



Report No: FCC 1512023-02 File reference No: 2016-04-29

Applicant: Speech Processing Solutions GmbH

Product: Smart Voice Recorder

Model No: PSP1000, PSPXXXX (Remark: "X" denotes 0 to 9 or A to Z or

Blank, In accordance with buyer coder)

Trademark: PHILIPS

Test Standards: FCC Part 15.247

Test result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.4, FCC Part 15 Subpart C, Paragraph 15.247 regulations for the evaluation of

electromagnetic compatibility

Approved By

# Jack Chung

Jack Chung

Manager

Dated: April 29, 2016

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

Room 512-519, 5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District, Shenzhen, Guangdong, 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 meets 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 17025:1999 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 899988

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.:899988.

### **IC- Registration No.: IC5205A-02**

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration No.: IC 5205A-02.

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### 1.0 General Details

#### Test Lab Details 1.1

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.

Address: Room 512-519,5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District, Shenzhen,

Guangdong China

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Site on File with the Federal Communications Commission – United Sates

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-02

For 3m & 10 m OATS

### 1.2 Applicant Details

Applicant: Speech Processing Solutions GmbH

Address: Gutheil-Schoder Gasse 8-12,1100 Vienna, Austria

Telephone: +43 1 60529 1742 +43 1 60529 1268 Fax:

### 1.3 Description of EUT

Product: Smart Voice Recorder

Manufacturer: Shenzhen Jingwah Information Technology Co., Ltd.

Address: 4F, Bldg, 4, Jing Hua Square, Jinghua Street, Shennan Road Centre, Shenzhen,

Guangdong, China

Brand Name: **PHILIPS** Model Number: PSP1000

Additional Model Number: PSPXXXX (Remark: "X" denotes 0 to 9 or A to Z or Blank, In accordance with

buyer coder)

Type of Modulation GFSK, JI/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: Integral Antenna and the maximum Gain of this antenna is 2.0dBi

Model No.: KA23-0502000DEU Power Adapter

Input: 100-240V, 50/60Hz, 0.35A; Output: DC5V, 2000mA

#### Submitted Sample: 4 Samples 1.4

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1.5 Test Duration 2015-12-07 to 2016-04-27

1.6 Test Uncertainty Conducted Emissions Uncertainty =3.6dB Radiated Emissions Uncertainty =4.7dB

Test Engineer 1.7

The sample tested by

Print Name: Terry Tang

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2.0 Test Equipments					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2015-08-22	2016-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2015-08-22	2016-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2015-08-22	2016-08-21
Ultra Broadband ANT	R&S	HL562	100157	2015-08-23	2016-08-22
ESDV Test Receiver	R&S	ESDV	100008	2015-08-22	2016-08-21
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2015-08-22	2016-08-21
System Controller	CT	SC100	-		
Printer	EPSON	РНОТО ЕХЗ	CFNH234850		
Computer	IBM	8434	1S8434KCE99BLXLO*	-	-
Loop Antenna	EMCO	6502	00042960	2015-08-23	2016-08-22
ESPI Test Receiver	R&S	ESI26	838786/013	2015-08-22	2016-08-21
3m OATS			N/A	2015-08-24	2016-08-23
Horn Antenna	R&S	BBHA 9170	BBHA9170265	2015-08-24	2016-08-23
Horn Antenna	R&S	BBHA 9120D	9120D-631	2015-08-24	2016-08-23
Power meter	Anritsu	ML2487A	6K00003613	2015-08-22	2016-08-21
Power sensor	Anritsu	MA2491A	32263	2015-08-22	2016-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2015-08-23	2016-08-21
LISN	AFJ	LS16C	10010947251	2015-08-22	2016-08-21
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2015-08-23	2016-08-22
9*6*6 Anechoic			N/A	2015-08-24	2016-08-23
EMI Test Receiver	RS	ESCS30	100139	2015-08-22	2016-08-21

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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
<b>Conducted Emissions</b>	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, ANSI C63.4:2014 and ANSI C63.10:2013

#### 4.0 **EUT Modification**

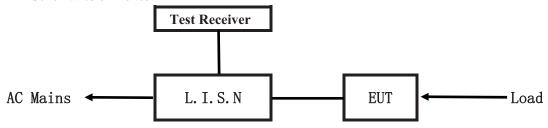
No modification by SHENZHEN TIMEWAY TESTING LABORATORIES

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#### 5. **Power Line Conducted Emission Test**

#### 5.1 Schematics of the test

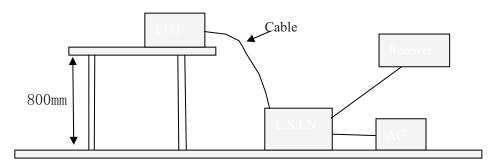


**EUT: Equipment Under Test** 

#### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2014. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 -2014.

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



#### 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2014. 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
Smart Voice Recorder	Shenzhen Jingwah Information Technology Co., Ltd.	PSP1000, PSPXXXX	2AD4M-PSP1

#### B. Internal Device

Device	Manufacturer	Model	Rating

#### C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable

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

Operating condition is according to ANSI C63.4-2014.

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

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

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

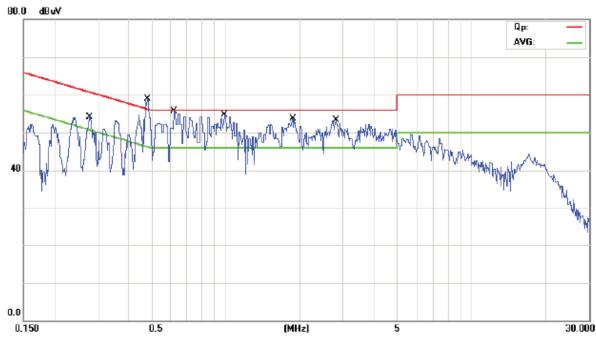
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Keep Bluetooth Transmitting** 

**Equipment Level: Class B** 

**Results: PASS** 

Please refer to following diagram for individual



No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBu∀	dB	dBu∀	dBu∀	dB	Detector	Comment
1	0.2780	38.00	11.14	49.14	60.88	-11.74	QP	
2	0.2780	8.60	11.14	19.74	50.88	-31.14	AVG	
3 *	0.4764	41.20	11.35	52.55	56.40	-3.85	QP	
4	0.4764	8.70	11.35	20.05	46.40	-26.35	AVG	
5	0.6183	34.50	11.50	46.00	56.00	-10.00	QP	
6	0.6183	-1.40	11.50	10.10	46.00	-35.90	AVG	
7	0.9891	36.40	11.89	48.29	56.00	-7.71	QP	
8	0.9891	4.00	11.89	15.89	46.00	-30.11	AVG	
9	1.8487	36.90	12.24	49.14	56.00	-6.86	QP	
10	1.8487	8.40	12.24	20.64	46.00	-25.36	AVG	
11	2.7916	35.70	12.62	48.32	56.00	-7.68	QP	
12	2.7916	6.40	12.62	19.02	46.00	-26.98	AVG	

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

**EUT Operating Environment** 

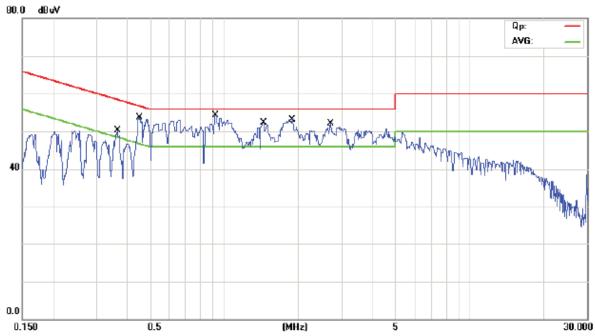
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Keep Bluetooth Transmitting** 

**Equipment Level: Class B** 

**Results: Pass** 

Please refer to following diagram for individual



		•				•		
No. M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBu∀	dB	dBu∀	dBu∀	dB	Detector	Comment
1	0.3645	36.50	11.23	47.73	58.63	-10.90	QP	
2	0.3645	8.50	11.23	19.73	48.63	-28.90	AVG	
3	0.4462	38.80	11.31	50.11	56.95	-6.84	QP	
4	0.4462	7.30	11.31	18.61	46.95	-28.34	AVG	
5 *	0.9230	40.20	11.82	52.02	56.00	-3.98	QP	
6	0.9230	9.50	11.82	21.32	46.00	-24.68	AVG	
7	1.4296	35.30	12.07	47.37	56.00	-8.63	QP	
8	1.4296	5.40	12.07	17.47	46.00	-28.53	AVG	
9	1.9075	36.40	12.26	48.66	56.00	-7.34	QP	
10	1.9075	8.70	12.26	20.96	46.00	-25.04	AVG	
11	2.7012	34.40	12.58	46.98	56.00	-9.02	QP	
12	2.7012	7.10	12.58	19.68	46.00	-26.32	AVG	
		·			·			

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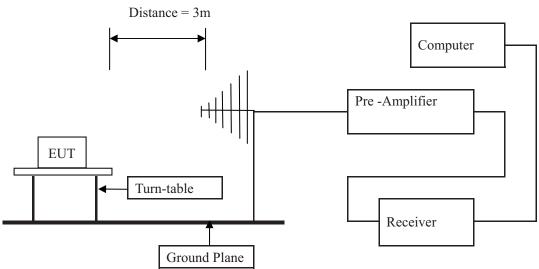
Date: 2016-04-29



#### 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 Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (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 "QP" 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.
- 6.4 Radiated Emission Limit

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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 µ 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. 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.
- 5. All modulation have been tested ,GFSK was found as the worst case and only reported

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#### Test result

### General Radiated Emission Data and Harmonics Radiated Emission Data

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

Keep Bluetooth Transmitting EUT set Condition:

**Results:** Pass

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
119.960	31.57	Н	43.50
267.320	35.66	Н	46.00
175.160	31.85	Н	43.50
474.400	36.46	V	46.00
175.920	27.74	V	43.50

