GFSK

## Band Edge Test Result

Product:	Bluetooth Speaker	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 14:25:05

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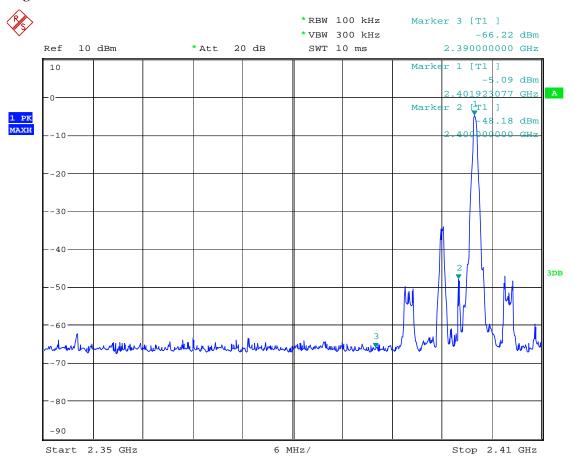


# Type of Modulation: $\sqrt{J/4DQPSK}$

#### 12.4 Out of Band Test Result

Product:	Bluetooth Speaker	Test Mode:	Low Channel
Mode	Keeping Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 14:12:21

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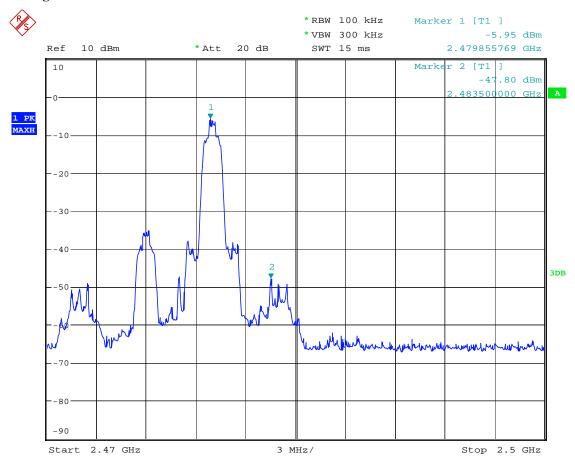


# Type of Modulation: $\sqrt{1/4}$ DQPSK

#### Band Edge Test Result 12.4

Product:	Bluetooth Speaker	Test Mode:	High Channel
Mode	Keeping Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 14:27:54

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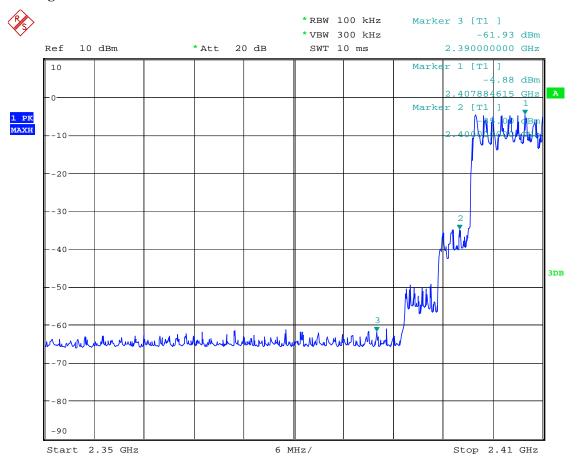


### Type of Modulation: Л/4DQPSK

#### Out of Band Test Result

Product:	Bluetooth Speaker	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 16:58:15

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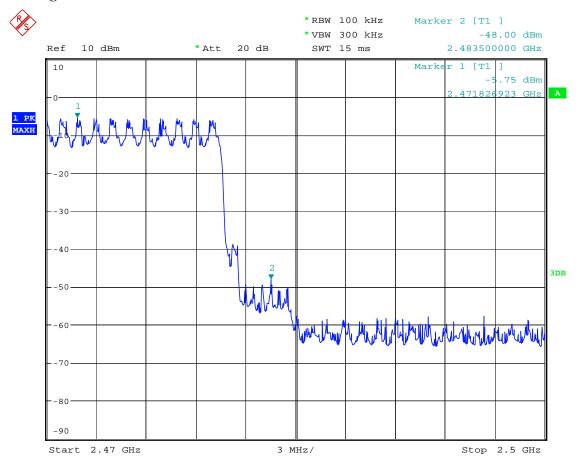


