



# FCC Part15.247 Test Report

Product Name : Motorola Buds  
Model No. : Motorola Buds  
FCC ID : IHDT6PA1

Applicant : Motorola Mobility, LLC.

Address : 8000 W. Sunrise Blvd, Suite A Plantation, FL  
33322, USA

Date of Receipt : 17/06/2013  
Test Date : 18/06/2013~22/06/2013  
Issued Date : 26/06/2013  
Report No. : 136S029R-RF-US-P06V01  
Report Version : V 1.1

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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# Test Report Certification

Issued Date : 26/06/2013

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 Applicant : Motorola Mobility, LLC.  
 Address : 8000 W. Sunrise Blvd, Suite A Plantation, FL 33322, USA  
 Manufacturer : Motorola Mobility, LLC.  
 Address : 8000 W. Sunrise Blvd, Suite A Plantation, FL 33322, USA  
 Model No. : Motorola Buds  
 FCC ID : IHDT6PA1  
 EUT Voltage : DC: 3.7V  
 Trade Name : Motorola  
 Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2012  
 ANSI C63.4: 2009; ANSI C63.10: 2009  
 Test Result : Complied  
 Performed Location : Suzhou EMC Laboratory  
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 FCC Registration Number: 800392

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## Laboratory Information

We, **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

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<b>Germany</b>	<b>:</b>	<b>TUV Rheinland</b>
<b>Norway</b>	<b>:</b>	<b>Nemko, DNV</b>
<b>USA</b>	<b>:</b>	<b>FCC</b>
<b>Japan</b>	<b>:</b>	<b>VCCI</b>
<b>China</b>	<b>:</b>	<b>CNAS</b>

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site :<http://www.quietek.com/tw/ctg/cts/accreditations.htm>  
The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :  
<http://www.quietek.com/>

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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**1. General Information**

**1.1. EUT Description**

Product	Motorola Buds
Brand Name	Motorola
Model No.	Motorola Buds
Working Voltage	DC 3.7V
Frequency Range	2402- 2480 MHz
Channel Number	79
Channel Separation	1MHz
Type of Modulation	FHSS
Data Rate	1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK)
Antenna Type	Stamping Antenna
Peak Antenna Gain	Reference to Antenna List
Component	
AC Adapter	Brand Name: MOTOROLA M/N: SSW-2285US Input: 100-240V~50/60Hz 0.15A Output: 5Vdc, 500mA

Bluetooth Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz	03	2405 MHz
04	2406 MHz	05	2407 MHz	06	2408 MHz	07	2409 MHz
08	2410 MHz	09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz	15	2417 MHz
16	2418 MHz	17	2419 MHz	18	2420 MHz	19	2421 MHz
20	2422 MHz	21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz	27	2429 MHz
28	2430 MHz	29	2431 MHz	30	2432 MHz	31	2433 MHz
32	2434 MHz	33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz	39	2441 MHz
40	2442 MHz	41	2443 MHz	42	2444 MHz	43	2445 MHz
44	2446 MHz	45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz	51	2453 MHz
52	2454 MHz	53	2455 MHz	54	2456 MHz	55	2457 MHz
56	2458 MHz	57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz	63	2465 MHz
64	2466 MHz	65	2467 MHz	66	2468 MHz	67	2469 MHz
68	2470 MHz	69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz	75	2477 MHz
76	2478 MHz	77	2479 MHz	78	2480 MHz	N/A	N/A

### Bluetooth Antenna List

Antenna	Manufacturer	Peak Gain
Stamping Antenna	Goertek	2.4GHz: 0.78dBi

**1.2. Mode of Operation**

Quietek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmitter-1Mbps(GFSK_DH5)
Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)
Mode 3: Transmitter-3Mbps(8DPSK_DH5)
Mode 4: Receiver-1Mbps(GFSK_DH5)
Mode 5: Receiver-2Mbps(Pi/4 DQPSK_DH5)
Mode 6: Receiver -3Mbps(8DPSK_DH5)

Note:

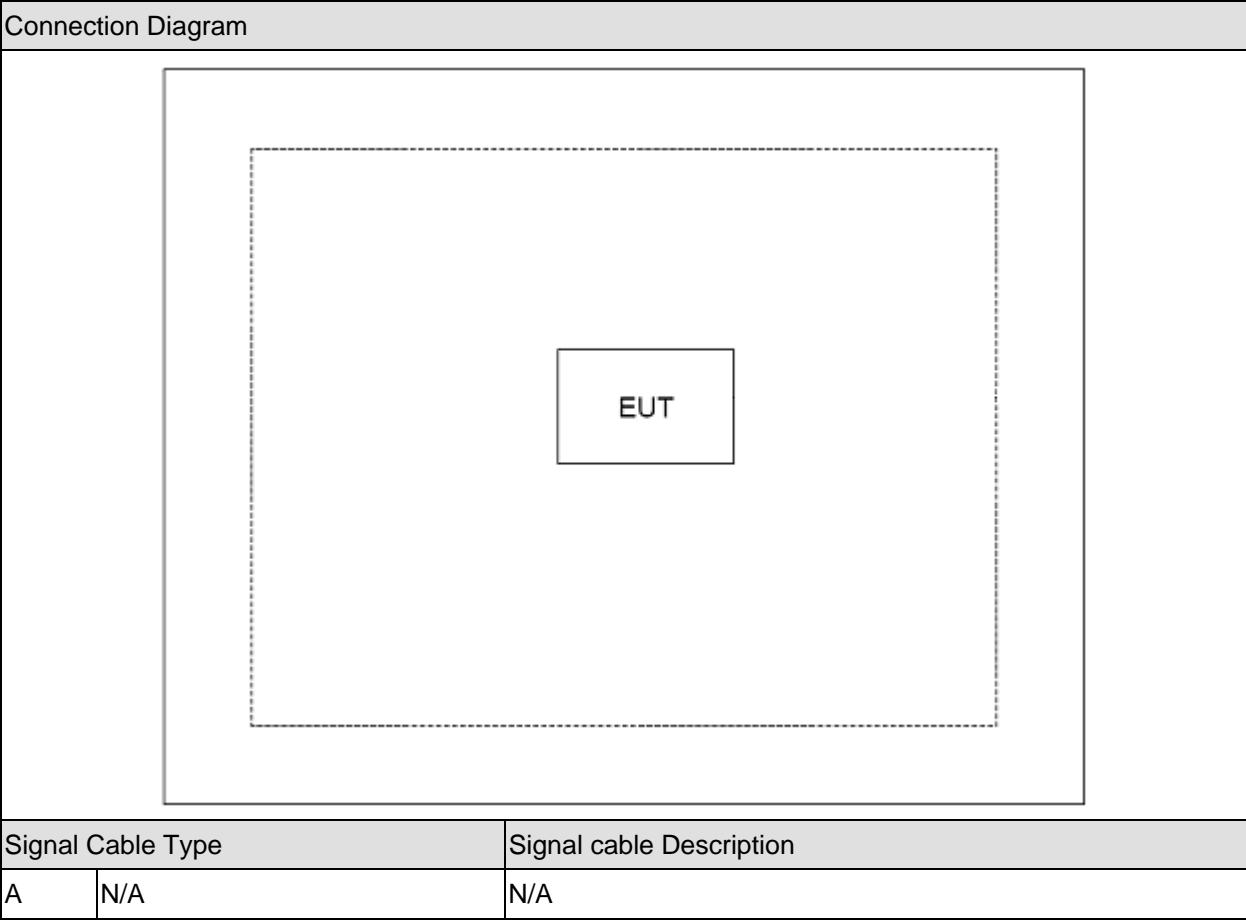
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For portable device, radiated spurious emission was verified over X, Y, Z Axis, and shown the worst case on this report.

**1.3. Tested System Details**

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 N/A	N/A	N/A	N/A	N/A

1.4. Configuration of Tested System



**1.5. EUT Exercise Software**

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Run the software "Bluetest3", then select test mode and channel to test

**2. Technical Test**

**2.1. Summary of Test Result**

No deviations from the test standards

Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.207	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.209	Yes	No
20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(a)(1)	Yes	No
99% Occupied Bandwidth	RSS-Gen Issue 3 June 2010 Section 4.6.1	Yes	No
Carrier Frequency Separation	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(a)(1)	Yes	No
Number of Hopping Frequencies	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(a)(1)(iii)	Yes	No
Time of Occupancy (Dwell Time)	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(a)(1)(iii)	Yes	No
Peak Output Power	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.247(b)(1)	Yes	No
Band-edge Compliance of RF Conducted Emissions	FCC CFR Title 47 Part 15 Subpart C: 2012 Section 15.215(c), 15.247(d)	Yes	No
Spurious RF Conducted Emissions	FCC CFR Title 47 Part 15 Subpart C: 2012 15.247(d)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2012 15.247(d)	Yes	No

**2.2. Test Environment**

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

### 3. Conducted Emission

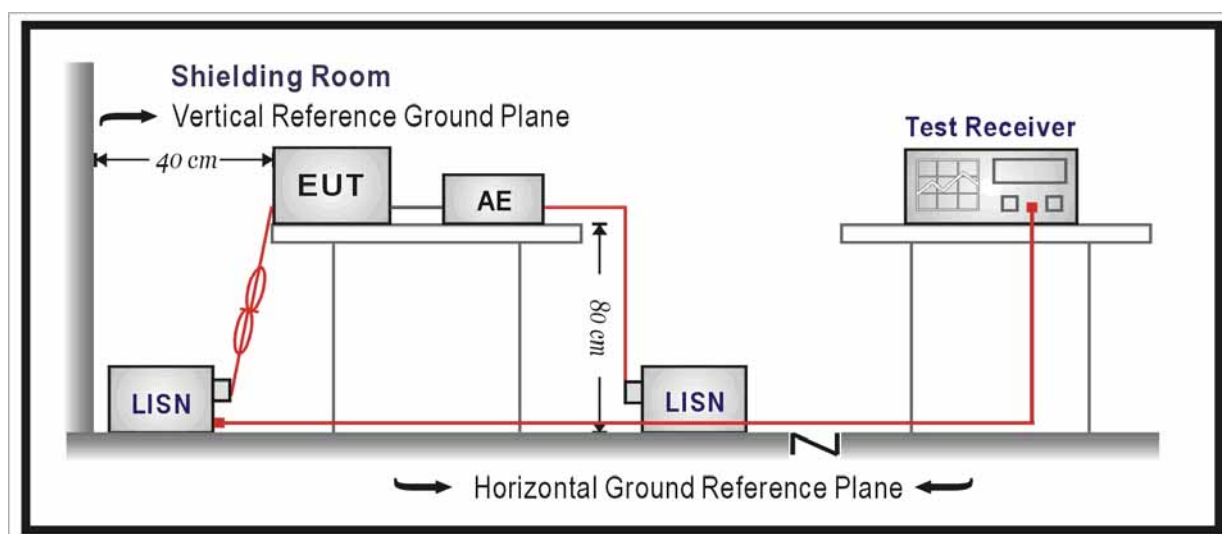
#### 3.1. Test Equipment

Conducted Emission / TR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100726	2014.03.30
Two-Line V-Network	R&S	ENV216	100043	2014.03.30
Two-Line V-Network	R&S	ENV216	100044	2013.09.17
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2014.03.01
50ohm Termination	SHX	TF2	07081401	2013.09.17
Temperature/Humidity Meter	zhicheng	ZC1-2	TR1-TH	2014.01.10

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

#### 3.2. Test Setup



**3.3. Limit**

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

**3.4. Test Procedure**

According to FCC ANSI C63.4: 2009 & ANSI C63.10: 2009.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

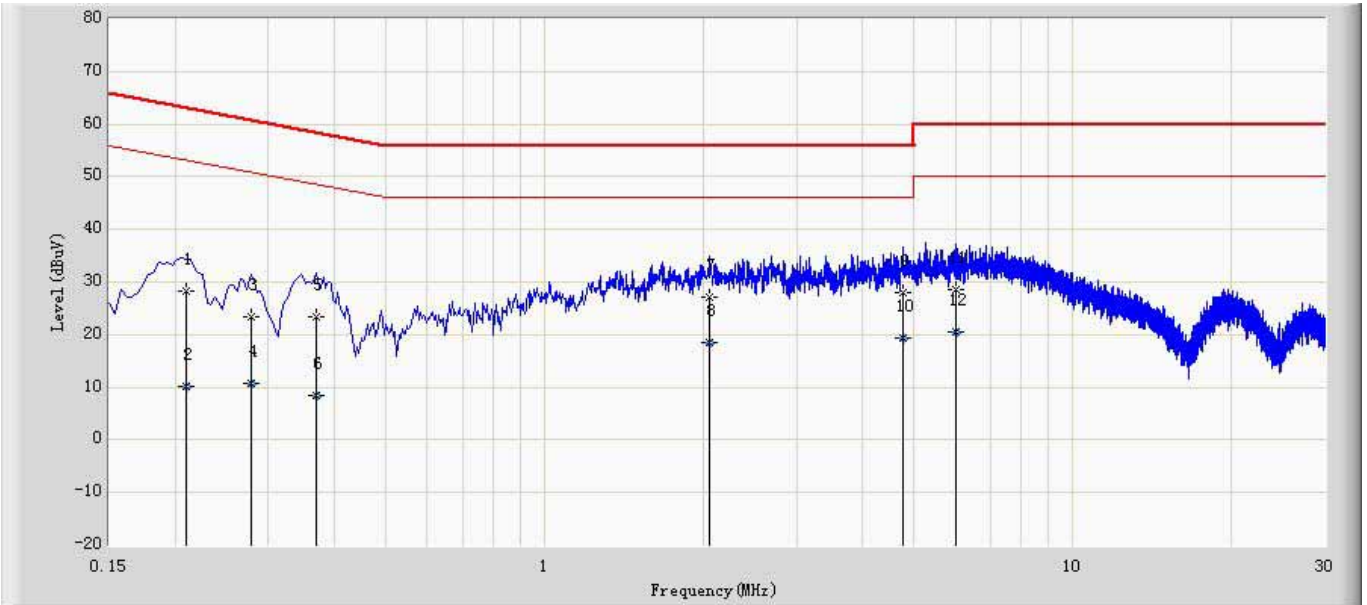
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