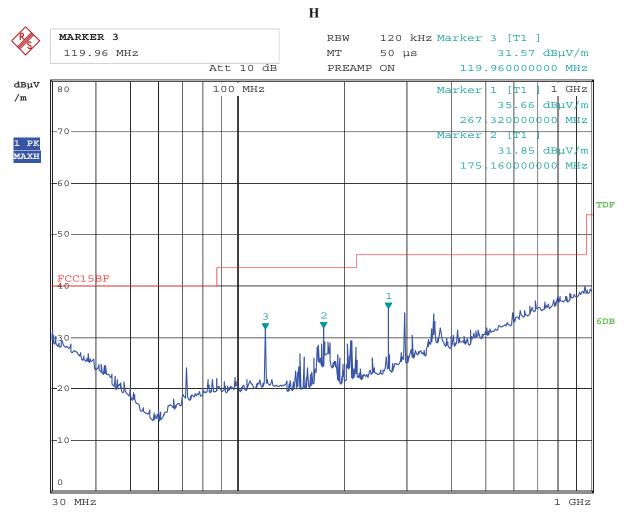
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# Test Figure:



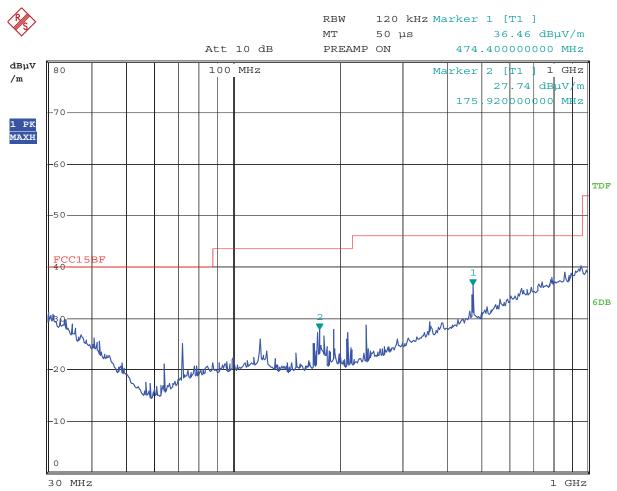
22.APR.2016 17:32:37 Date:

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Test Figure:



22.APR.2016 17:22:37 Date:

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# **Operation Mode: Transmitting under Low Channel (2402MHz)**

	0		
Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \mu V/m)
4804		Н	74(Peak)/ 54(AV)
4804		V	74(Peak)/ 54(AV)
7206		H/V	74(Peak)/ 54(AV)
9608		H/V	74(Peak)/ 54(AV)
12010		H/V	74(Peak)/ 54(AV)
14412		H/V	74(Peak)/ 54(AV)
16814		H/V	74(Peak)/ 54(AV)
19216		H/V	74(Peak)/ 54(AV)
21618		H/V	74(Peak)/ 54(AV)
24020		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

### Operation Mode: Transmitting g under Middle Channel (2441MHz)

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \u03b4 V/m)
4882	-	Н	74(Peak)/ 54(AV)
4882		V	74(Peak)/ 54(AV)
7323		H/V	74(Peak)/ 54(AV)
9764		H/V	74(Peak)/ 54(AV)
12205		H/V	74(Peak)/ 54(AV)
14646		H/V	74(Peak)/ 54(AV)
17087		H/V	74(Peak)/ 54(AV)
19528		H/V	74(Peak)/ 54(AV)
21969		H/V	74(Peak)/ 54(AV)
24410		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

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# Operation Mode: Transmitting under High Channel (2480MHz)

	0 0	,	
Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \mu V/m)
4960		Н	74(Peak)/ 54(AV)
4960		V	74(Peak)/ 54(AV)
7440		H/V	74(Peak)/ 54(AV)
9920		H/V	74(Peak)/ 54(AV)
12400		H/V	74(Peak)/ 54(AV)
14880		H/V	74(Peak)/ 54(AV)
17360		H/V	74(Peak)/ 54(AV)
19840		H/V	74(Peak)/ 54(AV)
22320		H/V	74(Peak)/ 54(AV)
24800		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

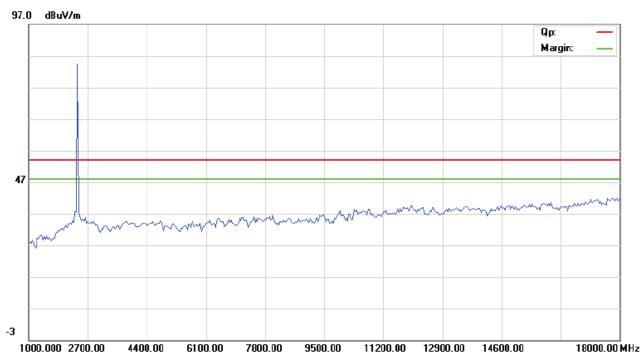
<sup>2.</sup> Remark "---" means that the emissions level is too low to be measured

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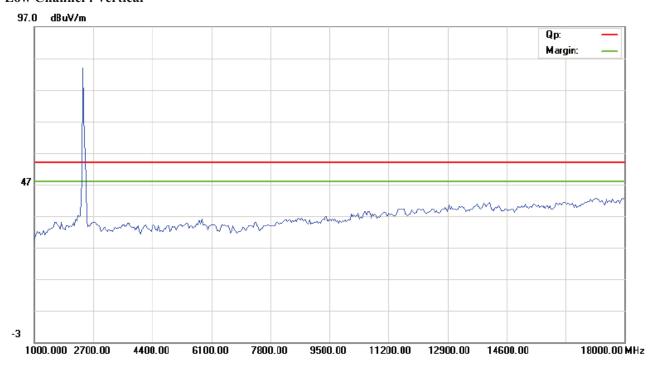


Please refer to the following test plots for details:

### Low Channel: Horizontal



### Low Channel: Vertical



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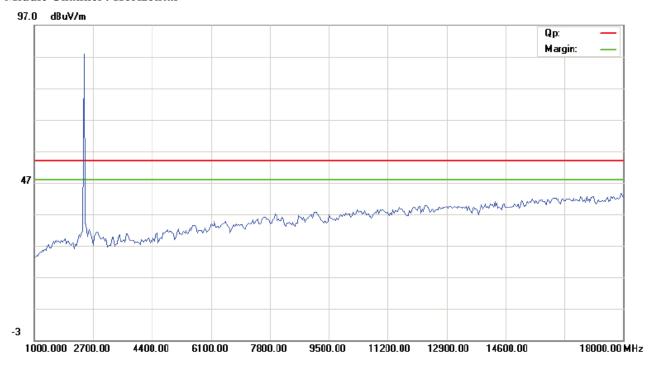
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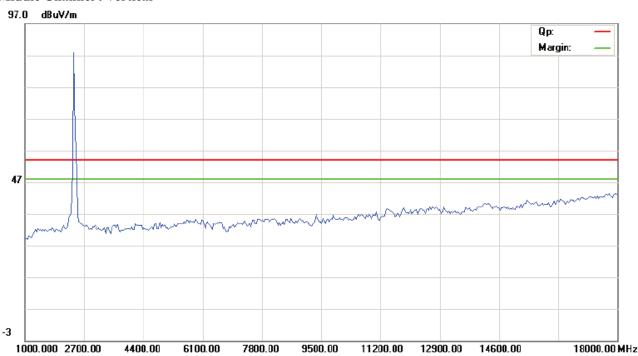
Date: 2016-04-29



### Middle Channel: Horizontal



#### Middle Channel: Vertical



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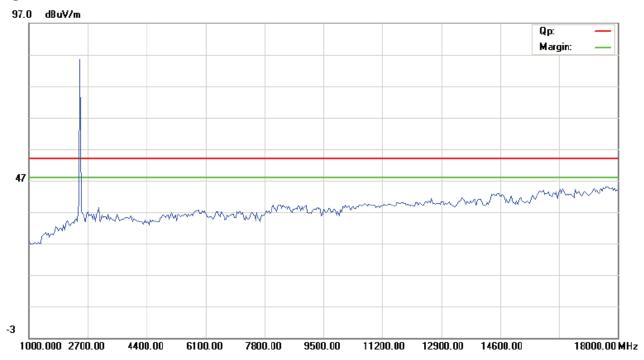
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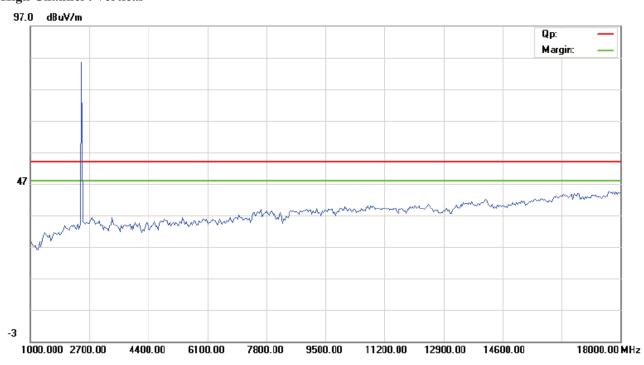
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### **High Channel: Horizontal**



### **High Channel: Vertical**



## Note: for the radiated emissions above 18G, it is the floor noise.

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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, G1511					
EUT	Smar	Smart Voice Recorder		PSP1000	
Mode	Ke	Keep Transmitting		DC3.7V	
Temperat	ure	re 24 deg. C,		56% RH	
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/ Fail	
Low	2402	1040		Pass	
Middle	2441	1034		Pass	
High	2480	1034		Pass	

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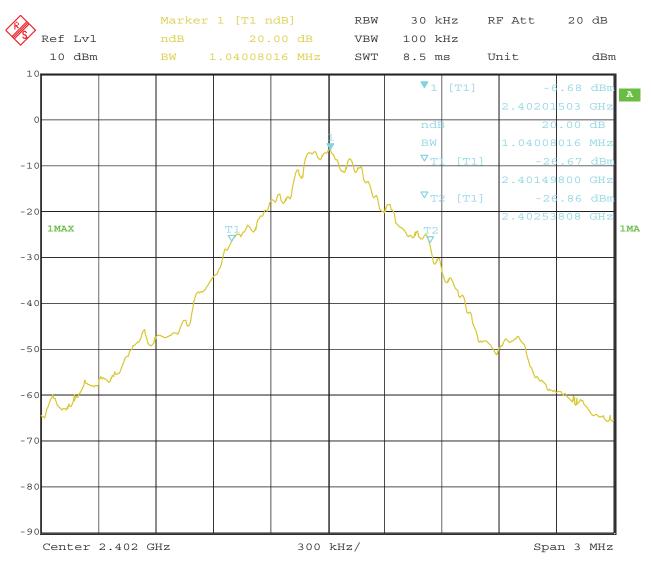
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### Test Figure:

### 1. Condition: Low Channel

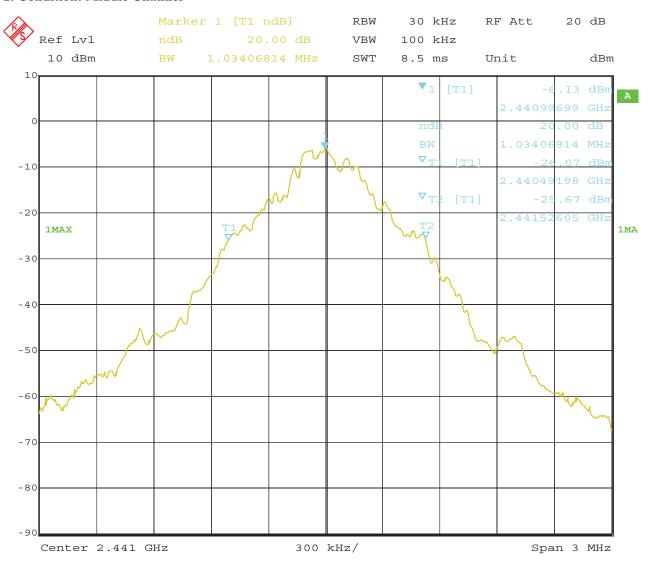


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### 2. Condition: Middle Channel

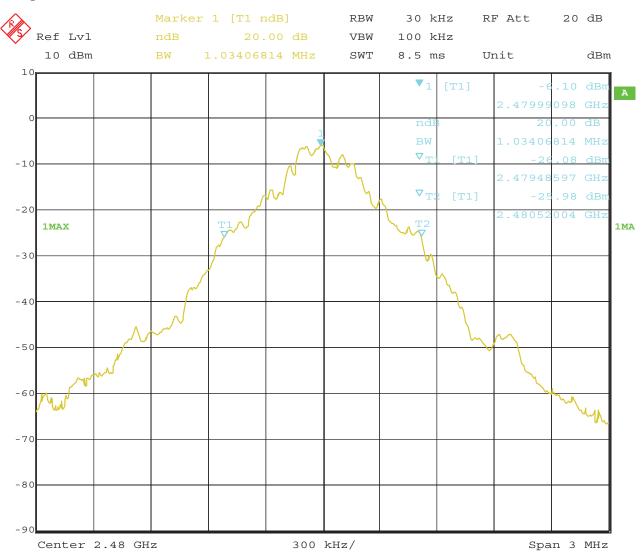


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# 3. High Channel



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### **Test Result**

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

EUT	Sma	Smart Voice Recorder		PSP1000		
Mode	K	Keep Transmitting		Keep Transmitting In		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	1329		Pass		
Middle	2441	1329		Pass		
High	2480	1329		Pass		

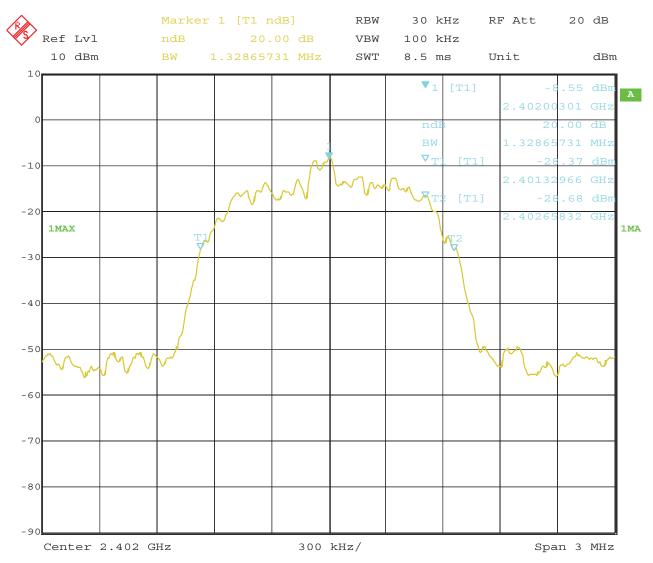
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# Test Figure:

### 1. Condition: Low Channel



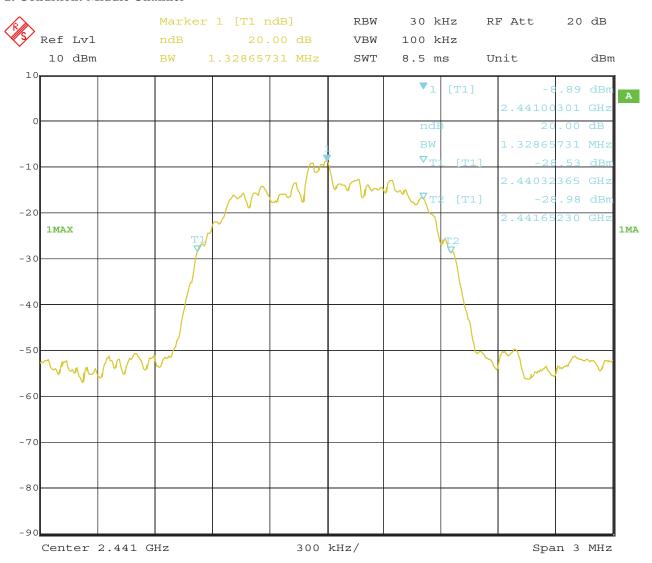
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### 2. Condition: Middle Channel

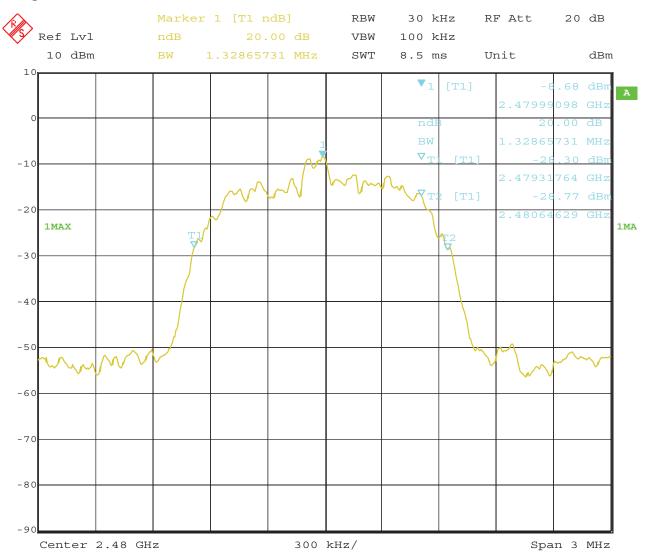


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# 3. High Channel



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### **Test Result**

**Type of Modulation: 8DPSK** 

EUT	Smar	Smart Voice Recorder		PSP1000
Mode	Kee	Keep Transmitting		DC3.7V
Temperate	ure	24 deg. C, Hun		56% RH
Channel	Channel Frequency (MHz) 20 dB Bandwidt (kHz)		Maximum Limit (kHz)	Pass/ Fail
Low	2402	1317		Pass
Middle	2441	1317		Pass
High	2480	1323		Pass

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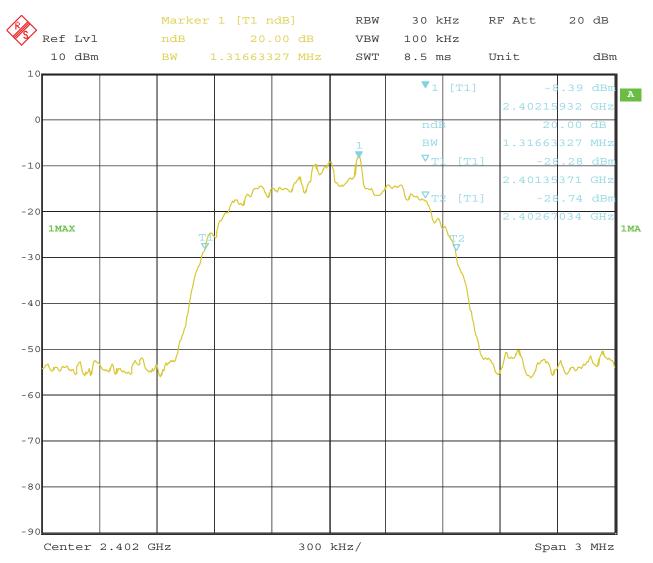
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### Test Figure:

### 1. Condition: Low Channel

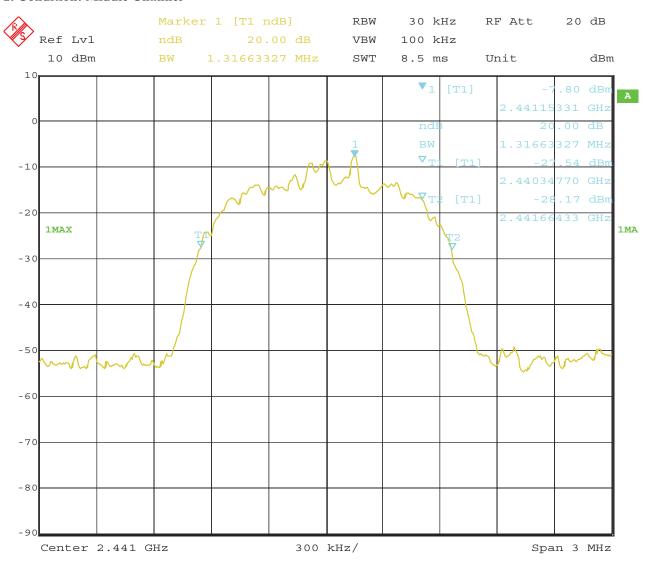


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### 2. Condition: Middle Channel