### Type of Modulation: Л/4DQPSK

#### Out of Band Test Result

Product:	Bluetooth Speaker	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 16:51:55

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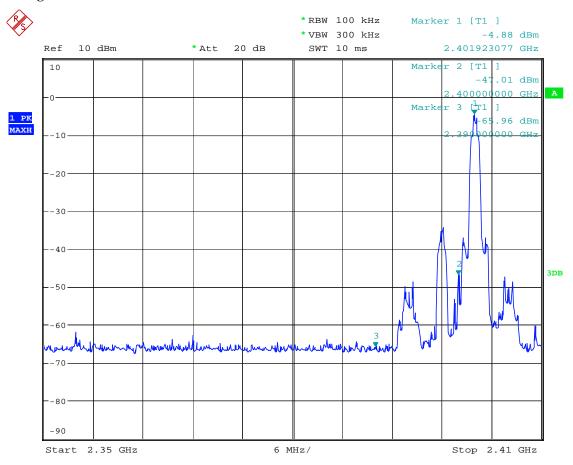


#### **Type of Modulation: 8DPSK**

#### 12.4 Band Edge Test Result

Product:	Bluetooth Speaker	Test Mode:	Low Channel
Mode	Keeping Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 14:08:31

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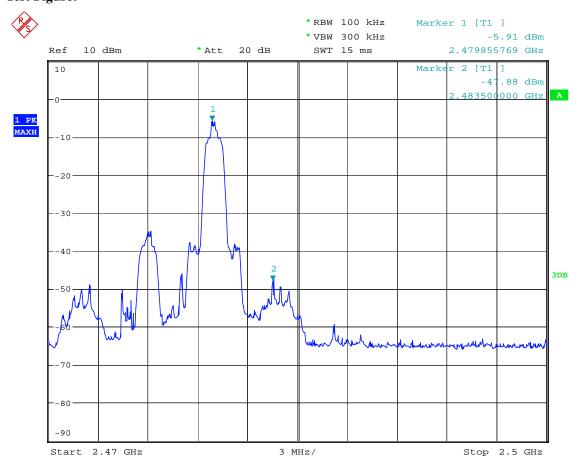


#### **Type of Modulation: 8DPSK**

#### Band Edge Test Result 12.4

Product:	Bluetooth Speaker	Test Mode:	High Channel
Mode	Keeping Transmitting	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 23.DEC.2019 14:36:32

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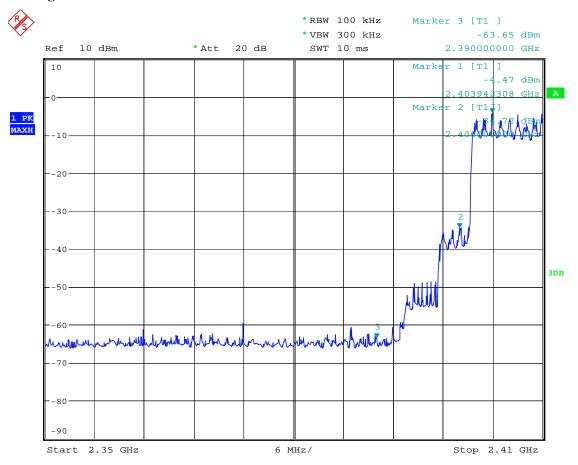


#### **Type of Modulation: 8DPSK**

## Band Edge Test Result

Product:	Bluetooth Speaker	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 24.DEC.2019 11:14:09

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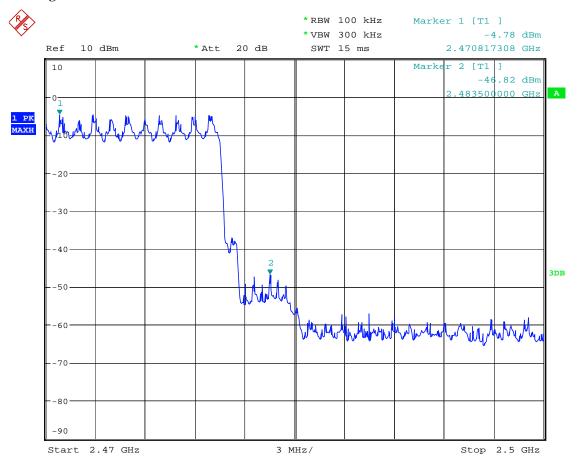