**3.5. Uncertainty**

The measurement uncertainty is defined as  $\pm 2.02$  dB

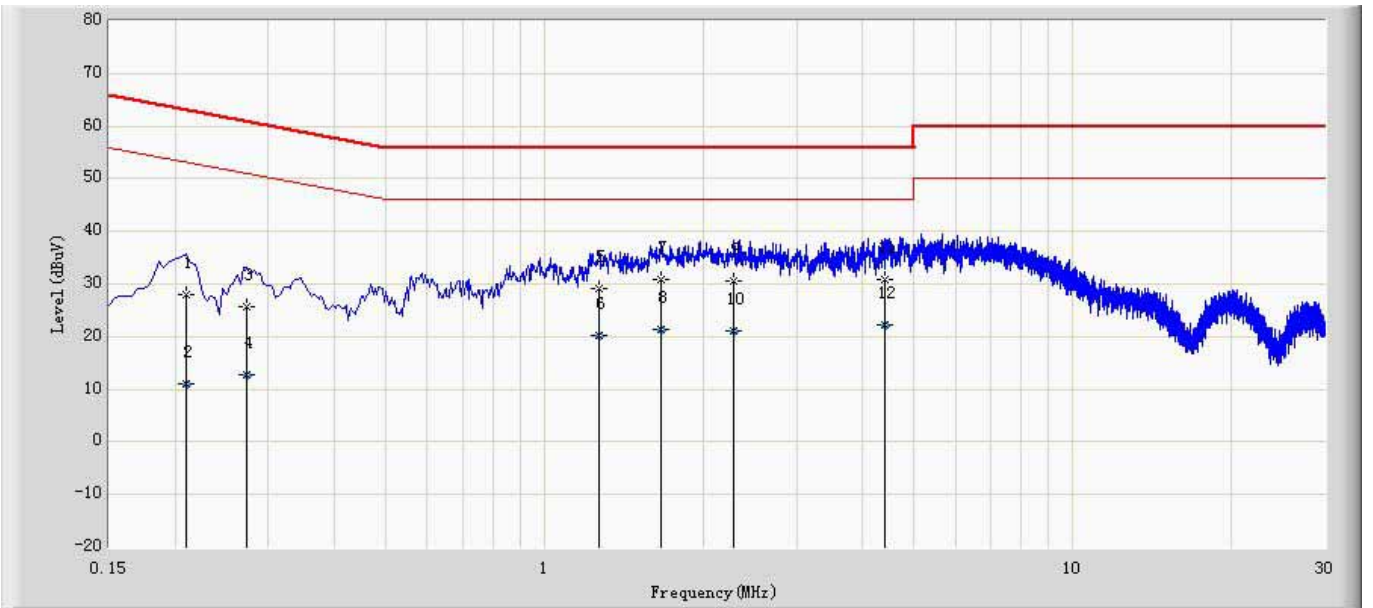
3.6. Test Result

Engineer: Milo	
Site: TR1	Time: 2013/06/20 - 09:02
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Neutral
EUT: Motorola Buds	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.210	28.243	18.329	-34.962	63.205	9.914	QP
2		0.210	10.087	0.172	-43.119	53.205	9.914	AV
3		0.278	23.348	13.410	-37.527	60.875	9.939	QP
4		0.278	10.623	0.685	-40.252	50.875	9.939	AV
5		0.370	23.498	13.514	-35.002	58.501	9.985	QP
6		0.370	8.559	-1.426	-39.942	48.501	9.985	AV
7		2.050	27.110	17.159	-28.890	56.000	9.951	QP
8		2.050	18.546	8.595	-27.454	46.000	9.951	AV
9		4.770	28.038	17.945	-27.962	56.000	10.093	QP
10	*	4.770	19.396	9.303	-26.604	46.000	10.093	AV
11		6.002	28.572	18.407	-31.428	60.000	10.165	QP
12		6.002	20.423	10.258	-29.577	50.000	10.165	AV

Engineer: Milo	
Site: TR1	Time: 2013/06/20 - 09:06
Limit: FCC_Part15.107_CE_AC Power_ClassB	Margin: 0
Probe: ENV216_101044(0.009-30MHz)	Polarity: Line
EUT: Motorola Buds	Power: AC 120V/60Hz
Note: Mode1	



No	Mark	Frequency (MHz)	Measure Level (dBuV)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV)	Factor (dB)	Type
1		0.210	27.917	18.056	-35.288	63.205	9.862	QP
2		0.210	11.163	1.302	-42.042	53.205	9.862	AV
3		0.274	25.614	15.744	-35.382	60.996	9.870	QP
4		0.274	12.831	2.961	-38.164	50.996	9.870	AV
5		1.270	29.129	19.330	-26.871	56.000	9.799	QP
6		1.270	20.171	10.372	-25.829	46.000	9.799	AV
7		1.658	30.731	20.937	-25.269	56.000	9.794	QP
8		1.658	21.412	11.618	-24.588	46.000	9.794	AV
9		2.286	30.637	20.846	-25.363	56.000	9.791	QP
10		2.286	20.997	11.206	-25.003	46.000	9.791	AV
11		4.422	30.788	20.940	-25.212	56.000	9.848	QP
12	*	4.422	22.306	12.458	-23.694	46.000	9.848	AV

## 4. Radiated Emission

### 4.1. Test Equipment

#### Radiated Emission / AC-2

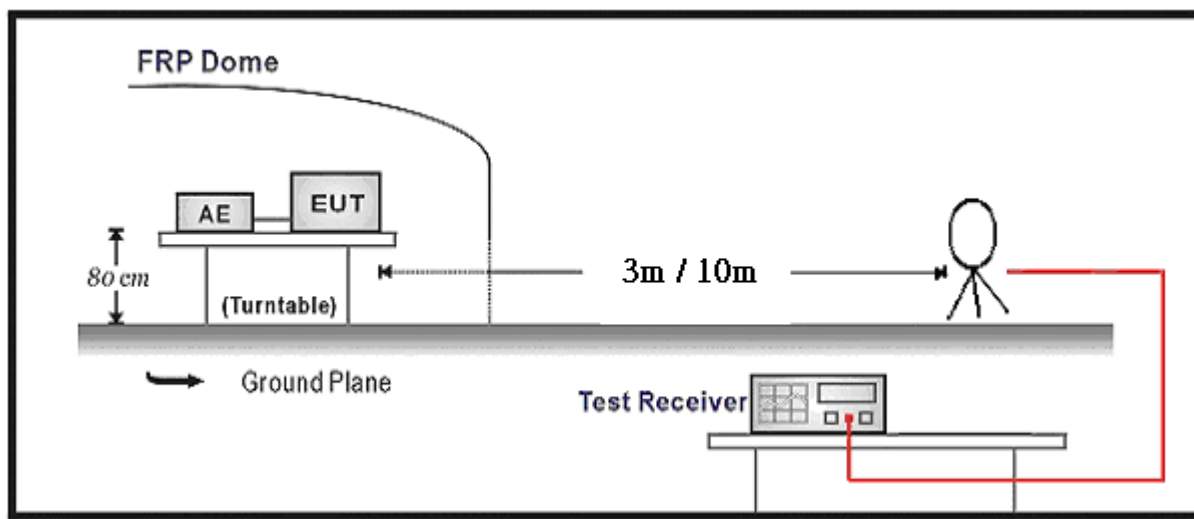
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
EMI Test Receiver	R&S	ESCI	100573	2014.04.30
Loop Antenna	R&S	HFH2-Z2	833799/003	2013.11.17
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2013.10.15
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC2-C	2014.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC2-TH	2014.05.07

#### Radiated Emission / AC-5

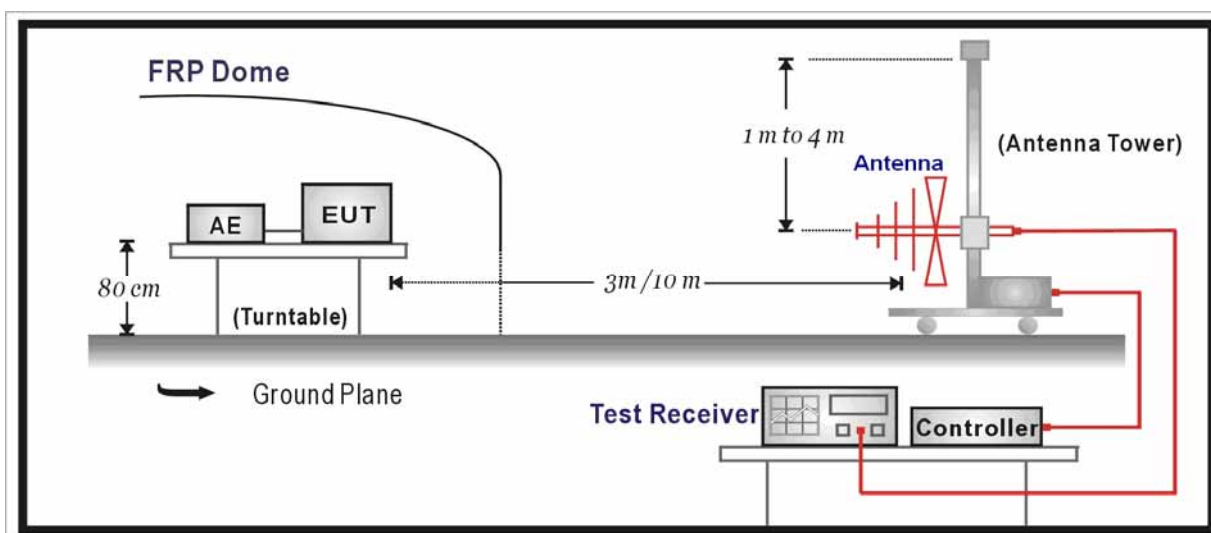
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2014.03.30
Preamplifier	Miteq	NSP1800-25	1364185	2014.05.03
Preamplifier	Quietek	AP-040G	CHM-0906001	2014.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2013.10.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2014.06.08
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	294	2013.11.24
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C1	2014.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC5-C2	2014.03.01
Coaxial Cable	Huber+Suhner	SUCOFLEX 102	AC5-C3	2014.03.01
Temperature/Humidity Meter	Zhicheng	ZC1-2	AC5-TH	2014.01.11

4.2. Test Setup

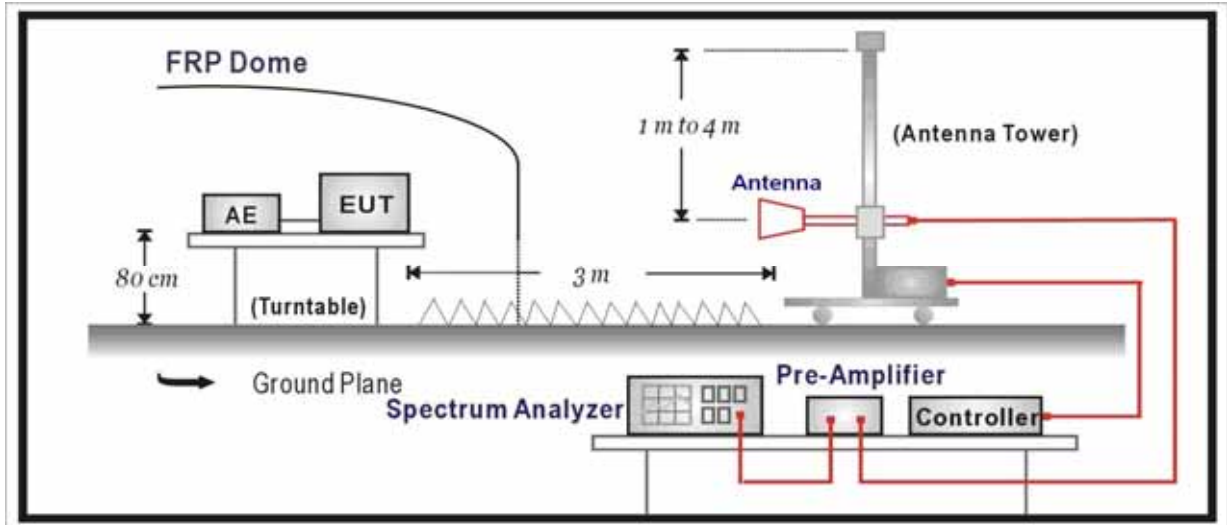
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

According to ANSI C63.10: 2009.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the

maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the "cone of radiation" of EUT. The 3dB beamwidth is 60~10 degrees for H-plane and 90~10 degrees for E-plane.

#### **4.5. Uncertainty**

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB  
below 1G is defined as  $\pm 3.8$  dB

**4.6. Test Result**

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor – Preamplifier Gain

Mode 1: Transmitter-1Mbps(GFSK\_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4808.0	48.6	-7.1	41.5	54(Note2)	-12.5	PK
	V	4808.0	50.7	-7.2	43.5	54(Note2)	-10.5	PK
	H	7206.0	44.0	-1.8	42.2	54(Note2)	-11.8	PK
	V	7206.0	44.4	-1.9	42.5	54(Note2)	-11.5	PK
	H	9608.0	38.4	4.3	42.7	54(Note2)	-11.3	PK
	V	9608.0	38.6	4.4	43.0	54(Note2)	-11.0	PK
39	H	4884.5	50.0	-7.0	43.0	54(Note2)	-11.0	PK
	V	4884.5	49.0	-7.0	42.0	54(Note2)	-12.0	PK
	H	7323.0	44.2	-1.6	42.6	54(Note2)	-11.4	PK
	V	7323.0	44.2	-1.6	42.6	54(Note2)	-11.4	PK
	H	9764.0	38.3	4.5	42.8	54(Note2)	-11.2	PK
	V	9764.0	38.6	4.6	43.2	54(Note2)	-10.8	PK
78	H	4961.0	48.4	-7.1	41.3	54(Note2)	-12.7	PK
	V	4961.0	49.4	-6.9	42.5	54(Note2)	-11.5	PK
	H	7440.0	44.4	-1.2	43.2	54(Note2)	-10.8	PK
	V	7440.0	43.9	-1.2	42.7	54(Note2)	-11.3	PK
	H	9920.0	37.9	5.2	43.1	54(Note2)	-10.9	PK
	V	9920.0	37.8	5.2	43.0	54(Note2)	-11.0	PK

Note 1: The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode 2: Transmitter-2Mbps(Pi/4 DQPSK \_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	46.9	-7.1	39.8	54(Note2)	-14.2	PK
	V	4808.0	50.3	-7.2	43.1	54(Note2)	-10.9	PK
	H	7206.0	43.7	-1.8	41.9	54(Note2)	-12.1	PK
	V	7206.0	42.7	-1.9	40.8	54(Note2)	-13.2	PK
	H	9608.0	39.0	4.3	43.3	54(Note2)	-10.7	PK
	V	9608.0	38.7	4.4	43.1	54(Note2)	-10.9	PK
39	H	4882.0	46.0	-7.0	39.0	54(Note2)	-15.0	PK
	V	4882.0	47.5	-7.0	40.5	54(Note2)	-13.5	PK
	H	7323.0	43.7	-1.6	42.1	54(Note2)	-11.9	PK
	V	7323.0	43.1	-1.6	41.5	54(Note2)	-12.5	PK
	H	9764.0	38.0	4.5	42.5	54(Note2)	-11.5	PK
	V	9764.0	38.2	4.6	42.8	54(Note2)	-11.2	PK
78	H	4960.0	46.0	-7.1	38.9	54(Note2)	-15.1	PK
	V	4960.0	47.6	-6.9	40.7	54(Note2)	-13.3	PK
	H	7440.0	43.3	-1.2	42.1	54(Note2)	-11.9	PK
	V	7440.0	43.6	-1.2	42.4	54(Note2)	-11.6	PK
	H	9920.0	38.1	5.2	43.3	54(Note2)	-10.7	PK
	V	9920.0	37.3	5.2	42.5	54(Note2)	-11.5	PK

Note 1: The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode 3: Transmitter-3Mbps(8DPSK\_DH5)