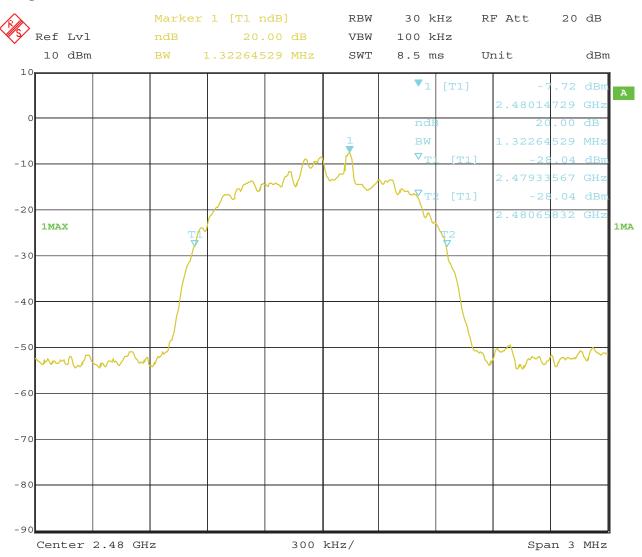


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# 3. High Channel



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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 = 10MHz, RBW=3MHz; Sweep = auto; Detector function = peak; 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	Sma	Smart Voice Recorder		PSP1000
Mode	Ke	Keep Transmitting		DC3.7V
Temperature	e	24 deg. C,		56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
Low	2402	-3.12	30	Pass
Middle	2441	-3.17	30	Pass
High	2480	-3.26	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

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

EUT		Smart Voice Recorder		Model	PSP1000
Mode		Keep Transmitting		Input Voltage	DC3.7V
Temperature	e	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)		Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
Low		2402	-3.36	30	Pass
Middle		2441	-3.58	30	Pass
High		2480	-3.40	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

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# **Type of Modulation: 8DPSK**

EUT	Sma	Smart Voice Recorder		PSP1000
Mode	K	Keep Transmitting		DC3.7V
Temperature	е	24 deg. C,		56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
Low	2402	-3.81	30	Pass
Middle	2441	-4.07	30	Pass
High	2480	-3.93	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

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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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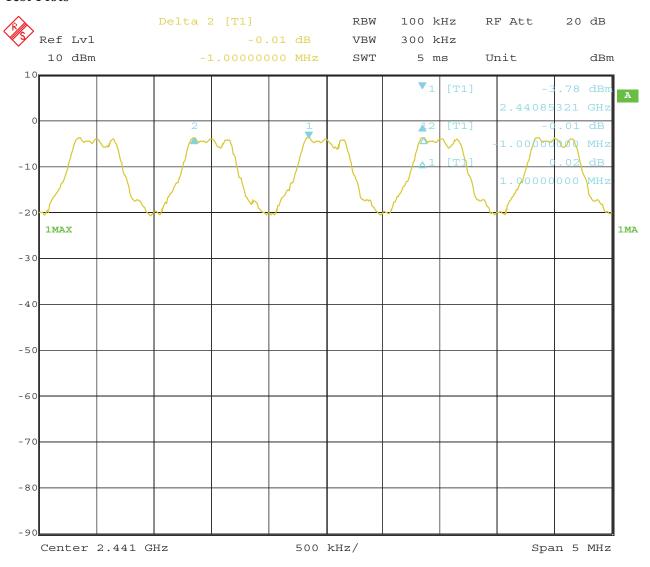


#### 9.4Test Result

Type of Modulation: GFSK

EUT	Smart Voice Recorder		Model		PSP1000
Mode	Hopping On I		Input Voltage		DC3.7V
Temperature	24 deg. C,		Humidity		56% RH
Carrier I	Frequency Separation		Limit		Pass/ Fail
	1.000MHz	≥ 25 kHz or 2/3 of the 20 dB bandwidth			Pass

### **Test Plots**



Date: 12.APR.2016 11:00:36

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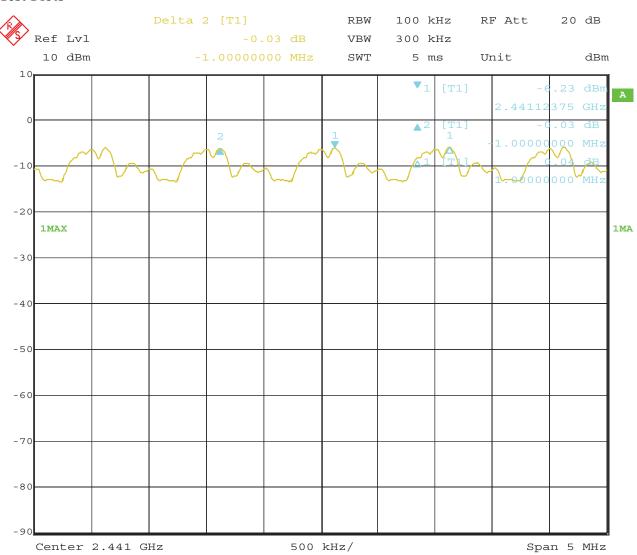
Date: 2016-04-29



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

EUT	Smart Voice Recorder		Model		PSP1000
Mode	Hopping On I		Input Voltage		DC3.7V
Temperature	24 deg. C,		Humidity		56% RH
Carrier Frequency Separation			Limit		Pass/ Fail
	1.000MHz		≥ 25 kHz or 2/3 of 20 dB bandwidth		Pass

## **Test Plots**



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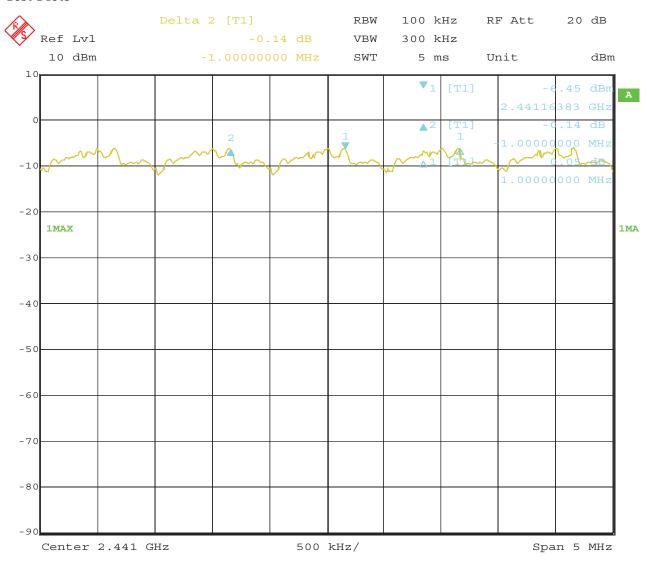
Date: 2016-04-29



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

EUT	Smart Voice Recorder		Model		PSP1000
Mode	Hopping On I		Input Voltage		DC3.7V
Temperature	24 deg. C,		Humidity		56% RH
Carrier Frequency Separation		Limit		Pass/ Fail	
	1.000MHz	≥ 25 kHz or 2/3 of 20 dB bandwidth		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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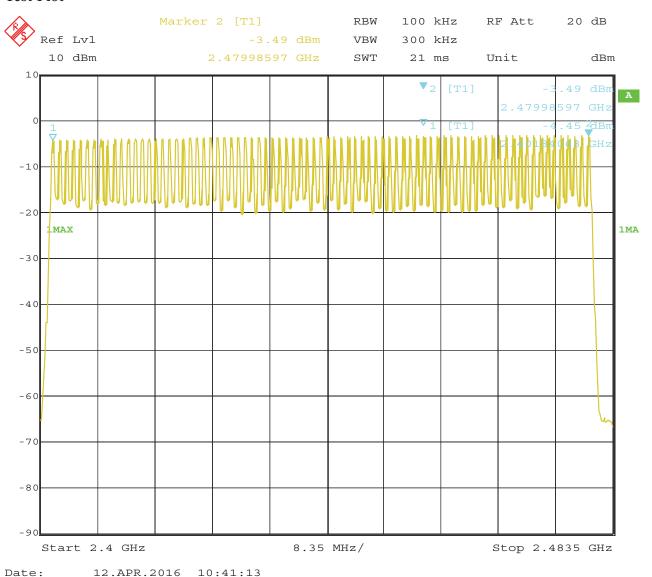


#### 10.4Test Result

## Type of Modulation: GFSK

EUT	Smart Voice Recorder		Model	PSP1000	
Mode	Hopping On		Input Voltage	DC3.7V	
Temperature	24 deg. C,		Humidity	56% RH	
Operating Frequen	Operating Frequency Number of hopping channels		oing channels	Limit	Pass/ Fail
2402-2480MHz		79		≥ 15	Pass

### **Test Plot**



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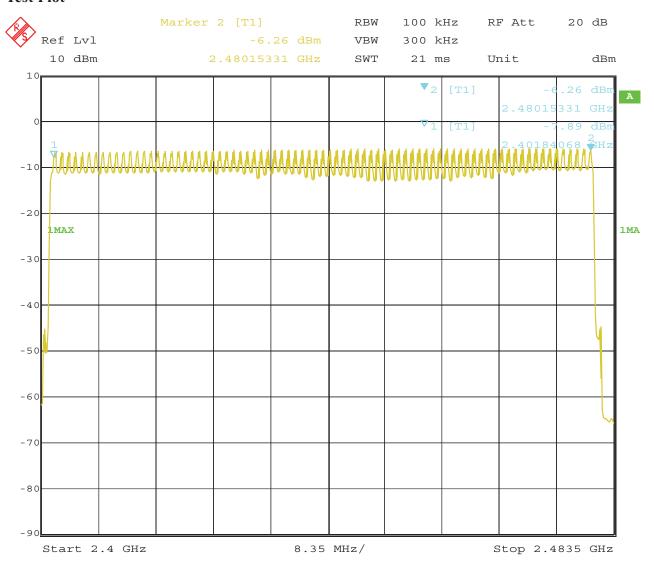
Date: 2016-04-29



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

EUT	Smart Voice Recorder		Model		PSP1000	
Mode		Hopping On		oltage		DC3.7V
Temperature	24 deg. C,		Humidi	ty	56% RH	
Operating Frequen	Frequency Number of hopp channels		oing	Liı	mit	Pass/ Fail
2402-2480MHz 79			≥	15	Pass	