#### **Type of Modulation: 8DPSK**

## Band Edge Test Result

Product:	Bluetooth Speaker	Test Mode:	Hopping mode
Mode	Hopping On	Input Voltage	DC3.7V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

## **Test Figure:**



Date: 24.DEC.2019 11:09:28

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#### 12.4 Restrict Band Measurement

	E	EUT	Blı	uetooth S	peaker		Model			AE012	7
Mode		lode	Keep Transmitting Input Voltage		ige			V			
-	Гетр	perature	re 24 deg. C,			Humidity		56% RH		Н	
	Test	Result:		Pass		M	odulation '	Гуре		8DPSk	(Worse cas
		Class B 1GHz-18GHz - 2	2								
1.	0E+2-										
	90-									<u></u>	
									/		
	80-									$\overline{}$	
	70-									$\overline{}$	
	/0-										
	60-								$\neg$	$\longrightarrow$	
									/ V	$\overline{}$	
	50-									· · · · · · · · · · · · · · · · · · ·	7
	40-										<u></u>
		ومرون ويوال المتحولات	فاستناد استان اللفاق	المحارا أأوام أوارا والأورا				"			N. W. Park
	30-	teri i de destili e dillementali di i de	Acres to the call have seen	and a second of the second of the		and the state of t	· to specified a				2410
		,				Frequency (M	1Hz)				2410
	2500				I	Over	Detector	Table (o)	Height	ANT	Verdict
No		Frequency	Results	Factor	Limit	Over	_ 0.00.0.		- 3	,	verdict
No		Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Limit (dB)			(cm)	7	Verdict

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#### 12.4 Pactrict Rand Massurament

	EUT	Bl	uetooth Spea	aker	Mod	lel		AE	E0127	
	Mode	Ke	eep Transmit	ting	Input V	oltage		DC	C3.7V	
Teı	mperature		24 deg. C,		Humi	dity		56%	% RH	
Те	st Result:		Pass		Modulatio	on Type		8D	PSK (	worse case
	art 15B Class B 1GHz-1	8GHz - 2								
90-										
80-									\	
$\vdash$									+	
70-										
60-									$\rightarrow$	
- 1								My /	-	
50-								TWO STATES		
50-			. di i	1	. 14 . 1.			₩		
50-										<b>A.</b>
								**		N <sub>AM</sub> IAN
40-		N. May						<b>**</b>		<b>*</b>
40-					Frequency (MHz)		WWW.			2410
30- 2360	Frequency	Results	Factor (dB)	Limit	Frequency (MHz)  Over Limit	Detector	Table	Height	ANT	2410 Verdict
40-		Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	T	Detector	Table (o)	Height (cm)	ANT	

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#### 12.4 Restrict Band Measurement

	E	UT	Blı	ietooth S	peaker		Model			AE0	127	
Mode Temperature		Keep Transmitting 24 deg. C,				Input Voltage Humidity			DC3.7V 56% RH			
-	Test I	Result:		Pass		N	Iodulation	Туре		8DP	SK (worse ca	
	rt 15B Cl	lass B 1GHz-18GHz - 2	2									
	90-											
(111/400) 1949	60-	- January				Married Marrie						
	30-2470					2483.5 Frequency (M	5 Frequency (MHz)					
No	).	Frequency	Results	Factor	Limit	Over	Detector	Table (o)	Height	ANT	Verdict	
		(MHz)	(dBuV/m)	(dB)	(dBuV/m)	Limit (dB)			(cm)			
1**	,	2483.444	37.47	-3.57	54.0	-16.53	AV	118.00	100	Н	Pass	
ı		2483.444	56.21	-3.57	74.0	-17.79	Peak	118.00	100	Н	Pass	

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#### 12.4 Restrict Band Measurement

E	EUT	В	luetooth	Speaker		Model			AE012	27
M	/lode	K	eep Tran	smitting		Input Volta	age		DC3.7	V
Temp	perature		24 deg	g. C,		Humidity	y		56% R	Н
Test	Result:		Pas	SS	M	odulation '	Туре		8DPS	K(worse case
C_FCC Part 1	15B Class B 1GHz-1	.8GHz - 2								
70-										
40-	White has been been been been been been been bee									
40- 30-	Ather March Market				No. of the last of					
40-	upper Marin Ma				2483.5 Frequency (N	1Hz)				2500
40- 30- 2470	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)		n <sub>Hz</sub> )	Table (o)	Height (cm)	ANT	2500 Verdict

Note: 1. For Restricted band test, only the worst case was reported.