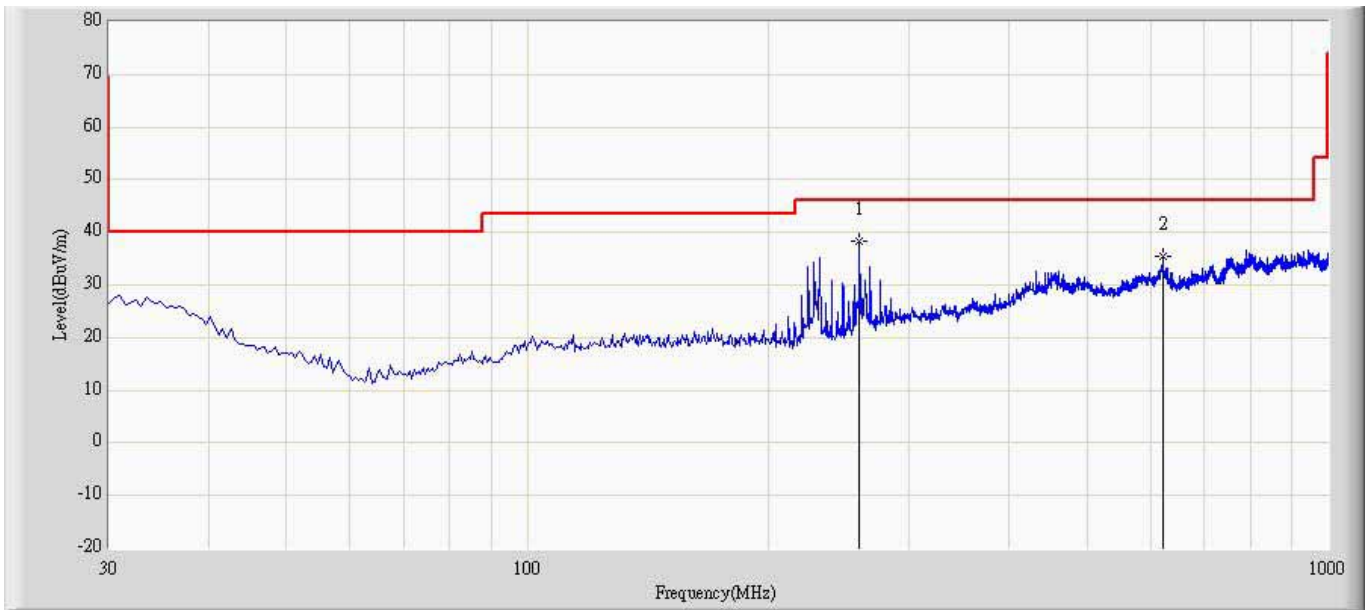
CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	4804.0	46.9	-7.1	39.8	54(Note2)	-14.2	PK
	V	4808.0	48.7	-7.2	41.5	54(Note2)	-12.5	PK
	H	7206.0	42.7	-1.8	40.9	54(Note2)	-13.1	PK
	V	7206.0	42.8	-1.9	40.9	54(Note2)	-13.1	PK
	H	9608.0	39.3	4.3	43.6	54(Note2)	-10.4	PK
	V	9608.0	38.3	4.4	42.7	54(Note2)	-11.3	PK
39	H	4882.0	47.2	-7.0	40.2	54(Note2)	-13.8	PK
	V	4884.5	48.6	-7.0	41.6	54(Note2)	-12.4	PK
	H	7323.0	43.0	-1.6	41.4	54(Note2)	-12.6	PK
	V	7323.0	43.8	-1.6	42.2	54(Note2)	-11.8	PK
	H	9764.0	38.4	4.5	42.9	54(Note2)	-11.1	PK
	V	9764.0	37.4	4.6	42.0	54(Note2)	-12.0	PK
78	H	4960.0	46.5	-7.1	39.4	54(Note2)	-14.6	PK
	V	4960.0	47.0	-6.9	40.1	54(Note2)	-13.9	PK
	H	7440.0	42.9	-1.2	41.7	54(Note2)	-12.3	PK
	V	7440.0	42.8	-1.2	41.6	54(Note2)	-12.4	PK
	H	9920.0	37.5	5.2	42.7	54(Note2)	-11.3	PK
	V	9920.0	38.0	5.2	43.2	54(Note2)	-10.8	PK

Note 1: The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

2: This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

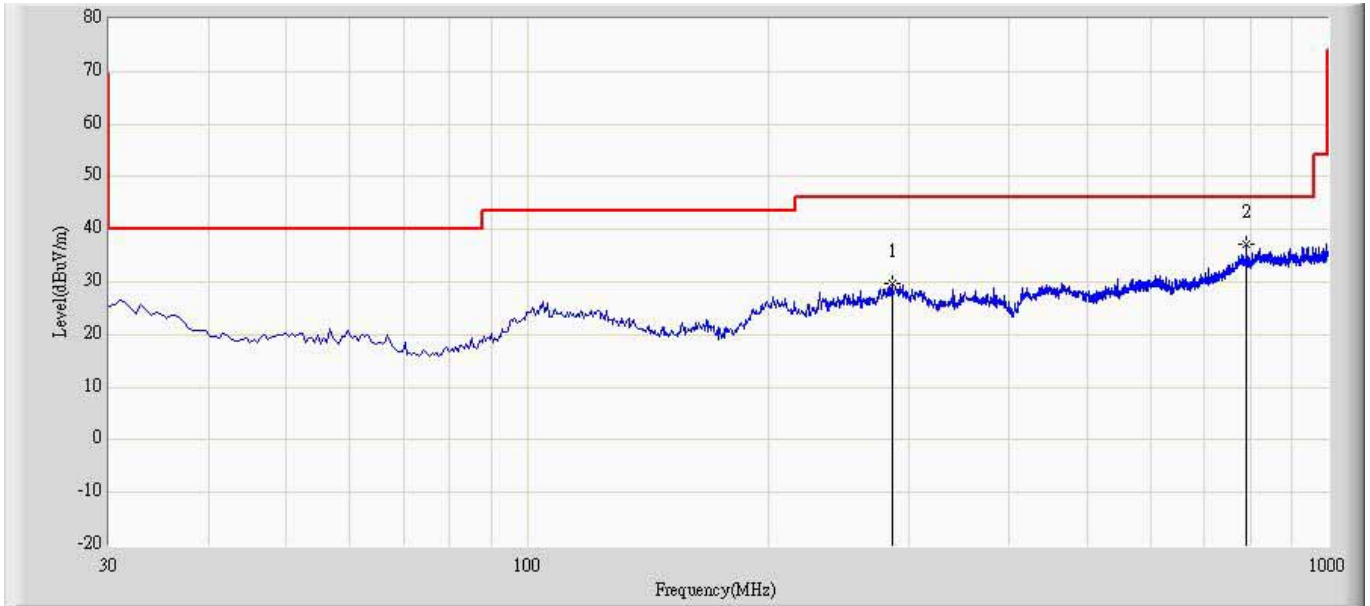
The worst case of Radiated Emission below 1GHz:

Engineer: Milo	
Site: AC2	Time: 2013/06/20 - 09:48
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC2_10M(30-1000M)20130511	Polarity: Horizontal
EUT: Motorola Buds	Power: AC 120V/60Hz
Note: Mode: Transmit at channel 2402MHz by DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	259.890	38.314	17.878	-7.686	46.000	20.436	QP
2		621.700	35.489	2.977	-10.511	46.000	32.512	QP

Engineer: Milo	
Site: AC2	Time: 2013/06/20 - 09:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC2_10M(30-1000M)20130511	Polarity: Vertical
EUT: Motorola Buds	Power: AC 120V/60Hz
Note: Mode: Transmit at channel 2402MHz by DH5	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		285.110	29.810	2.964	-16.190	46.000	26.846	QP
2	*	791.450	37.153	4.657	-8.847	46.000	32.496	QP

## 5. 20dB Bandwidth

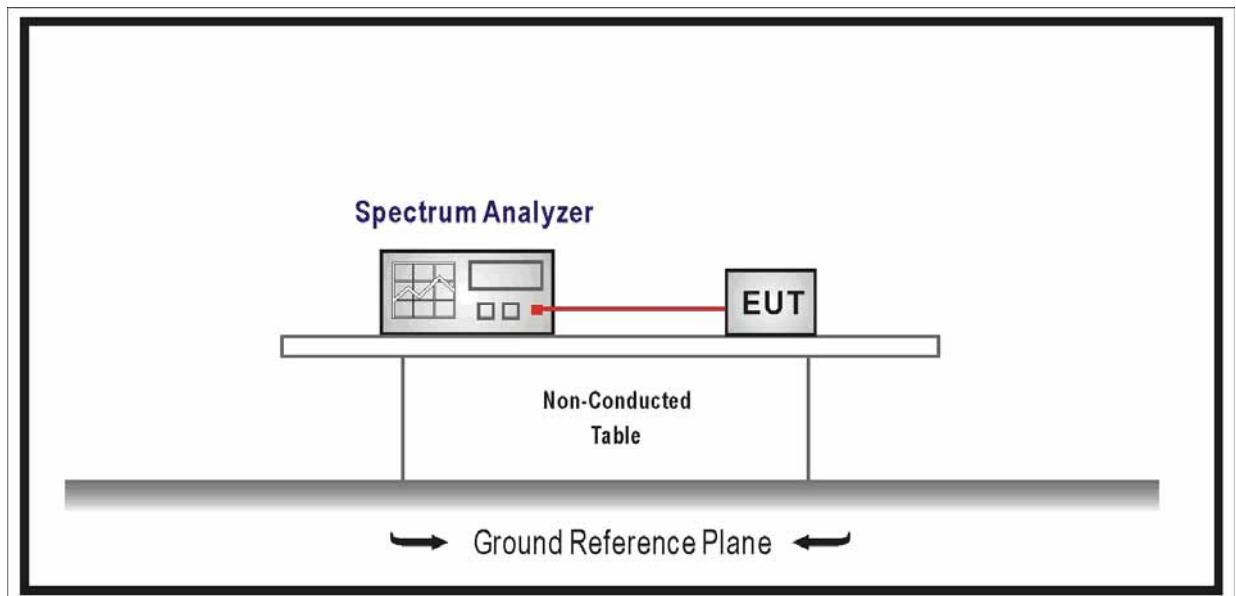
### 5.1 Test Equipment

20dB Bandwidth / TR8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2014.05.07

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 5.2 Test Setup



### 5.3 Limit

- For frequency hopping systems operating in 2400-2483.5 MHz band, no limitation.
- For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

## 5.4 Test Procedure

According to ANSI C63.10: 2009.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel

RBW  $\cong$  1% of the 20dB bandwidth

VBW  $\cong$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.

Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

## 5.5 Uncertainty

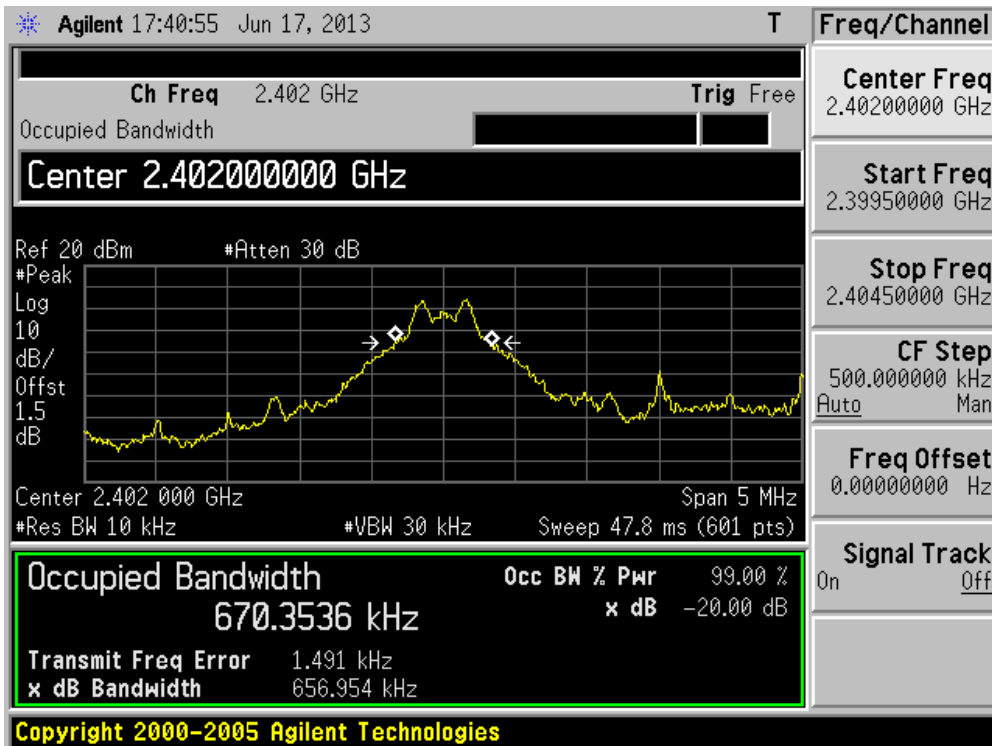
The measurement uncertainty is defined as  $\pm 1$  kHz

5.6 Test Result

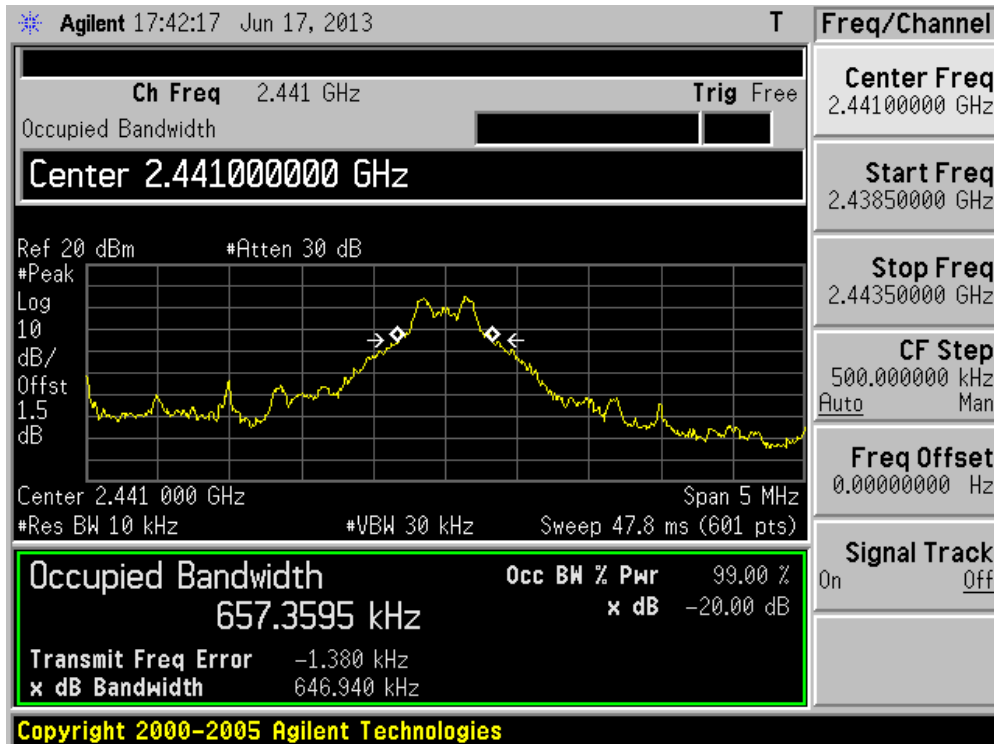
Product	:	Motorola Buds
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
00	2402	657.0	670.4
39	2441	646.9	657.4
78	2480	650.2	661.7

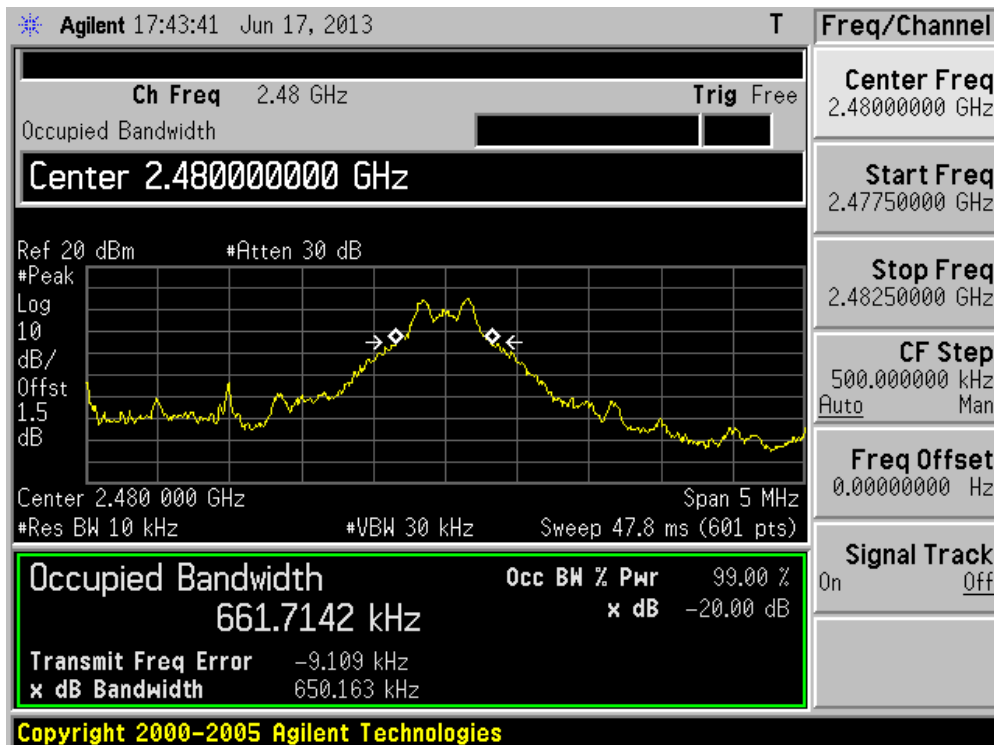
Channel 00 (2402MHz)