### **Test Plot**



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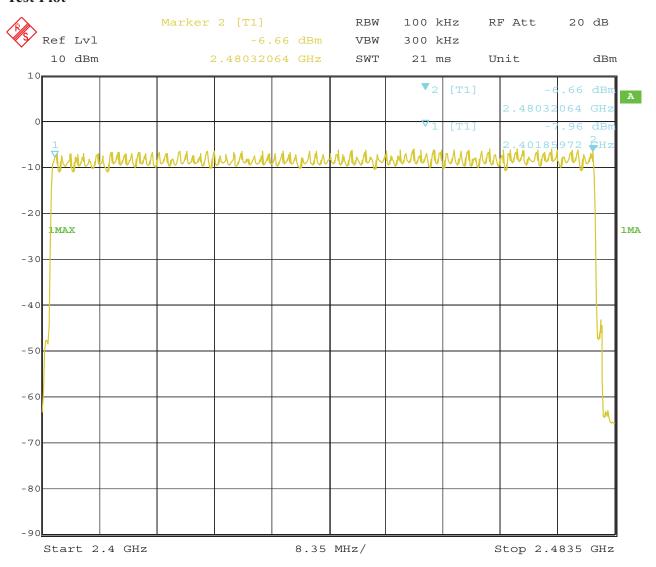
Date: 2016-04-29



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

EUT	Smart Voice Recorder		Model		PSP1000	
Mode	Hopping On		Input V	oltage		DC3.7V
Temperature		24 deg. C,		ty		56% RH
Operating Frequency		Number of hopp channels	oing	Liı	nit	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
- ≥ 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	Smart Voi	Smart Voice Recorder		PS	SP1000
Mode	Keep Tr	nnsmitting Input Voltage		D	OC3.7V
Temperatu	re 24 c	eg. C, Humidity		50	6% RH
Channel	Reading	Hoping	g Rate	Actual	Limit
High	2.946ms	266.66	7 hop/s	0.314s	0.4s
Middle	2.926ms	266.667 hop/s		0.312s	0.4s
Low	2.986ms	266.66	7 hop/s	0.319s	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 625µs with 79 channels.

Note: DH5 was the wore case

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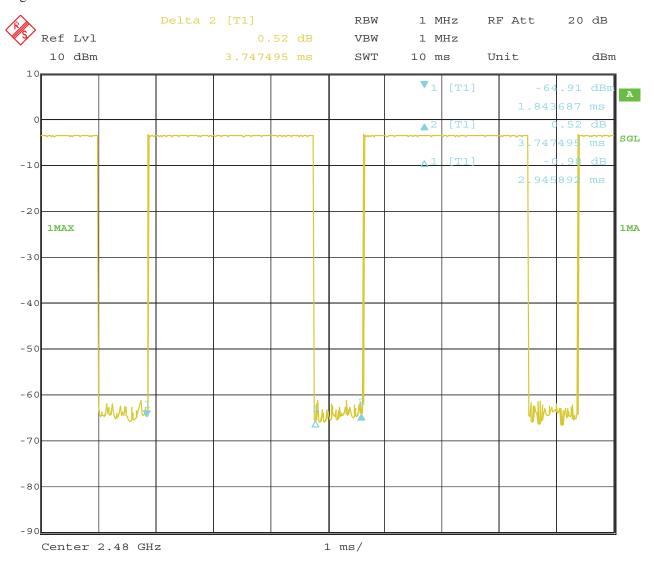
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Test Plots:

#### DH<sub>5</sub>

High Channel:



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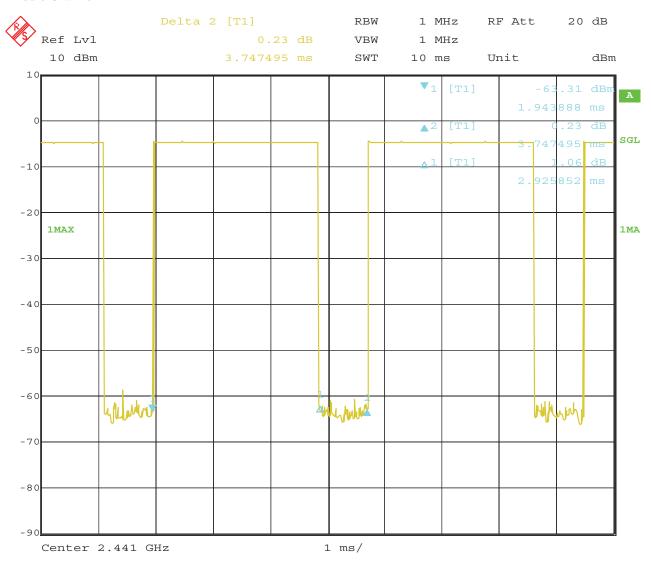
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DH5

#### Middle Channel



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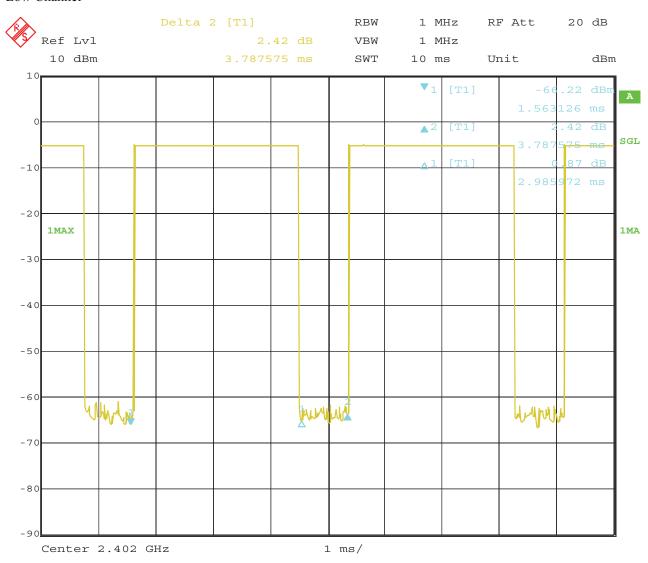
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DH5

Low Channel



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#### **Test Result**

Type of Modulation: Л/4DQPSK

EUT	Smart Voi	Smart Voice Recorder		P	PSP1000
Mode	Keep Tra	ansmitting	Input Voltage	DC3.7V	
Temperatur	re 24 d	leg. C, Humidity		5	56% RH
Channel	Reading	Hoping	g Rate	Actual	Limit
High	2.926ms	266.667	7 hop/s	0.312s	0.4s
Middle	2.946ms	266.667 hop/s		0.314s	0.4s
Low	2.946ms	266.66	7 hop/s	0.314s	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 625µs with 79 channels.

Note: DH5 was the worse case.

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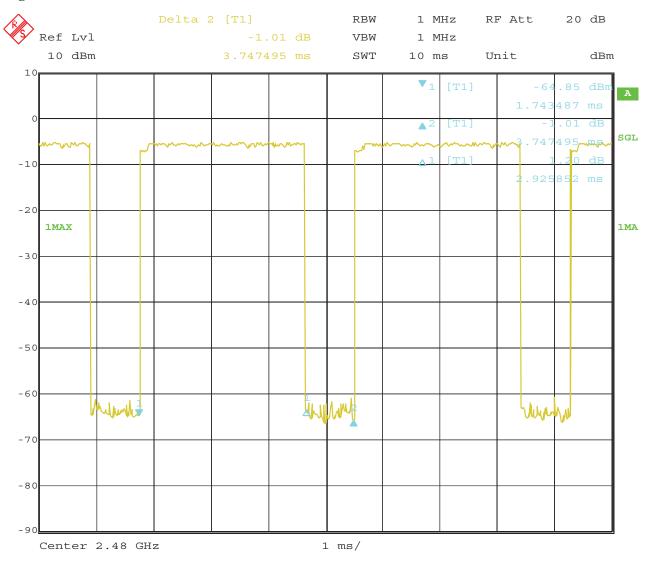
Date: 2016-04-29



Test Plots:

#### **2DH5**

### **High Channel**



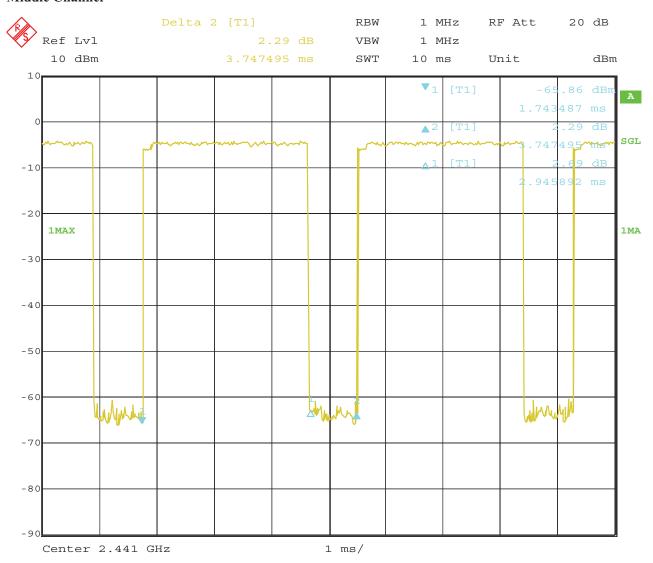
Date: 13.APR.2016 12:33:07

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Date: 2016-04-29



**2DH5 Middle Channel** 



Date: 13.APR.2016 12:34:57

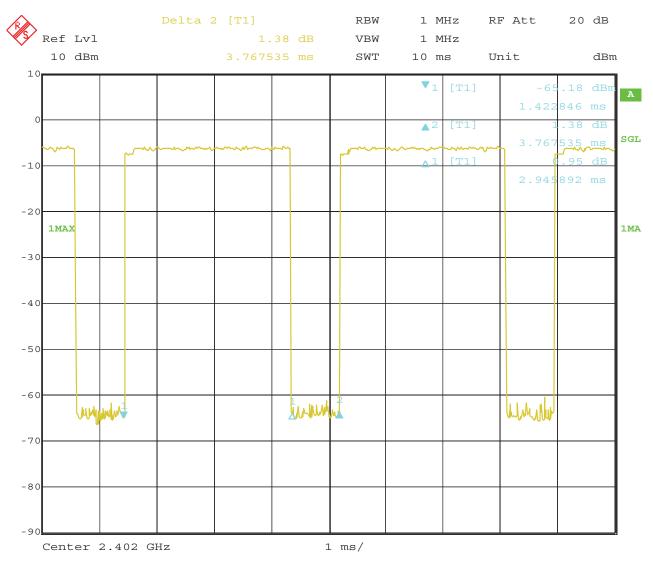
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#### **2DH5**

### **Low Channel**



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Date: 2016-04-29



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

-J P	Type of Midwall of Size							
EUT	Smart Voi	Smart Voice Recorder		F	PSP1000			
Mode	Keep Tr	ansmitting	Input Voltage	DC3.7V				
Temperatur	re 24 d	24 deg. C,		4	56% RH			
Channel	Reading	Hoping	g Rate	Actual	Limit			
High	2.946ms	266.66	7 hop/s	0.314s	0.4s			
Middle	2.966ms	266.667 hop/s		0.316s	0.4s			
Low	2.946ms	266.66	7 hop/s	0.314s	0.4s			

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

Note: DH5 was the worse case.