2. The measured PK value less than the AV limit, no necessary to take down the AV measurement result.

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#### 13.0 Antenna Requirement

### 13.1 Standard Applicable

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.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 13.2 Antenna Connected constructions

PCB antenna used. The gain of the antennas is 0.58dBi.

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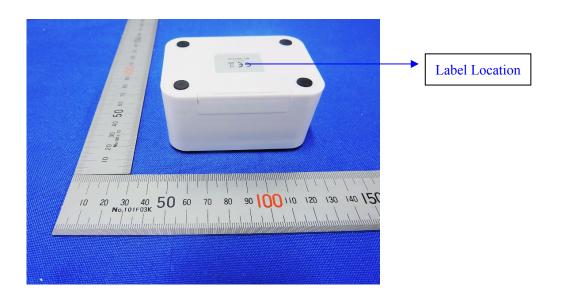


#### 14.0 FCC ID Label

## FCC ID: 2APYY-AE0127

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

#### **Mark Location:**



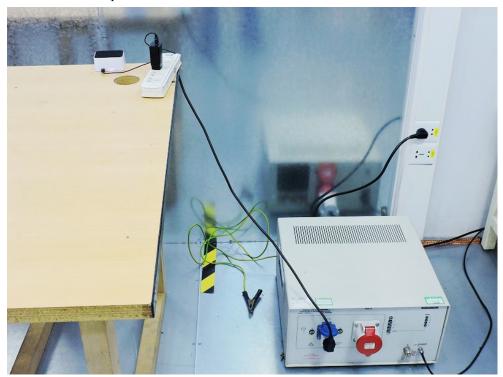
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#### 15.0 Photo of testing

Conducted Emission Test Setup:



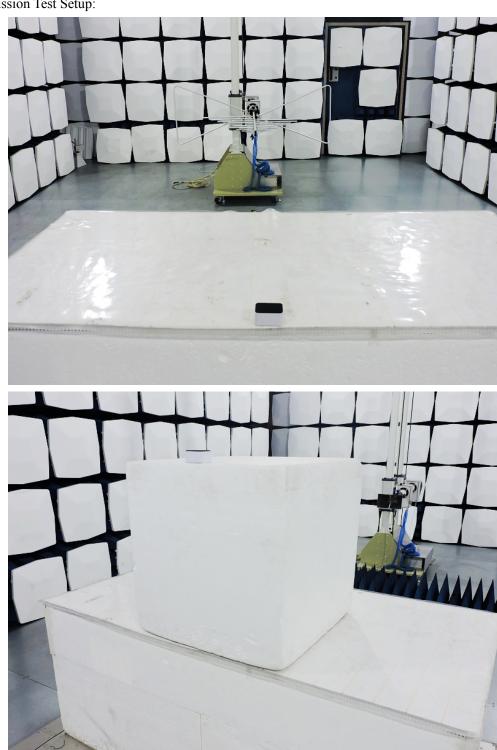
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# Radiated Emission Test Setup:

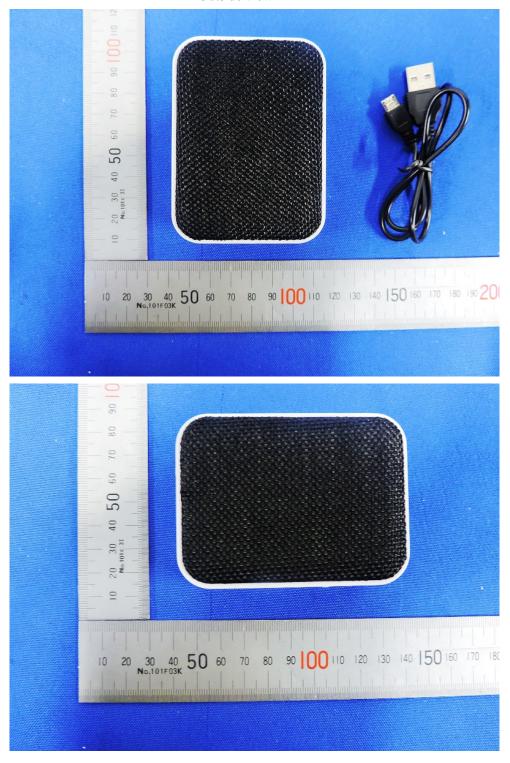


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### Photographs – EUT

Outside view



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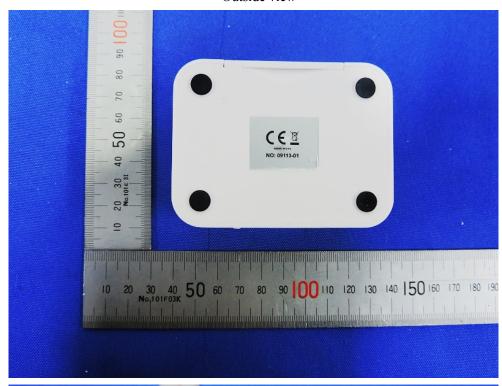
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Outside view





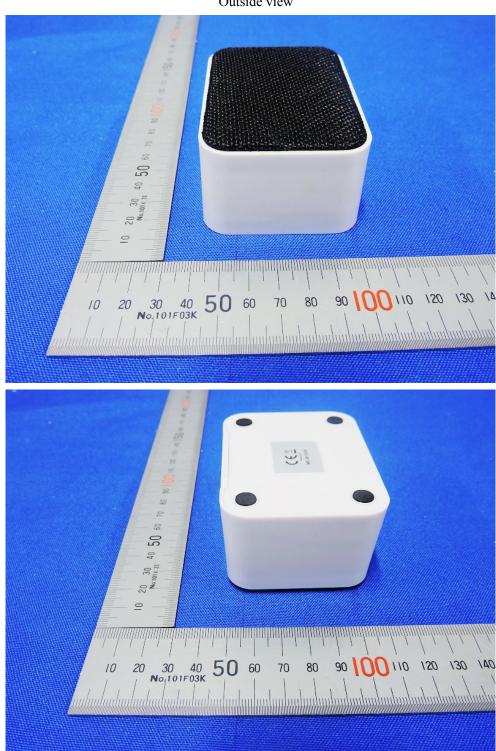
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Inside view





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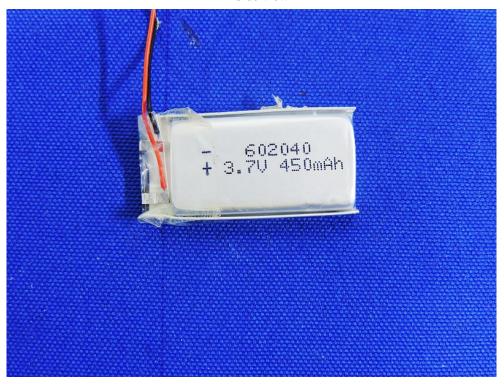
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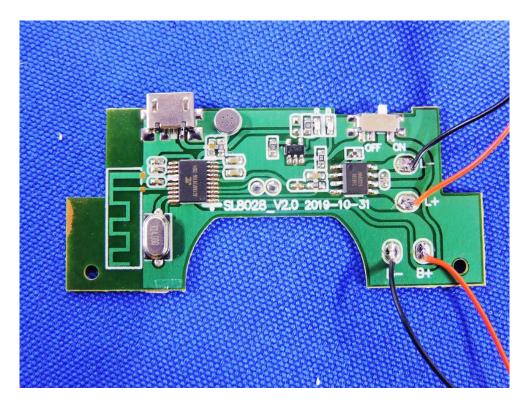
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Inside view





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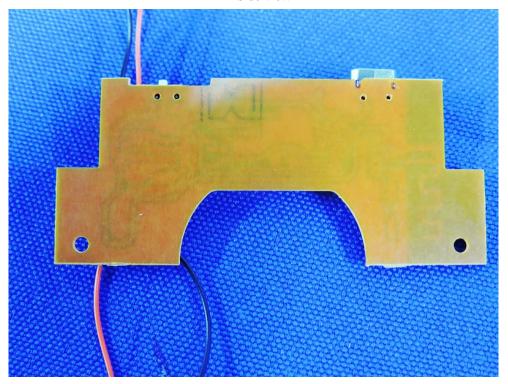
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Inside view





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