Channel 39 (2441MHz)



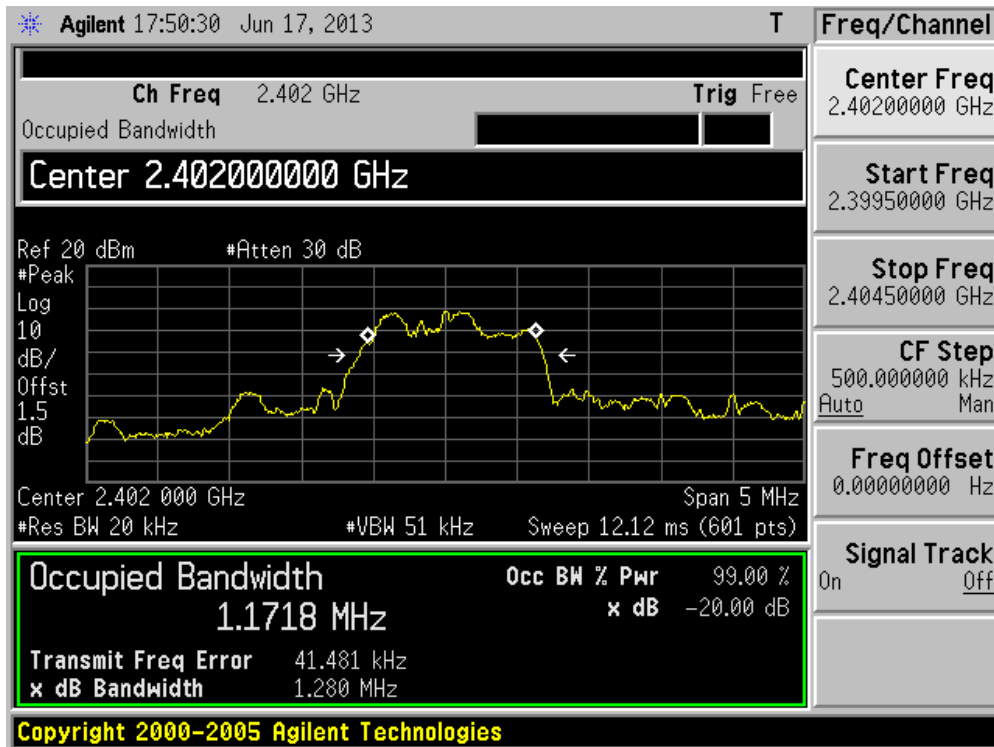
Channel 78 (2480MHz)



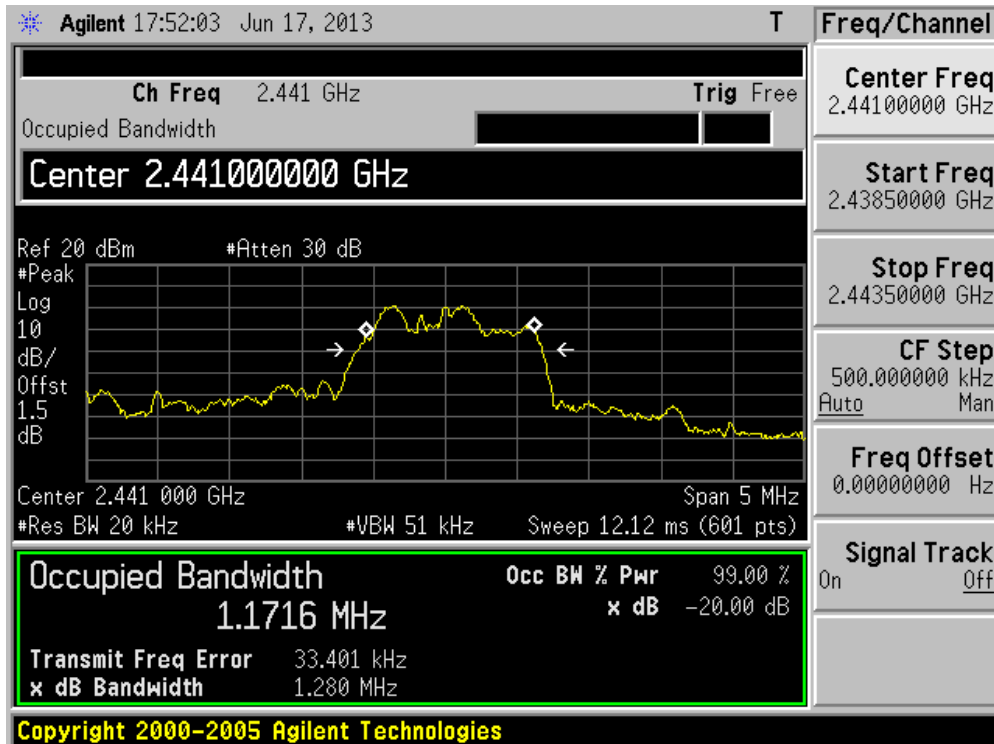
Product	:	Motorola Buds
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
00	2402	1280.0	1171.8
39	2441	1280.0	1171.6
78	2480	1284.0	1170.5

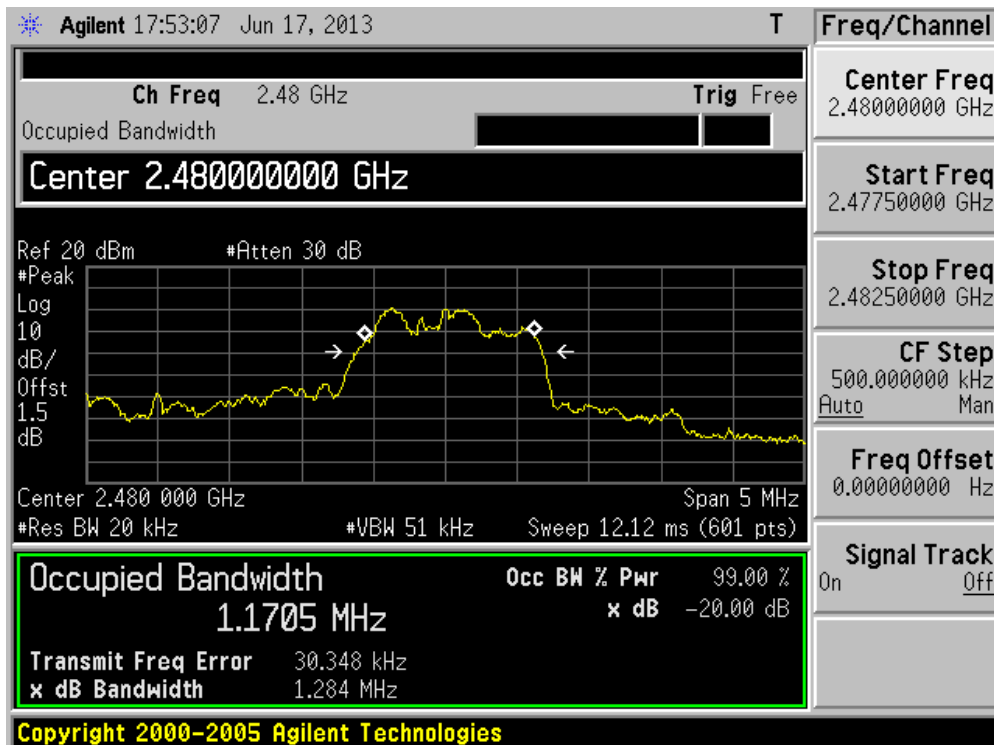
Channel 00 (2402MHz)



Channel 39 (2441MHz)



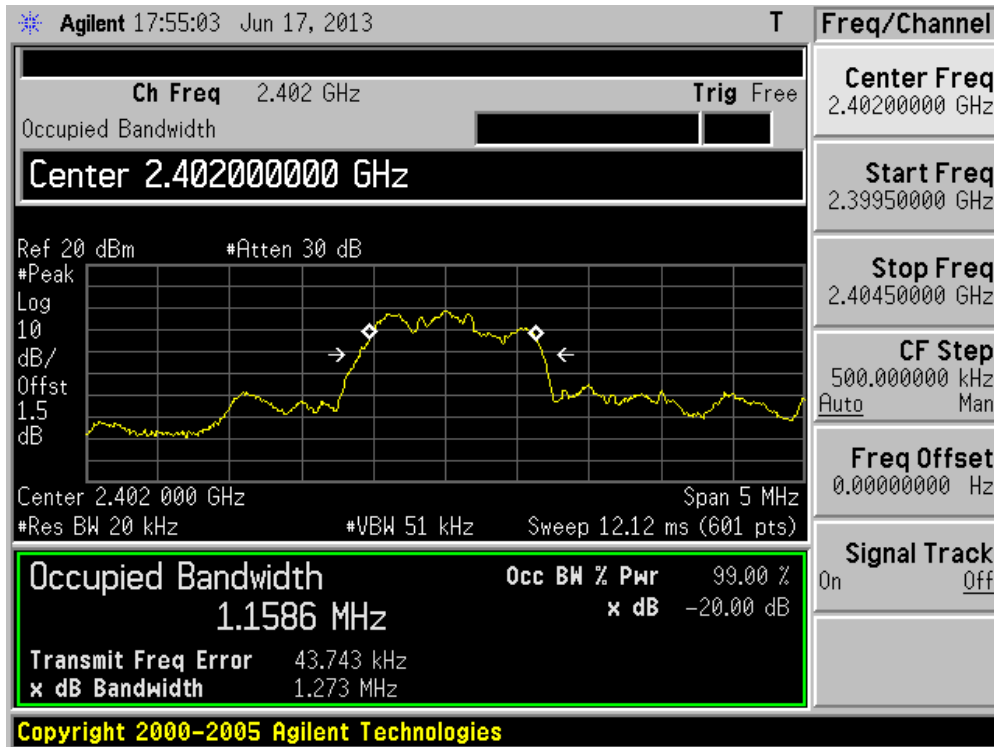
Channel 78 (2480MHz)



Product	:	Motorola Buds
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
00	2402	1273.0	1158.6
39	2441	1244.0	1142.4
78	2480	1270.0	1159.3

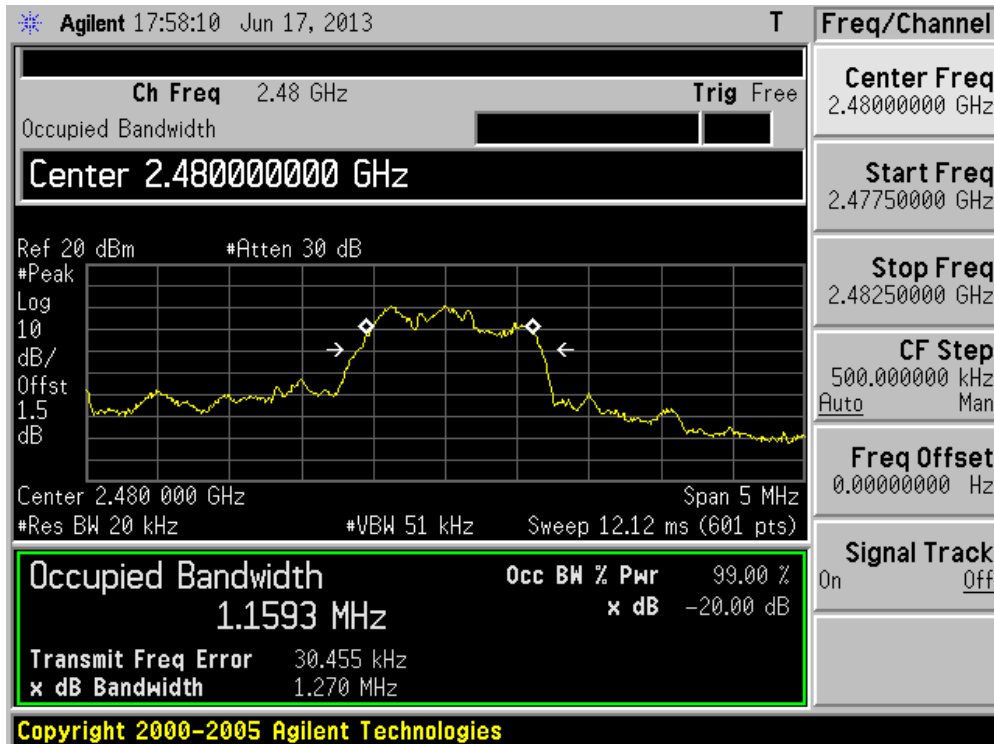
### Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



## 6. Carrier Frequency Separation

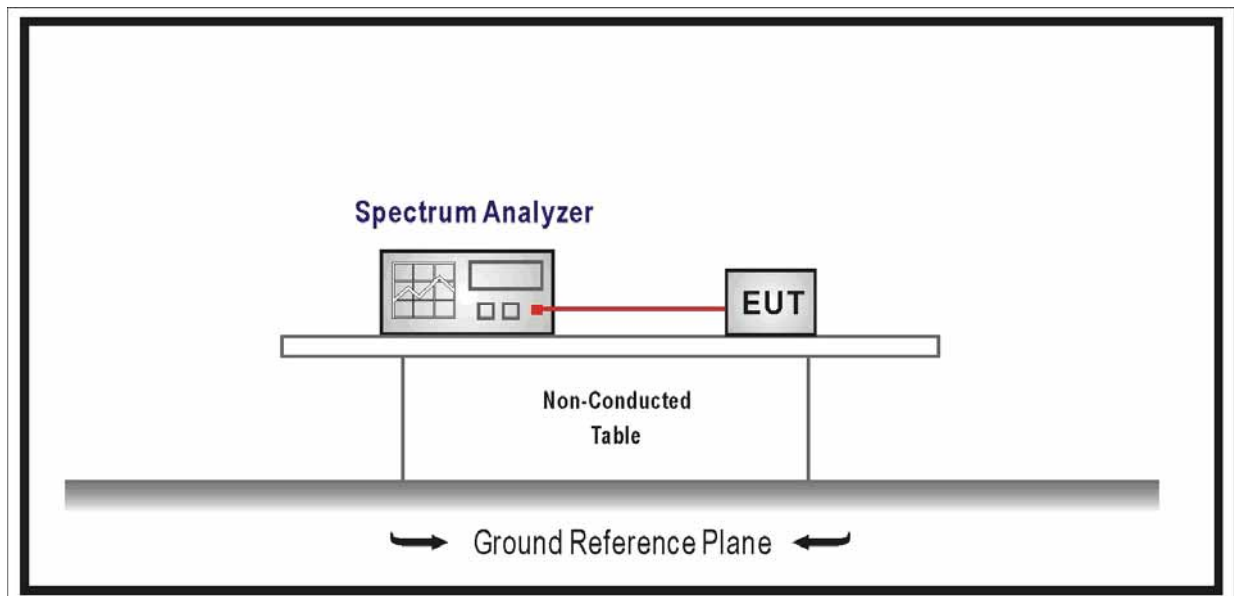
### 6.1. Test Equipment

Carrier Frequency Separation / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2014.05.07

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 6.2. Test Setup



### 6.3. Limit

- 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 125mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping

channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

#### 6.4. Test Procedure

According to ANSI C63.10: 2009.