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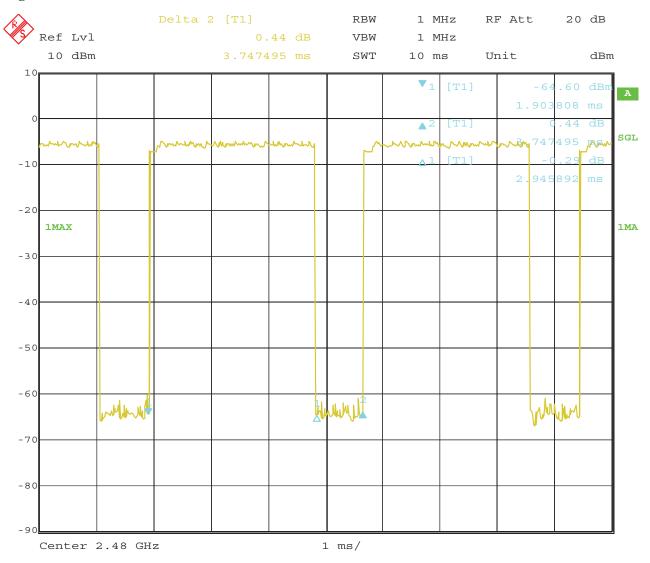
Date: 2016-04-29



Test Plots:

#### **3DH5**

### **High Channel**



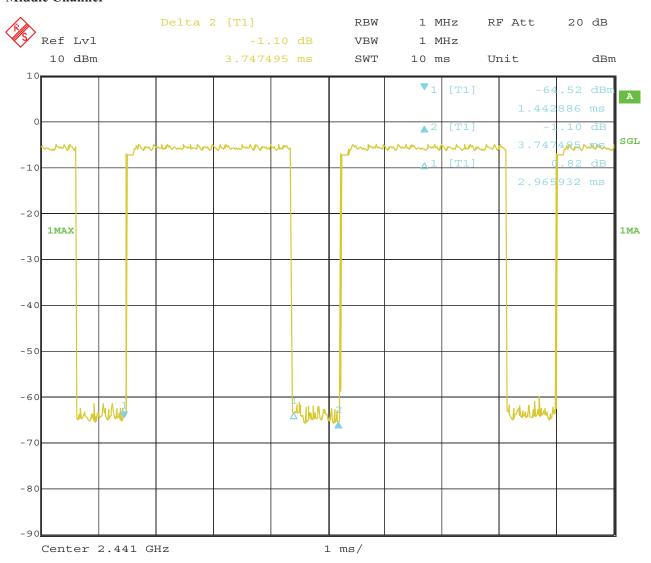
Date: 13.APR.2016 12:39:06

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Date: 2016-04-29



**3DH5 Middle Channel** 



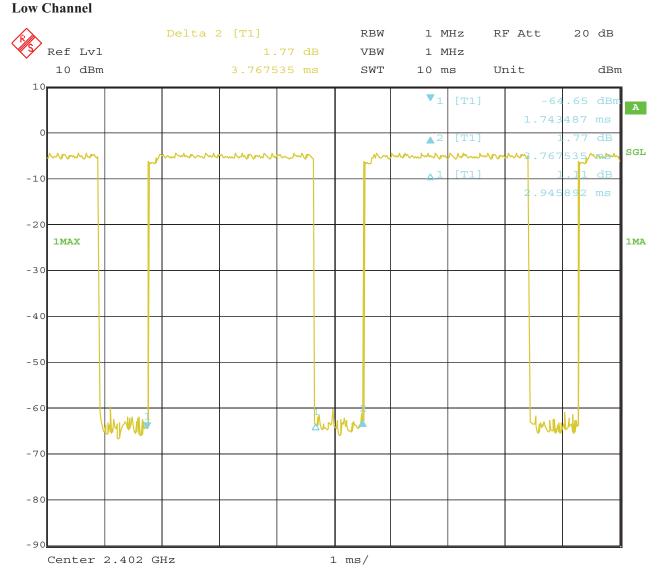
13.APR.2016 12:38:12 Date:

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Date: 2016-04-29



**3DH5** 



Date: 13.APR.2016 12:36:32 Report No.: FCC1512023-02

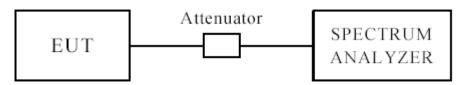
Date: 2016-04-29



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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, 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.
  - 3.H and V polarity all have been tested for radiated emission test, only worse case is reported.

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Date: 2016-04-29

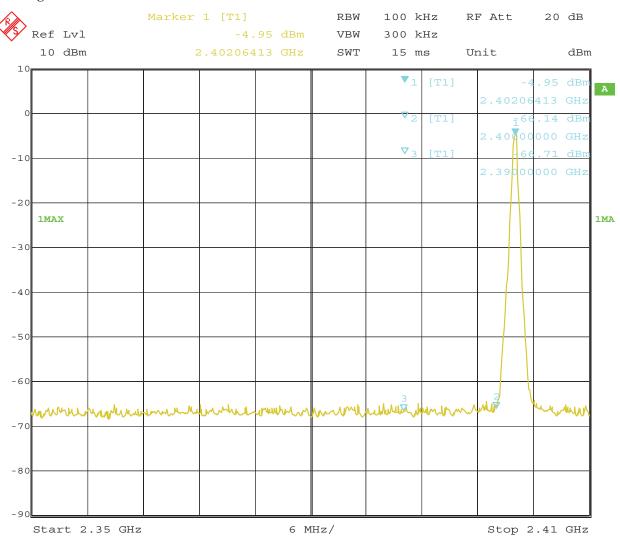


# Type of Modulation: GFSK

#### 12.4 Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Low Channel
Mode	Keeping Transmitting I		Input Voltage	DC3.7V
Temperature		24 deg. C		56% RH
Test Result:		Pass		PK
The Max. FS in	PK (dBμV/m)	46.7		74(dBμV/m)
Restrict Band	AV(dBμV/m)	$AV(dB\mu V/m)$		54(dBμV/m)
2390MHz				

## **Test Figure:**



12.APR.2016 18:46:46 Date:

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Date: 2016-04-29

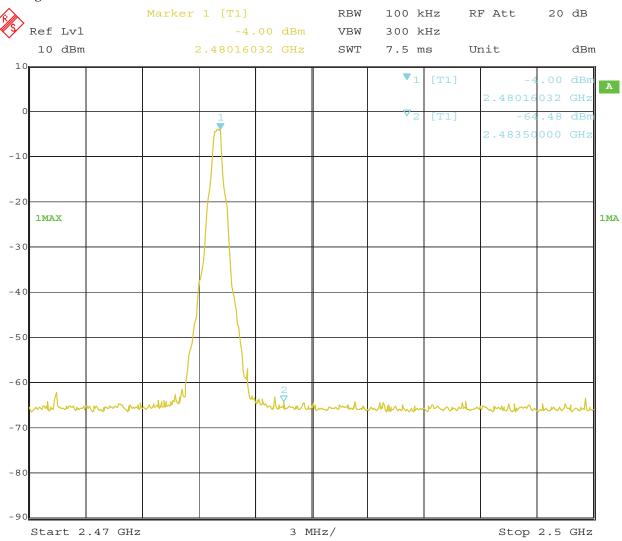


# Type of Modulation: GFSK

#### 12.4 Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	High Channel
Mode	Kee	Keeping Transmitting		DC3.7V
Temperature		24 deg. C,		56% RH
Test Result:		Pass		PK
The Max. FS in	PK (dBμV/m)	42.2		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)	$AV(dB\mu V/m)$		54(dBµV/m)
2483.5MHz				

## **Test Figure:**



Date: 12.APR.2016 18:50:39

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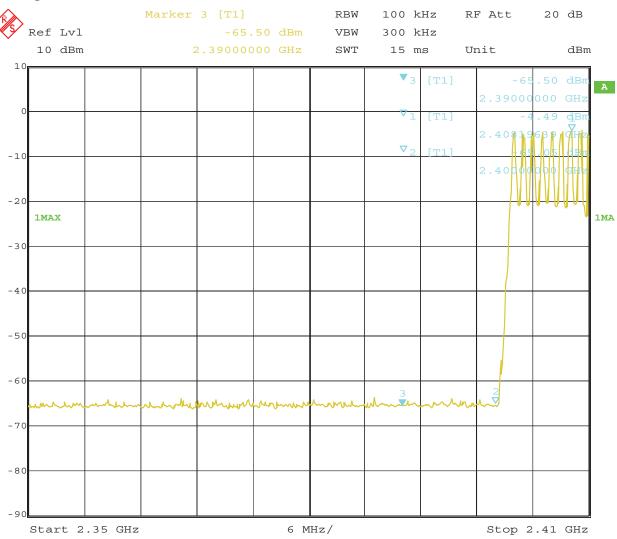