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW)  $\cong$  1% of the span

Video (or Average) Bandwidth VBW  $\cong$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

#### 6.5. Uncertainty

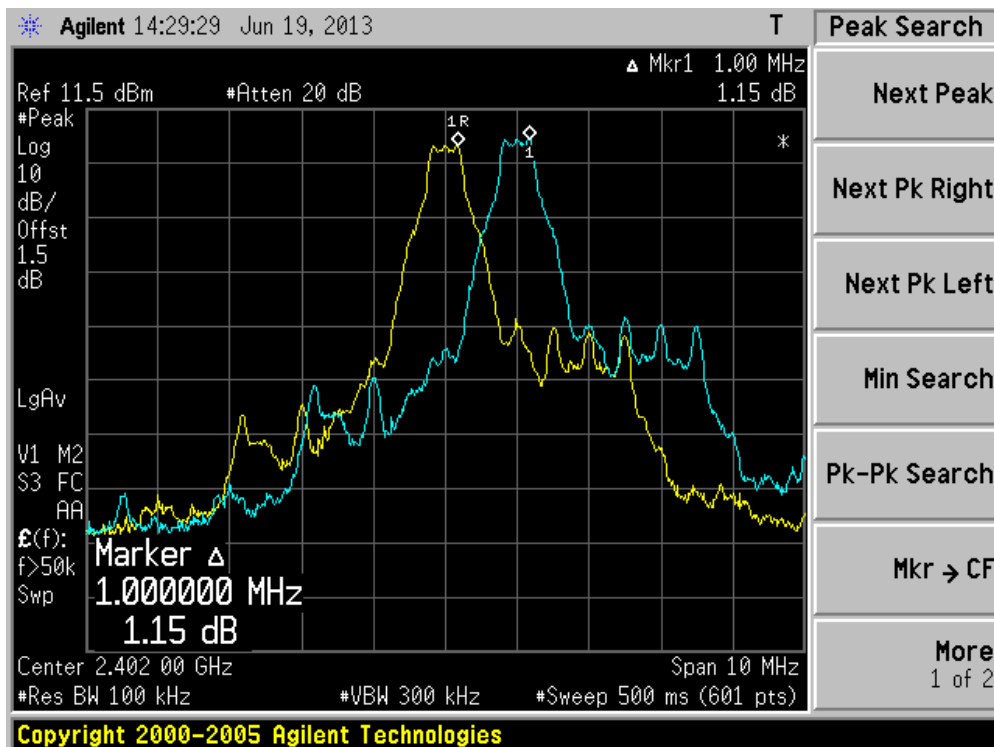
The measurement uncertainty is defined as  $\pm$  1 kHz

6.6. Test Result

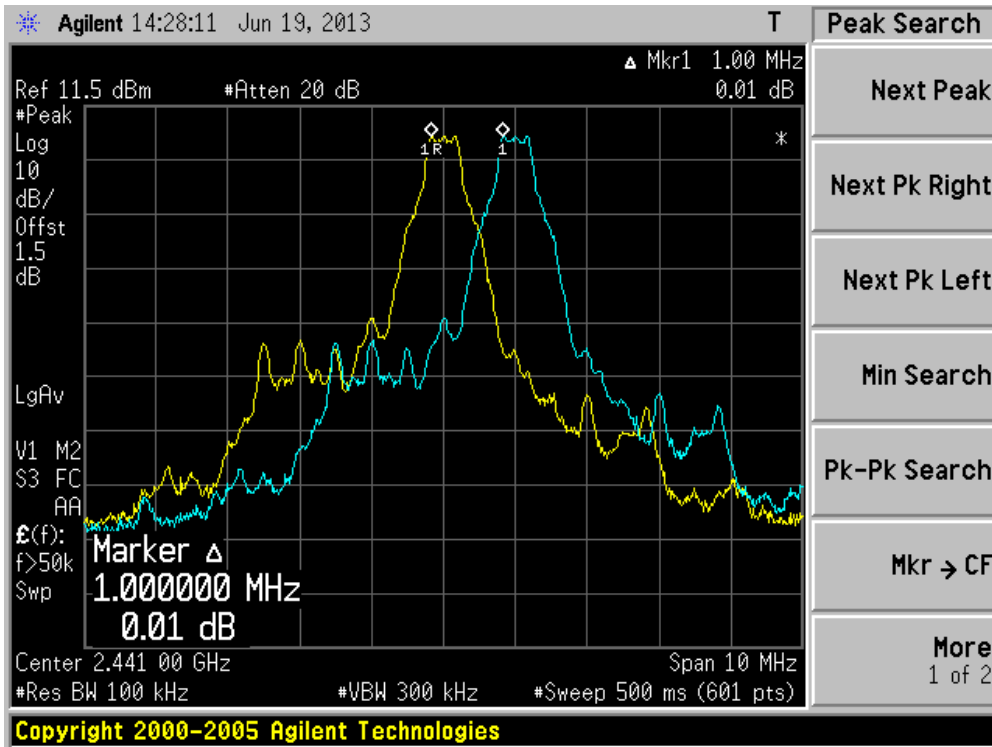
Product	:	Motorola Buds
Test Item	:	Carrier Frequency Separation
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
00	2402	1000	>25 kHz or 2/3 of 20 dB BW	Pass
39	2441	1000	>25 kHz or 2/3 of 20 dB BW	Pass
78	2480	1000	>25 kHz or 2/3 of 20 dB BW	Pass

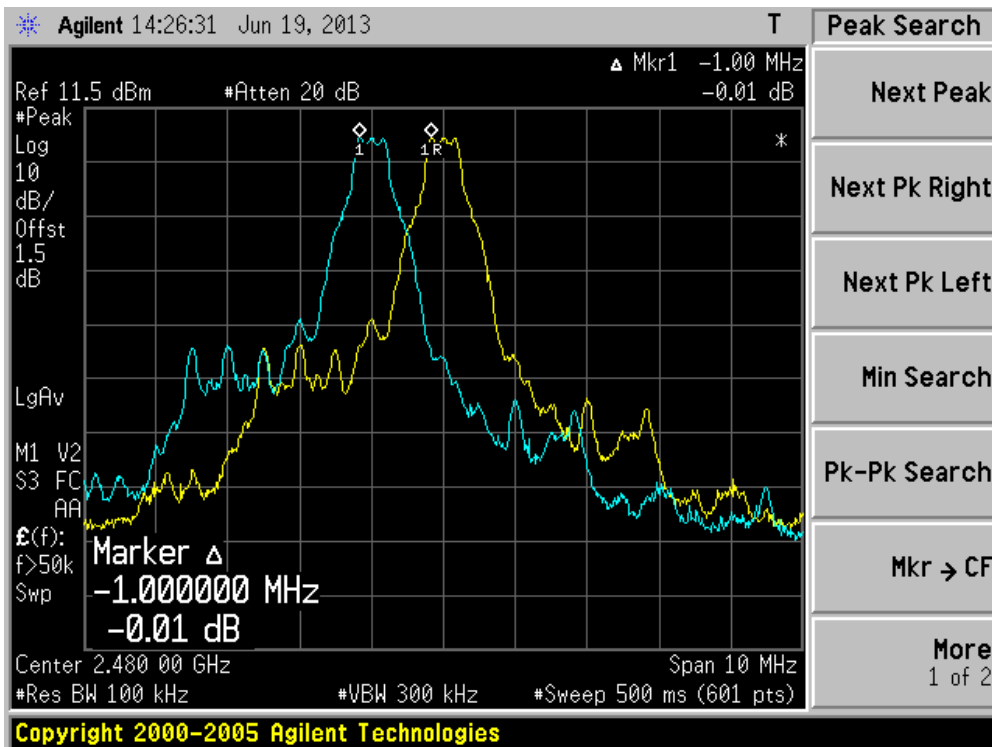
Channel 00 (2402MHz)



Channel 39 (2441MHz)



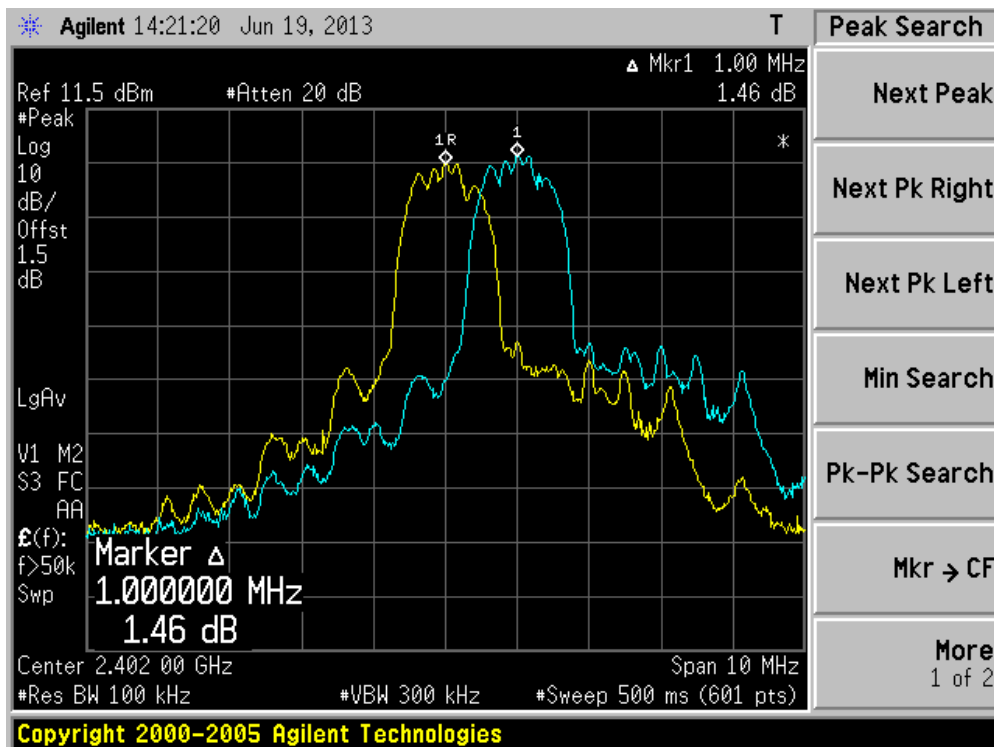
Channel 78 (2480MHz)



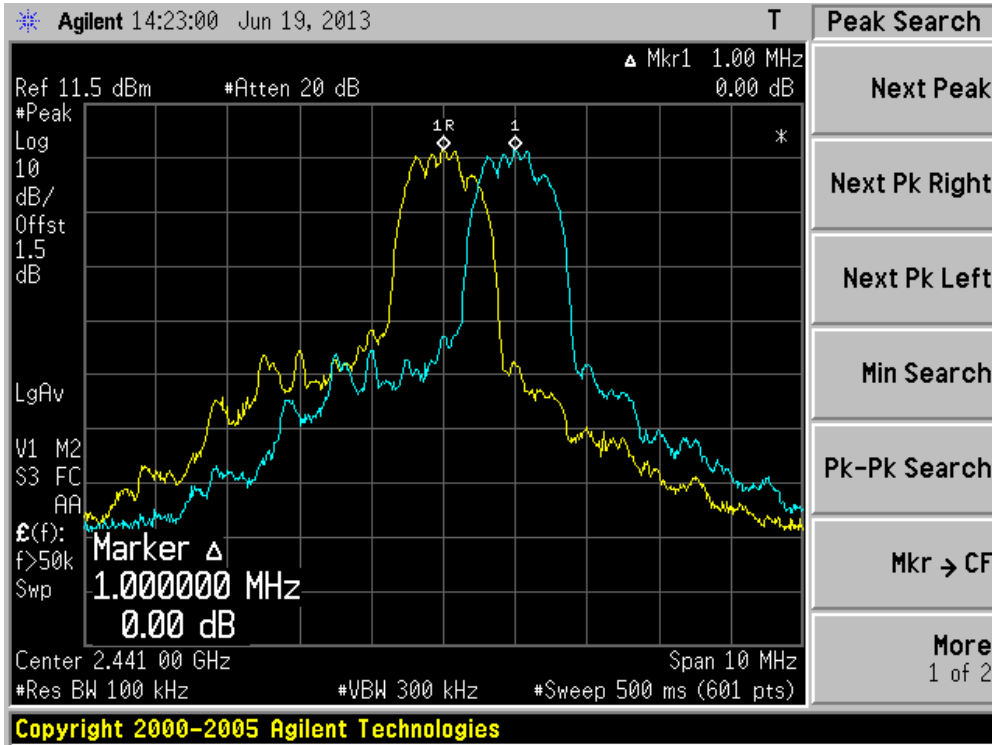
Product	:	Motorola Buds
Test Item	:	Carrier Frequency Separation
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
00	2402	1000	>25 kHz or 2/3 of 20 dB BW	Pass
39	2441	1000	>25 kHz or 2/3 of 20 dB BW	Pass
78	2480	1000	>25 kHz or 2/3 of 20 dB BW	Pass

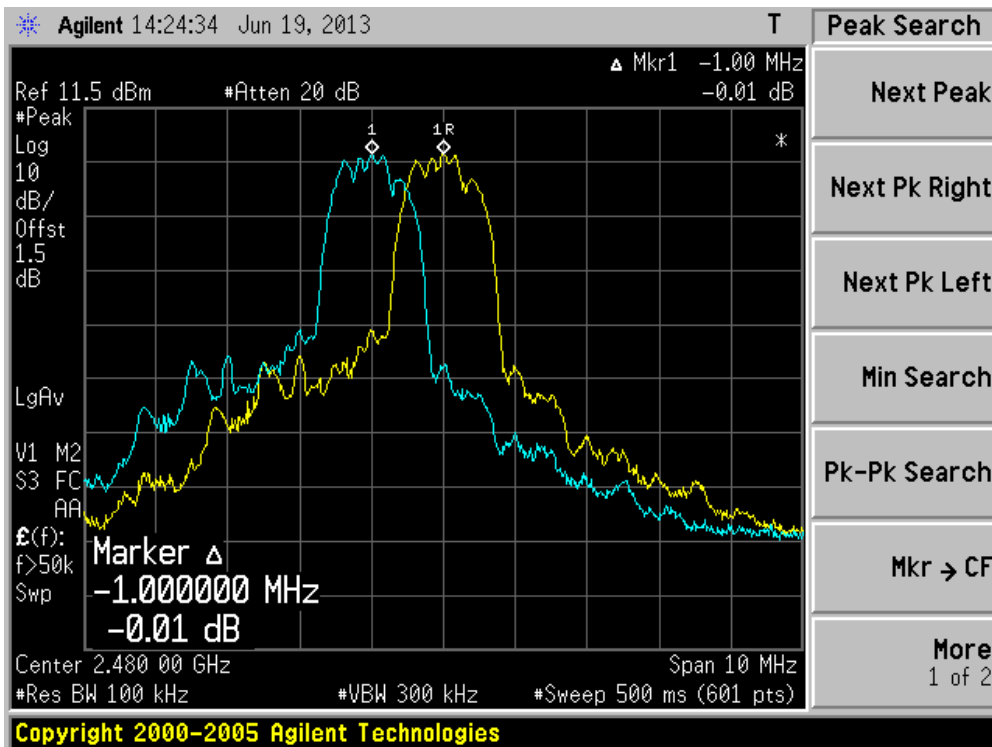
### Channel 00 (2402MHz)



Channel 39 (2441MHz)



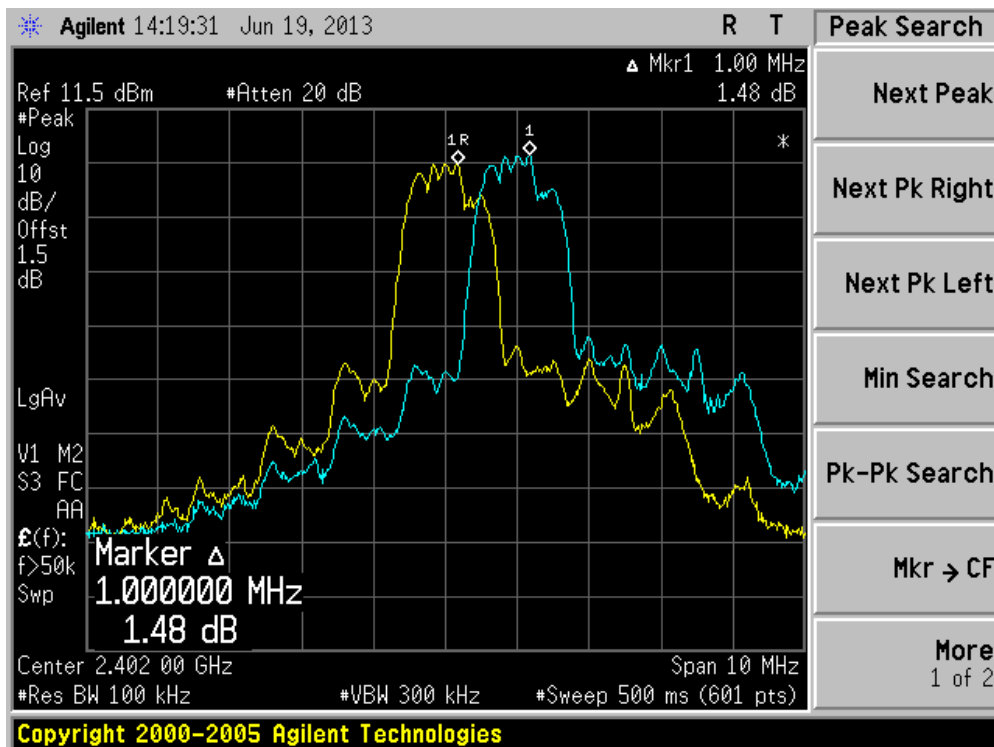
Channel 78 (2480MHz)



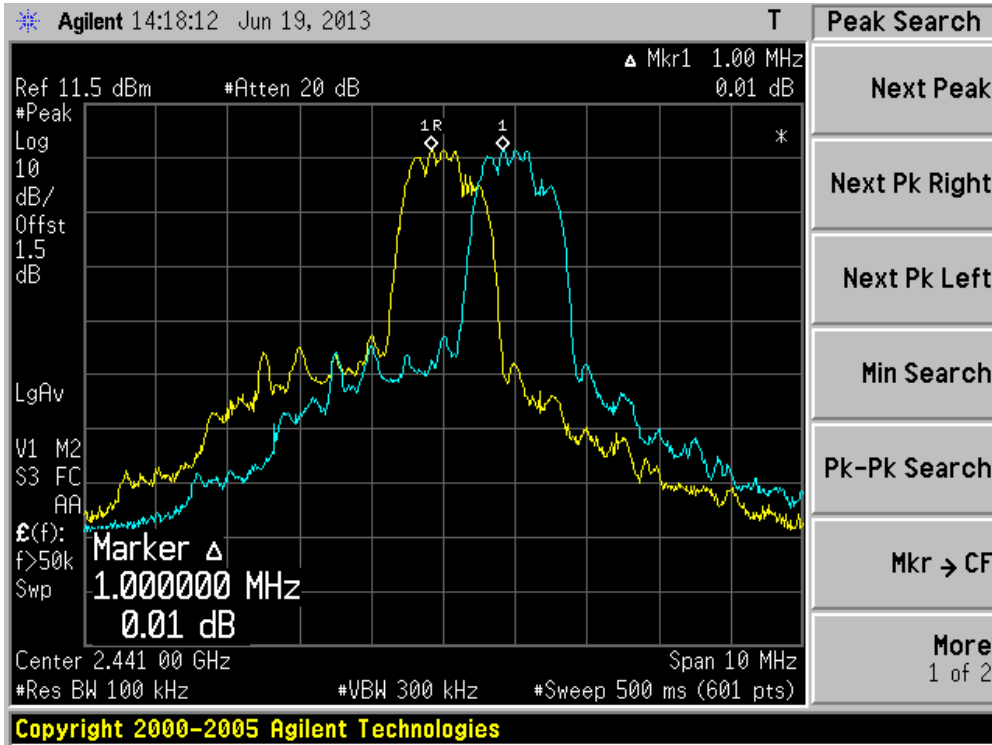
Product	:	Motorola Buds
Test Item	:	Carrier Frequency Separation
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
00	2402	1000	>25 kHz or 2/3 of 20 dB BW	Pass
39	2441	1000	>25 kHz or 2/3 of 20 dB BW	Pass
78	2480	1000	>25 kHz or 2/3 of 20 dB BW	Pass

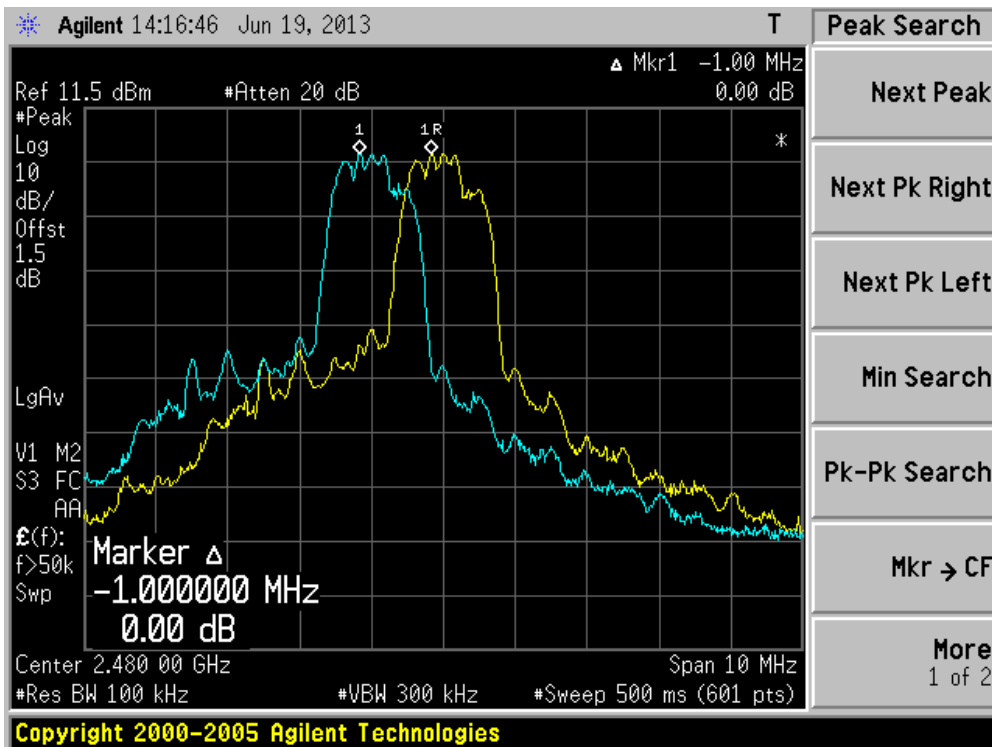
### Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



## 7. Number of Hopping Frequencies

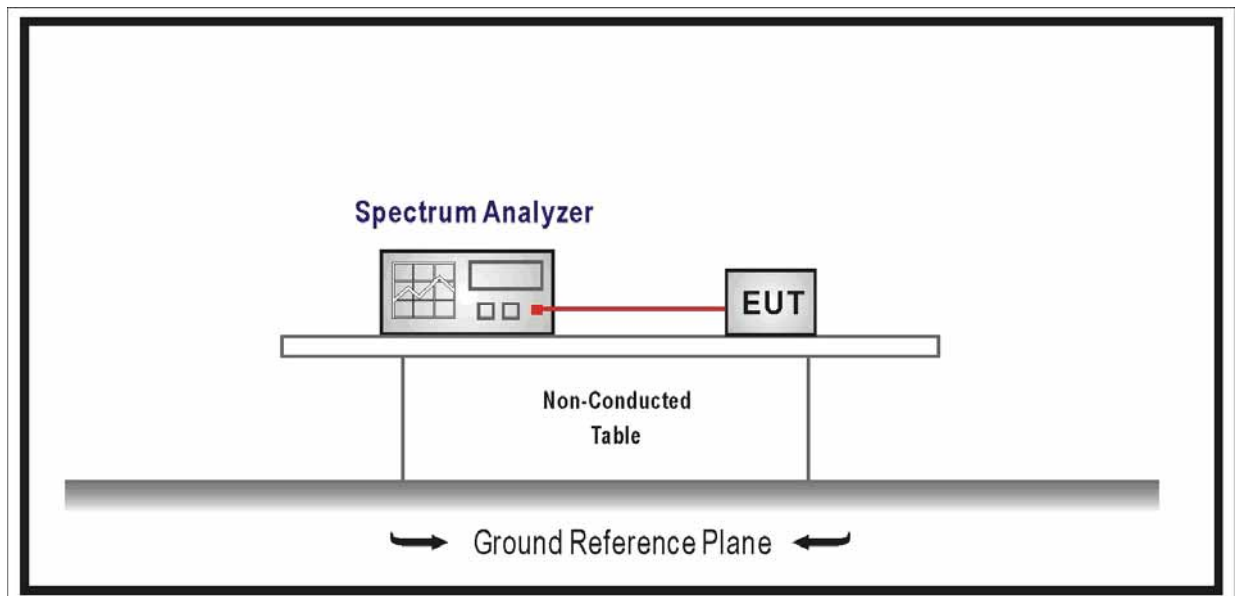
### 7.1. Test Equipment

Number of Hopping Frequencies / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2014.05.07

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 7.2. Test Setup



### 7.3. Limit

- For frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.
- For frequency hopping systems operating in 902-928 MHz band shall use at least 50 hopping frequencies.
- For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

## 7.4. Test Procedure

According to ANSI C63.10: 2009.

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW  $\cong$  1% of the span

VBW  $\cong$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to bread the span up to sections, in order to clearly show all of the hopping frequencies.

## 7.5. Uncertainty

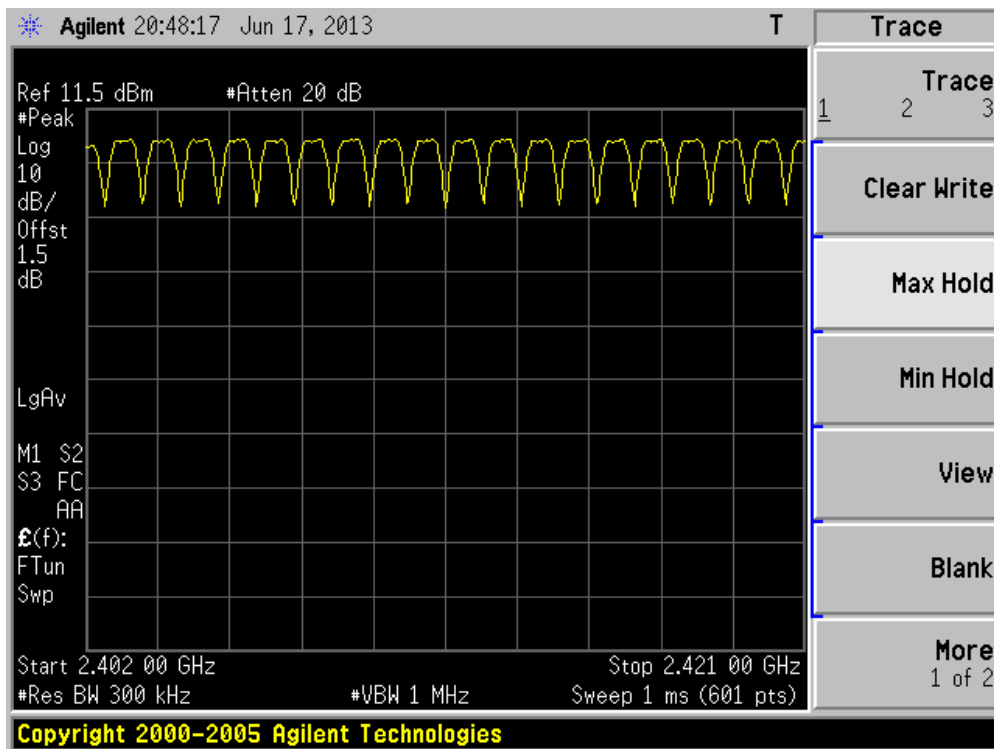
The measurement uncertainty is defined as  $\pm 1$  kHz

7.6. Test Result

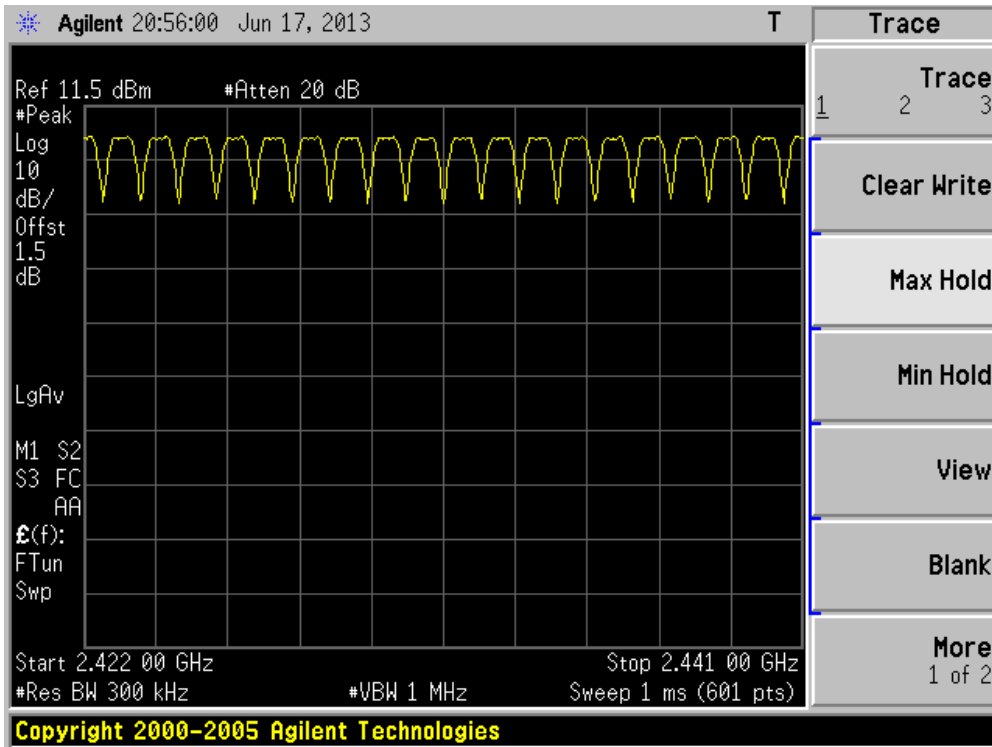
Product	:	Motorola Buds
Test Item	:	Number of Hopping Frequencies
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2400 - 2483.5	79	>15	Pass