# Type of Modulation: GFSK

#### Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature		24 deg. C,		56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	44.5		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	$54(dB\mu V/m)$
2390MHz				

# **Test Figure:**



Date: 12.APR.2016 17:53:02

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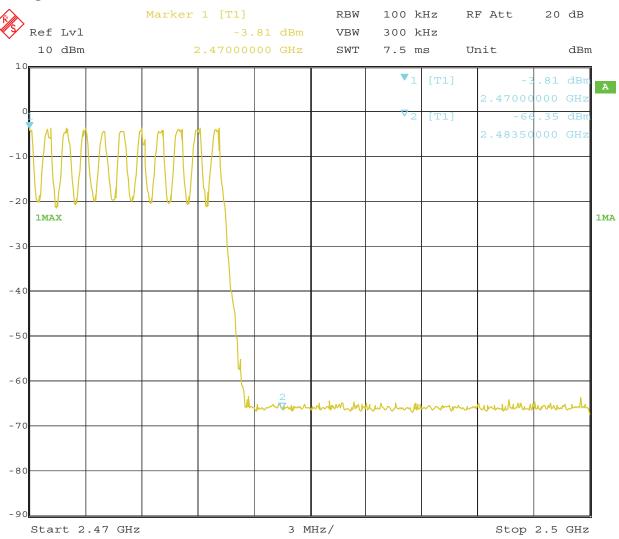


# Type of Modulation: GFSK

#### Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 41.7			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBµV/m)
2483.5MHz				

# **Test Figure:**



Date: 12.APR.2016 17:11:03

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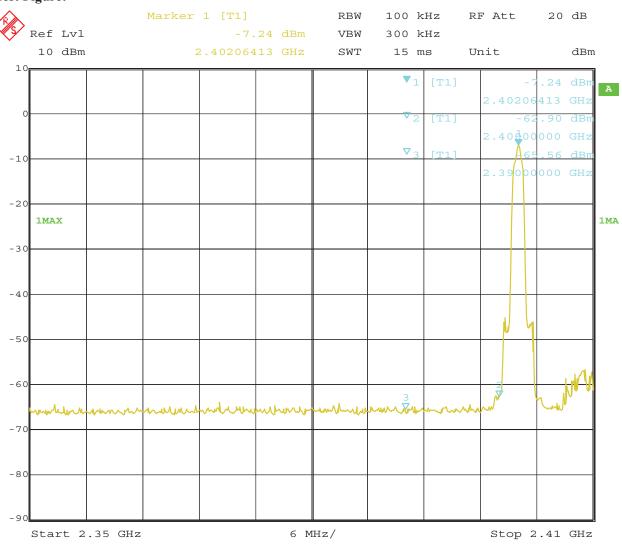


# Type of Modulation: $\pi/4DQPSK$

#### 12.4 Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Low Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	45.3		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2390MHz				

## **Test Figure:**



Date: 12.APR.2016 18:46:14

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Report No.: FCC1512023-02

Date: 2016-04-29

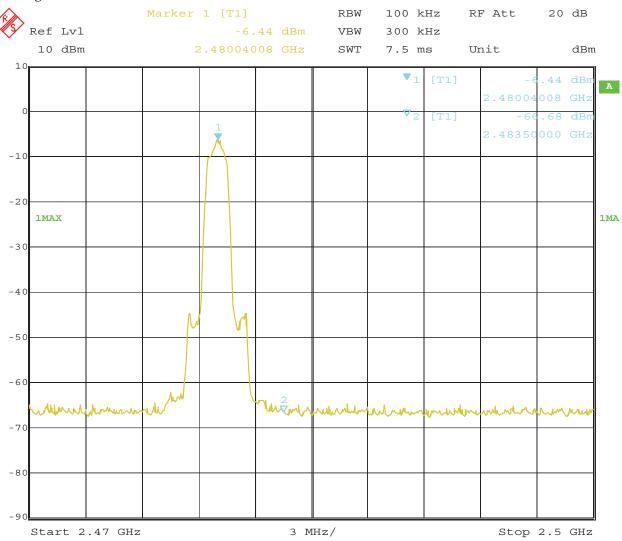


# Type of Modulation: $\sqrt{1/4}$ DQPSK

#### Out of Band Test Result 12.4

Product:	Smart Voice Recorder		Test Mode:	High Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 42.3			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBµV/m)
2483.5MHz				

## **Test Figure:**



Date: 12.APR.2016 18:43:55

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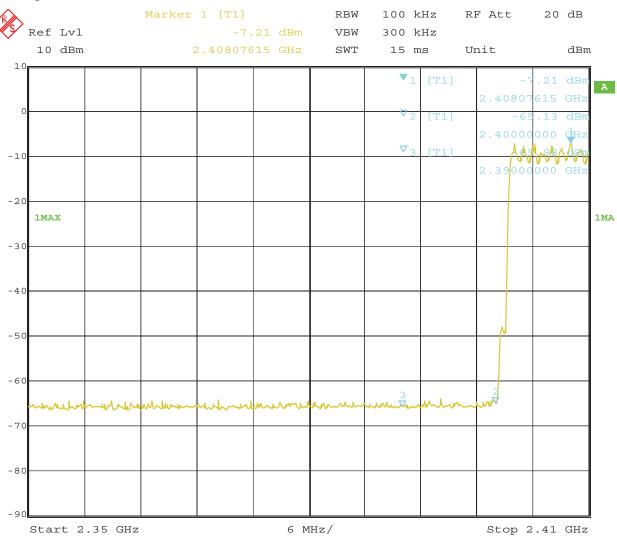


# Type of Modulation: $\sqrt{1/4}$ DQPSK

### Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 46.1			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	$54(dB\mu V/m)$
2390MHz				

# **Test Figure:**



Date: 12.APR.2016 18:38:11

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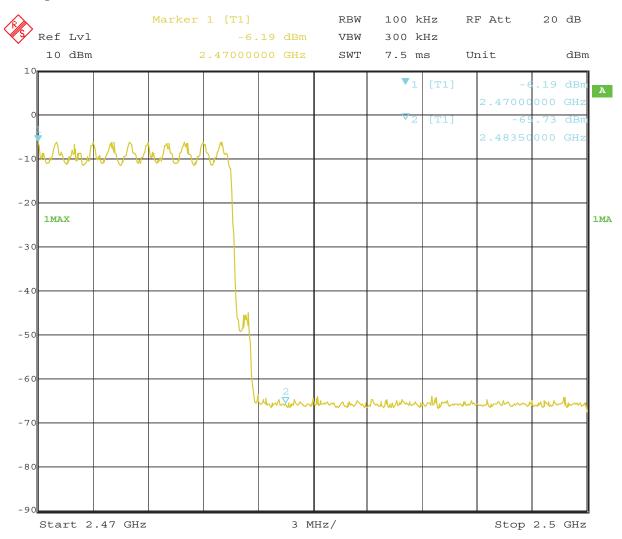


# Type of Modulation: $\sqrt{1/4}$ DQPSK

### Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 42.3			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2483.5MHz				

# **Test Figure:**



12.APR.2016 17:19:44 Date:

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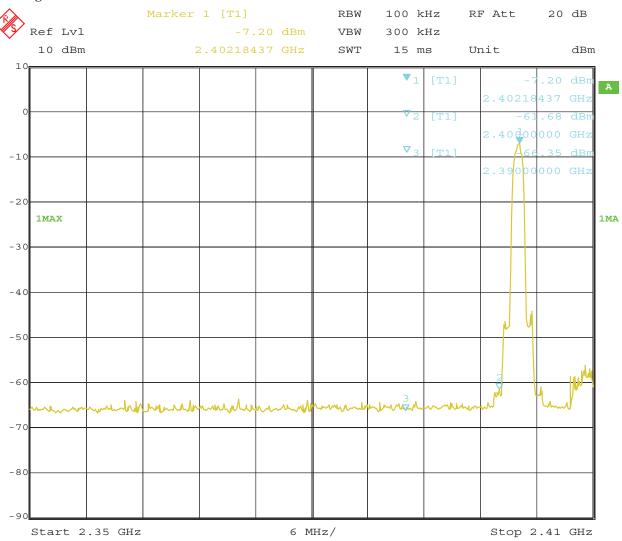


# Type of Modulation: 8DPSK

#### 12.4 Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Low Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	45.1		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	$54(dB\mu V/m)$
2390MHz				

## **Test Figure:**



Date: 12.APR.2016 18:57:21

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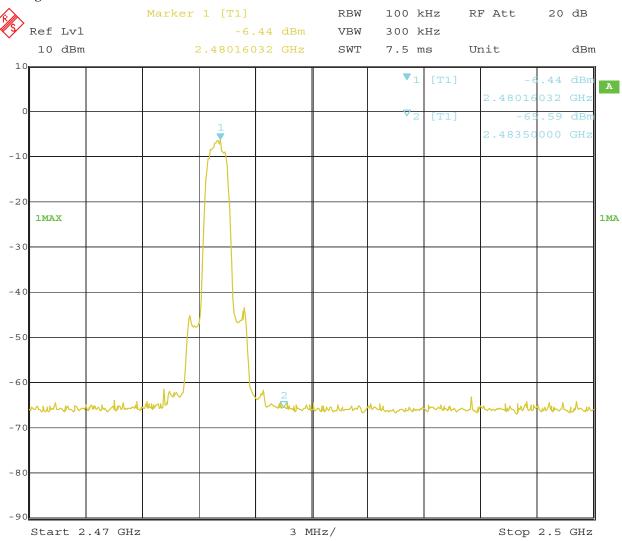


# Type of Modulation: 8DPSK

#### 12.4 Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	High Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 42.4			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBµV/m)
2483.5MHz				