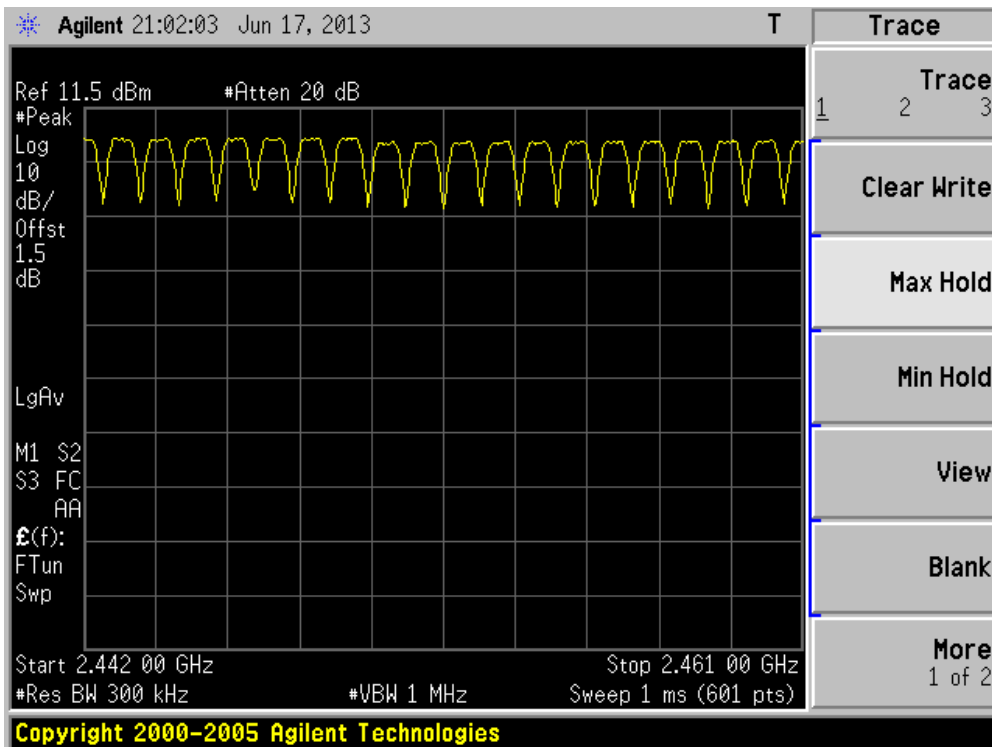
2402 - 2421 MHz



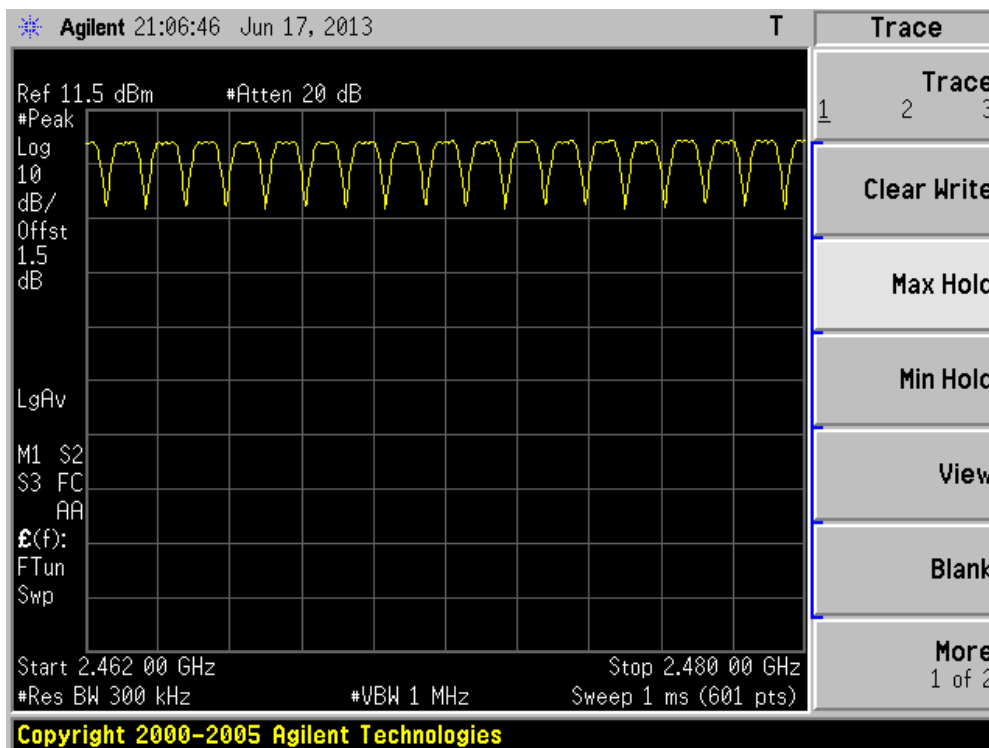
2422 - 2441 MHz



2442 - 2461 MHz



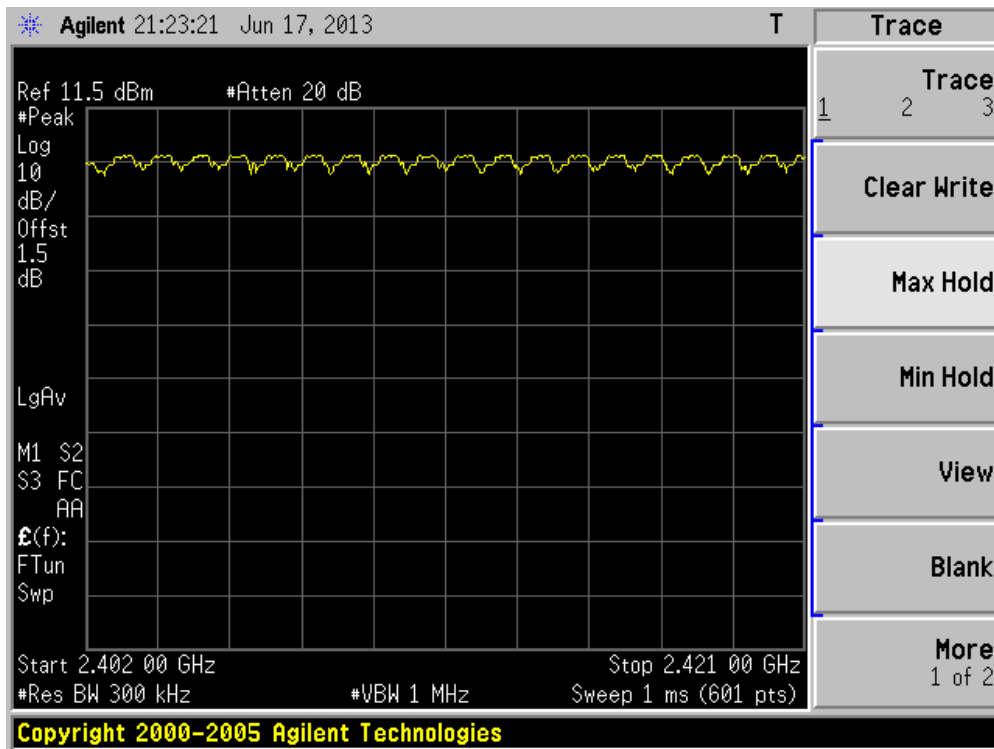
2462 - 2480 MHz



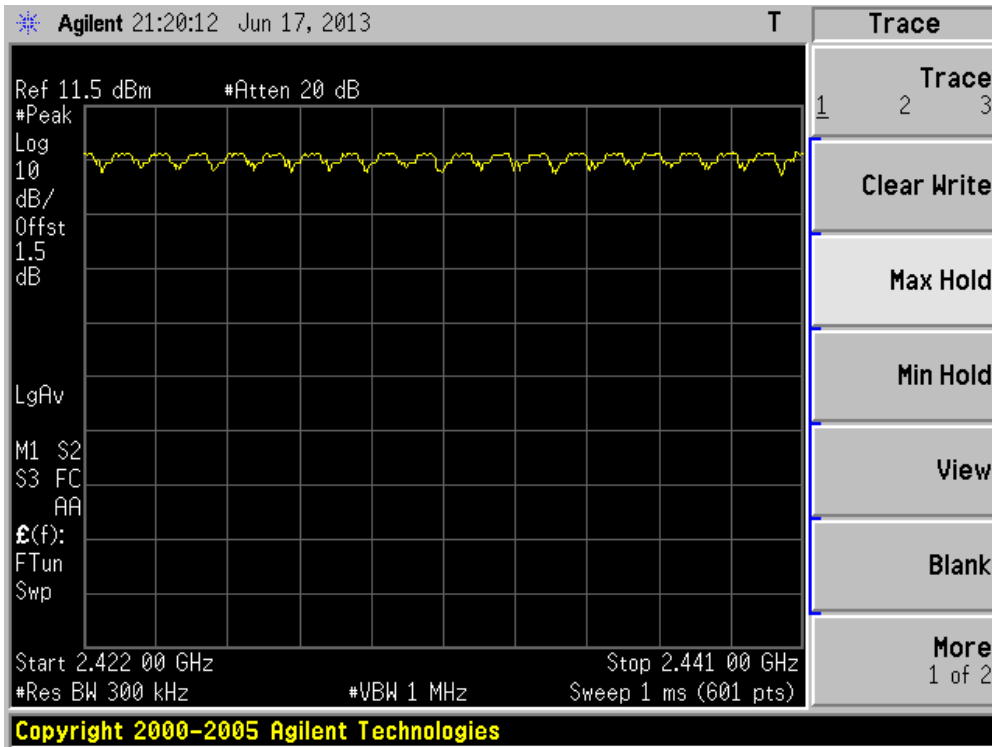
Product	:	Motorola Buds
Test Item	:	Number of Hopping Frequencies
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2400 - 2483.5	79	>15	Pass