## **Test Figure:**



Date: 12.APR.2016 18:53:48

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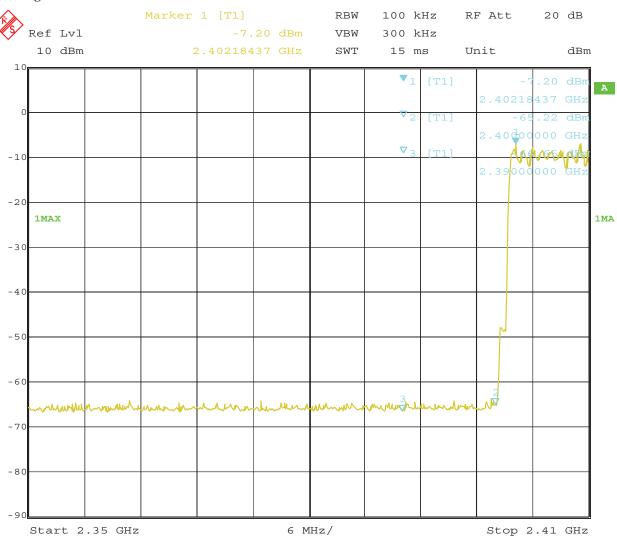


# **Type of Modulation: 8DPSK**

#### Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 45.8			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2390MHz				

# **Test Figure:**



Date: 12.APR.2016 17:55:39

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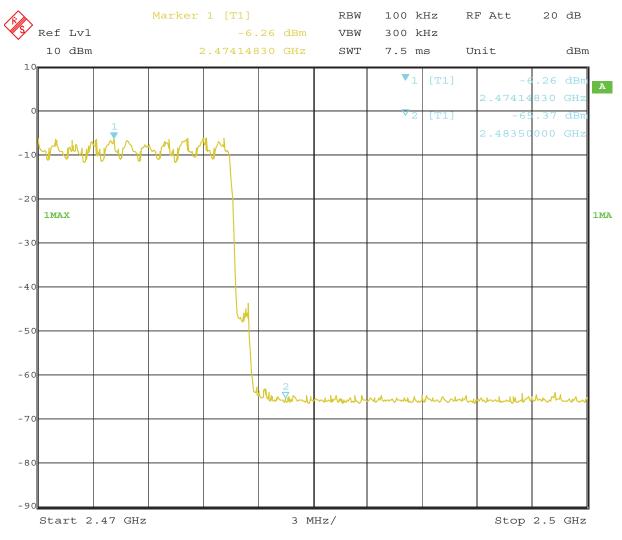


# **Type of Modulation: 8DPSK**

#### Out of Band Test Result

Product:	Smart Voice Recorder		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 42.0			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2483.5MHz				

# **Test Figure:**



12.APR.2016 18:01:28 Date:

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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

Integral Antenna and the maximum Gain of this antenna is 2.0dBi

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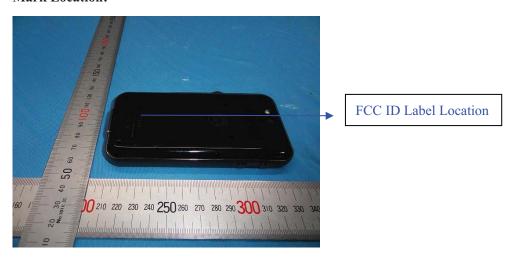
### 14.0 FCC ID/IC Label

### FCC ID: 2AD4M-PSP1

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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:**



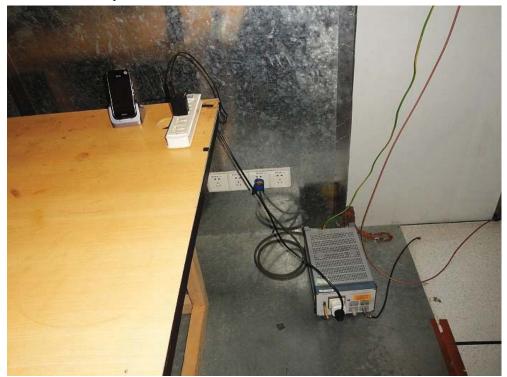
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## 15.0 Photo of testing

Conducted Emission Test Setup:



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## Radiated Emission Test Setup:





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## Photographs - EUT

## Outside view





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Outside view





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Outside view





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Outside view





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Outside view





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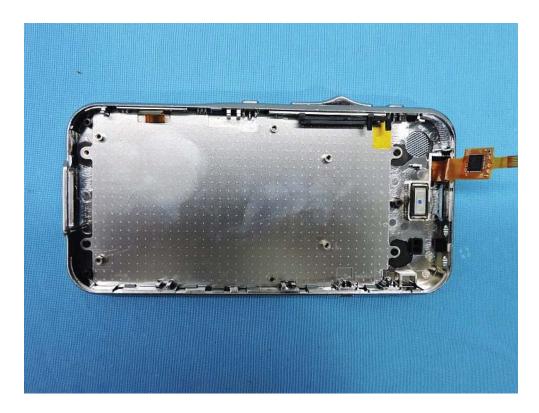
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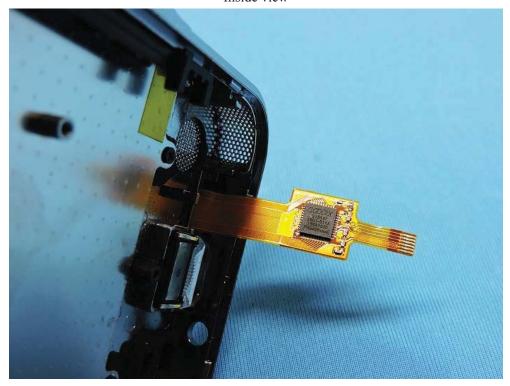
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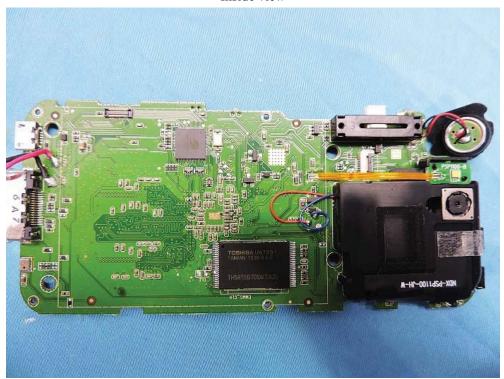
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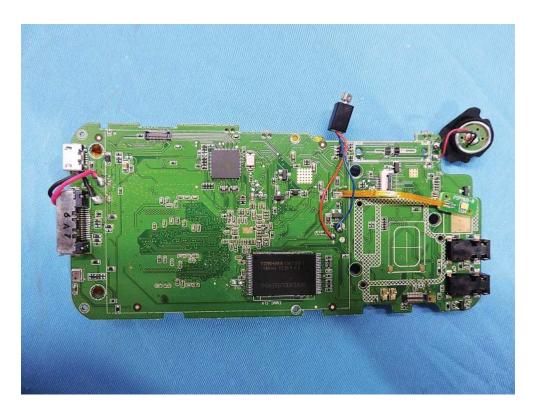
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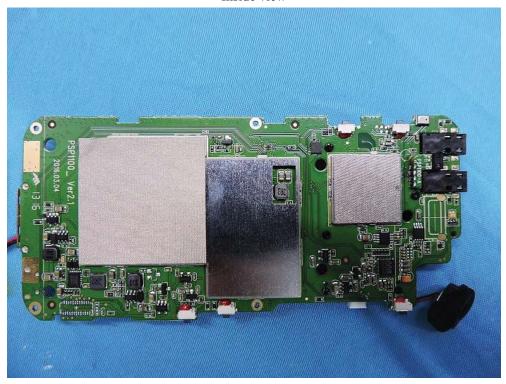
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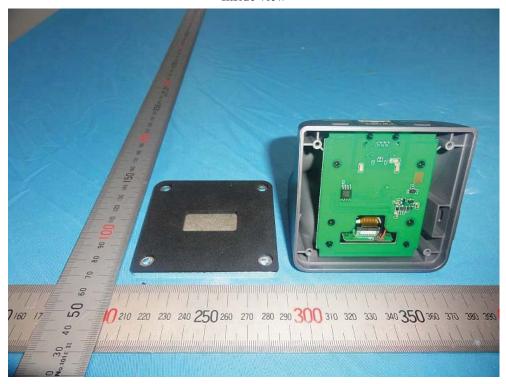
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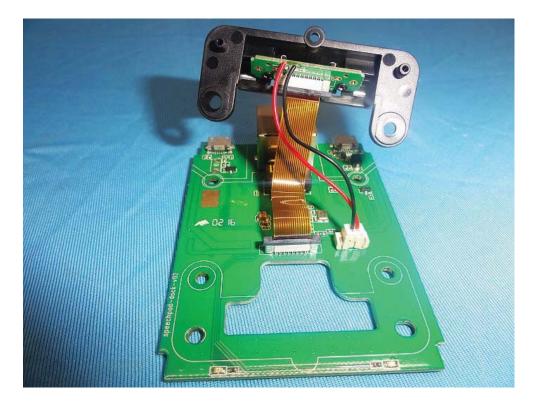
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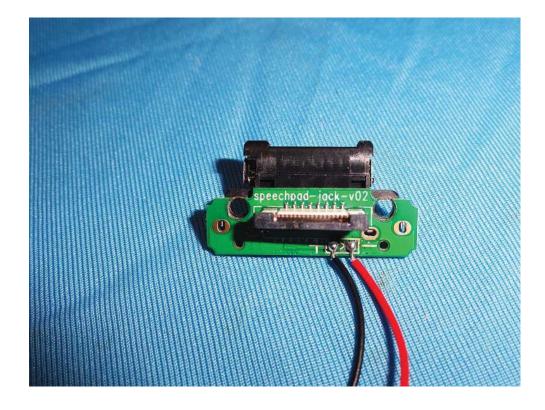
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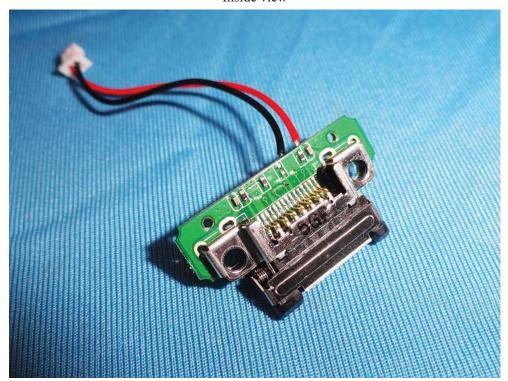
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End of the report