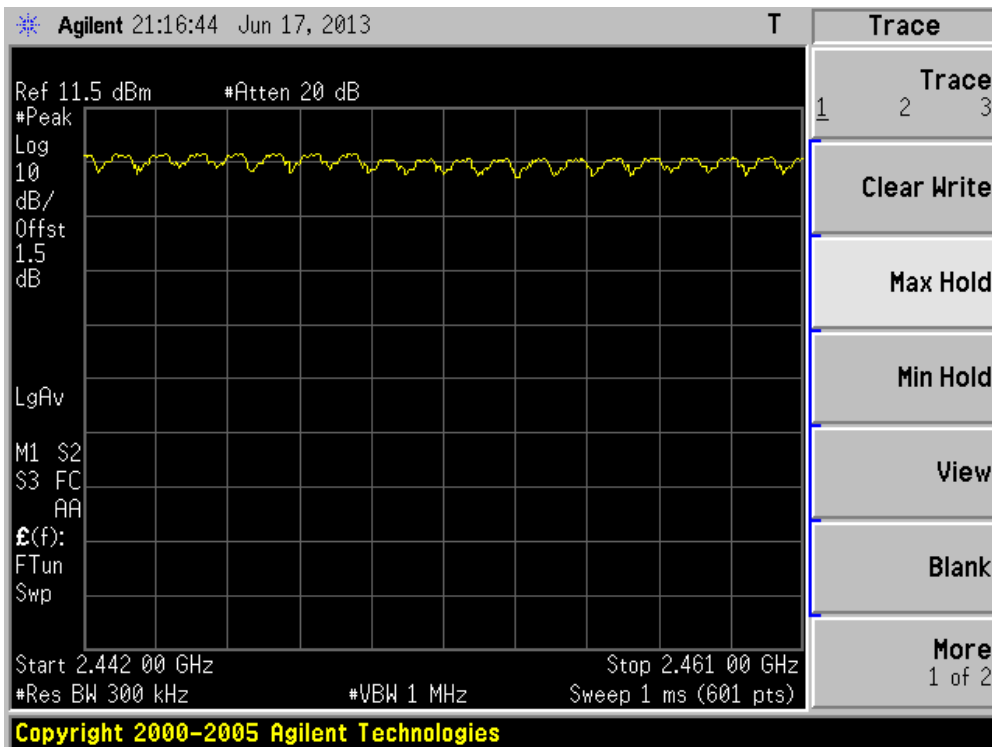
2402 - 2421 MHz



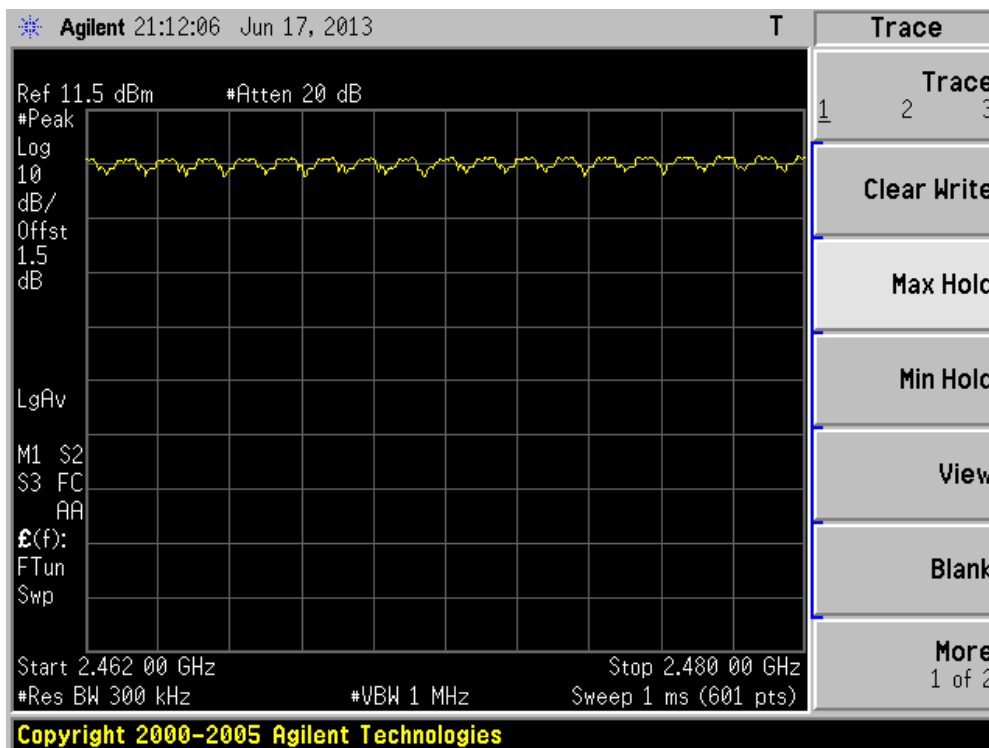
2422 - 2441 MHz



2442 - 2461 MHz



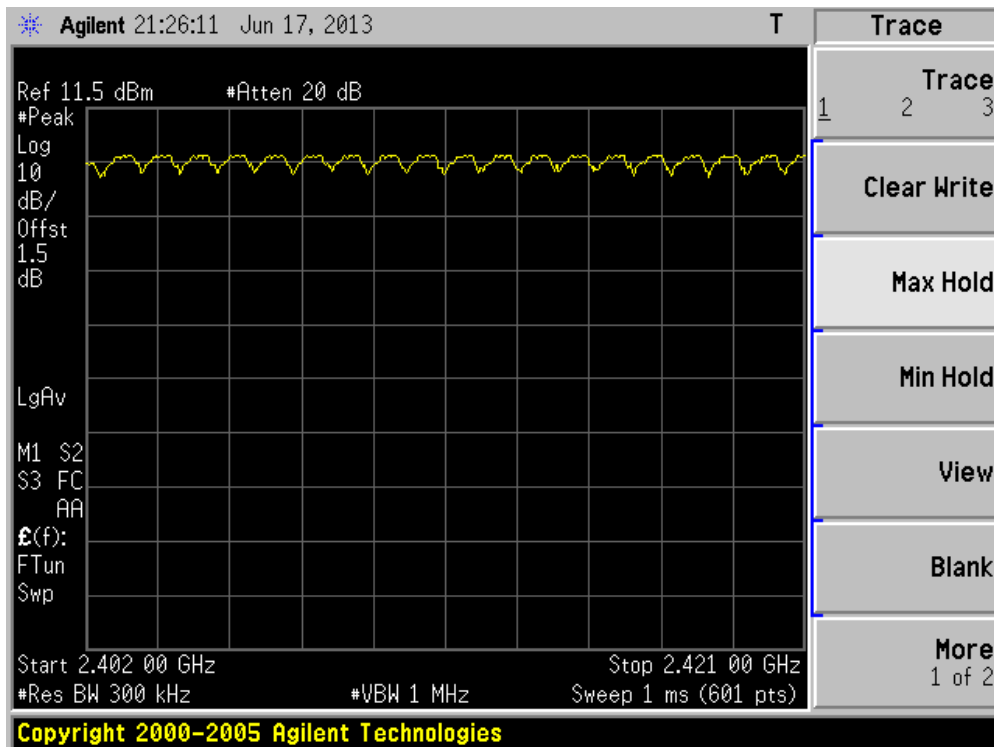
2462 - 2480 MHz



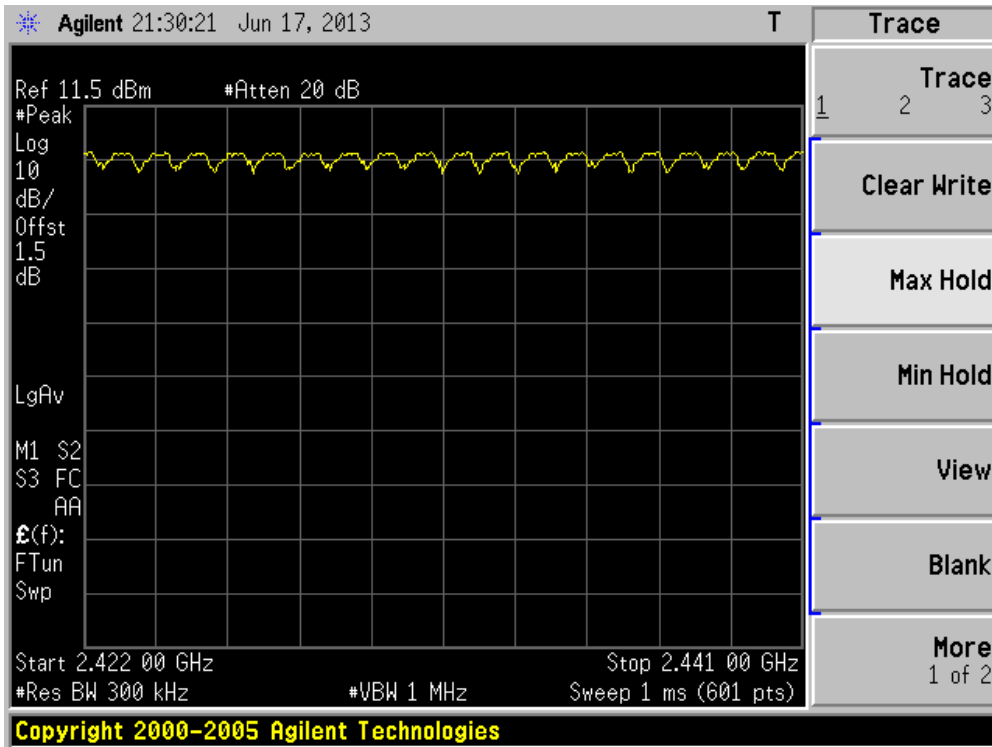
Product	:	Motorola Buds
Test Item	:	Number of Hopping Frequencies
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2400 - 2483.5	79	>15	Pass

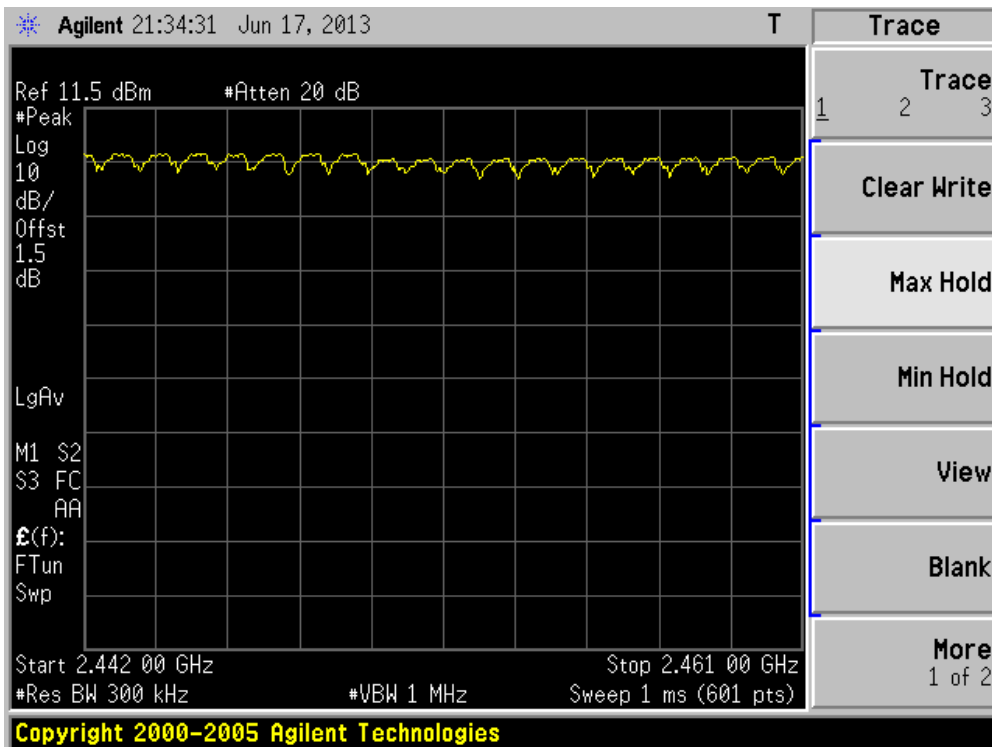
### 2402 - 2421 MHz



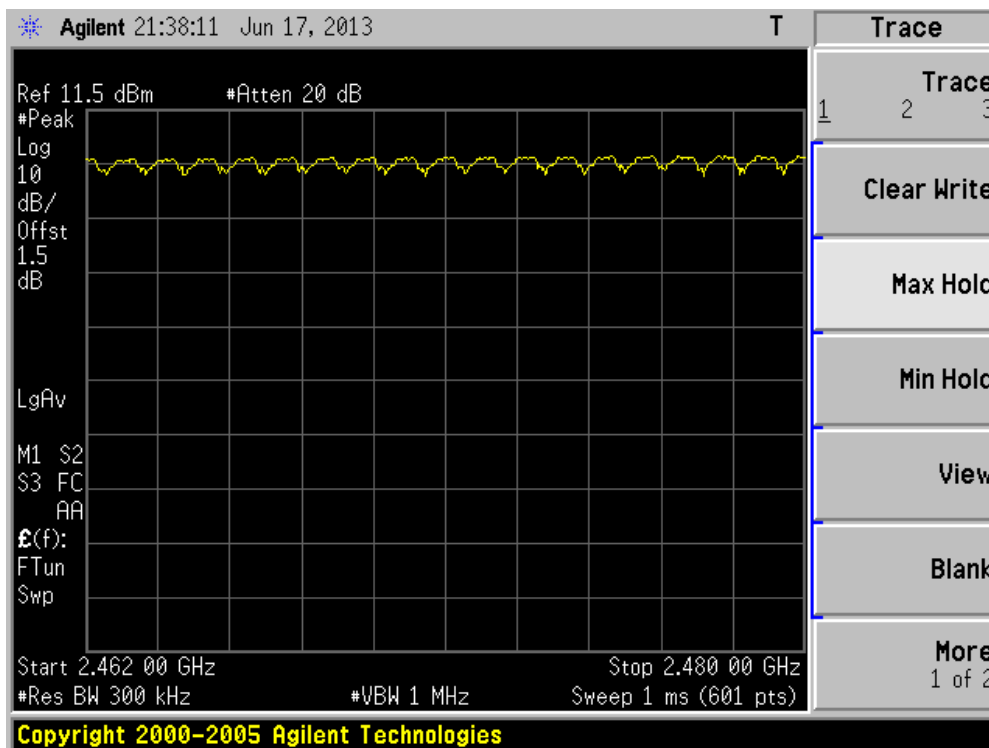
2422 - 2441 MHz



2442 - 2461 MHz



2462 - 2480 MHz



## 8. Time of Occupancy (Dwell Time)

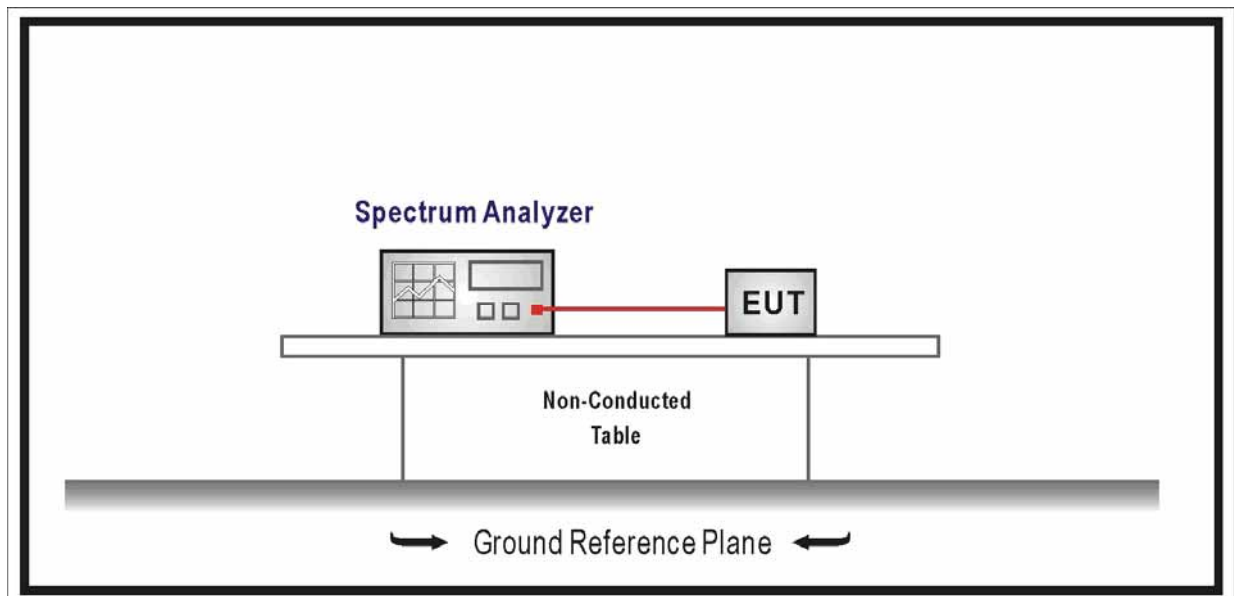
### 8.1. Test Equipment

Time of Occupancy (Dwell Time) / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2014.05.07

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 8.2. Test Setup



### 8.3. Limit

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75

hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

- 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.

#### 8.4. Test Procedure

According to ANSI C63.10: 2009.

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1MHz

VBW  $\cong$  RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

#### 8.5. Uncertainty

The measurement uncertainty is defined as  $\pm 0.1$  us

8.6. Test Result

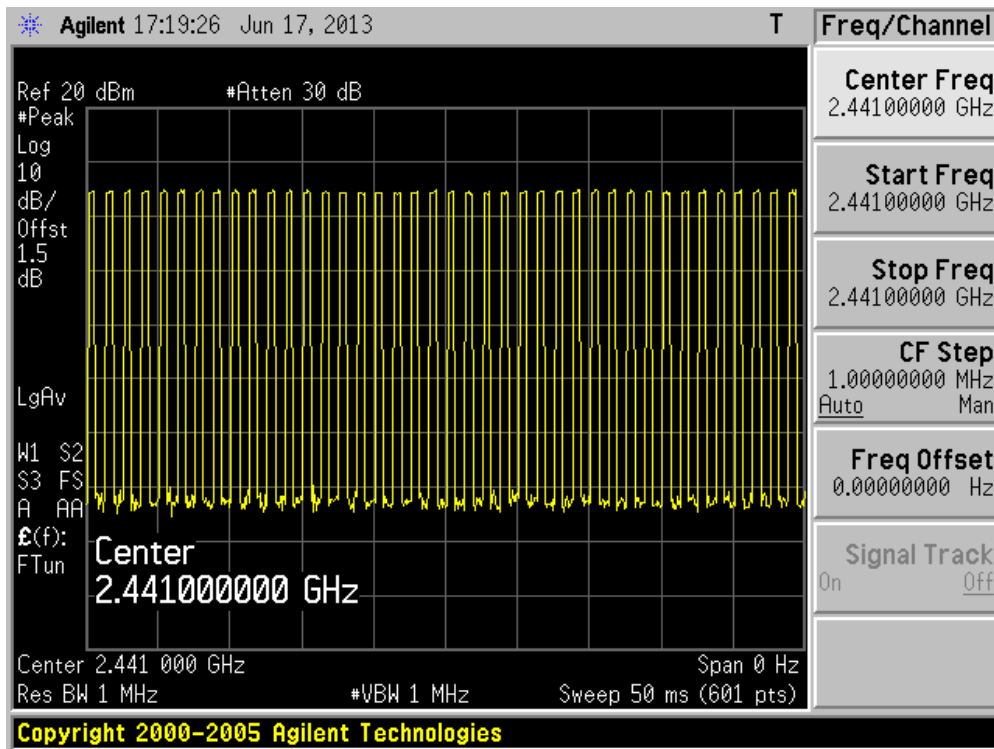
Product	:	Motorola Buds
Test Item	:	Time of Occupancy (Dwell Time)
Test Site	:	TR-8
Test Mode	:	Transmitter-3Mbps (8DPSK_DH1)

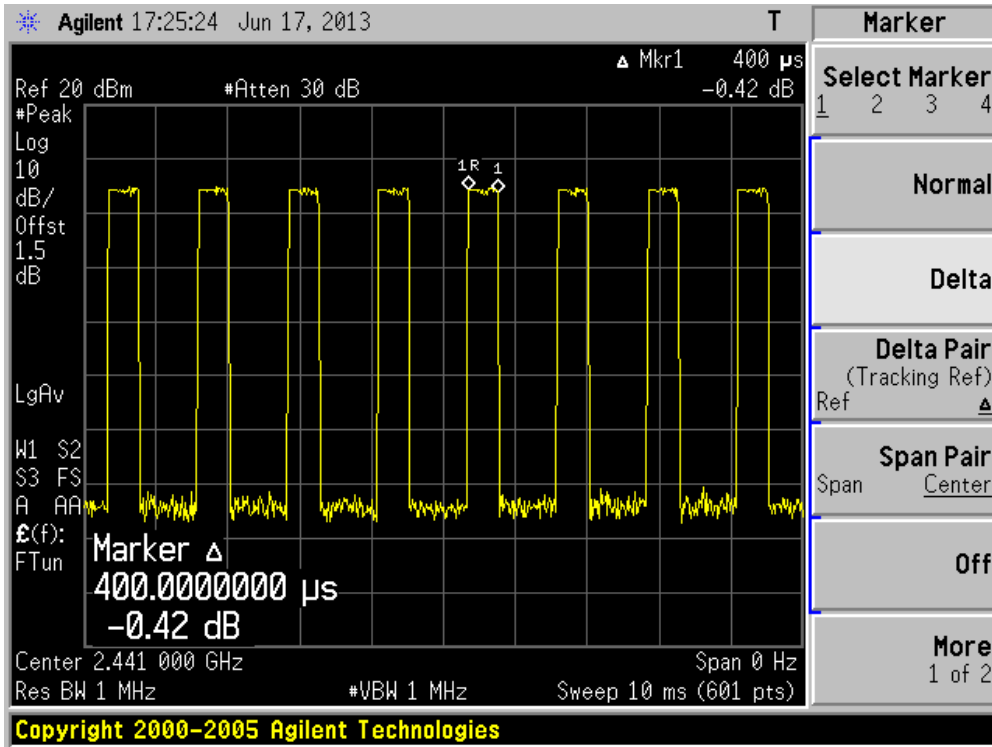
Channel No.	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	128.00	< 400	Pass

Test Time Period:  $0.4 \times 79 = 31.6$ sec, Hopping Times Within 1sec:  $40/50$ msec= $800$  hops/sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec:  $[(0.4\text{ms} \times 800)/79] \times 31.6 = 128.00$ msec

Channel 39 (2441MHz)-(3DH1)





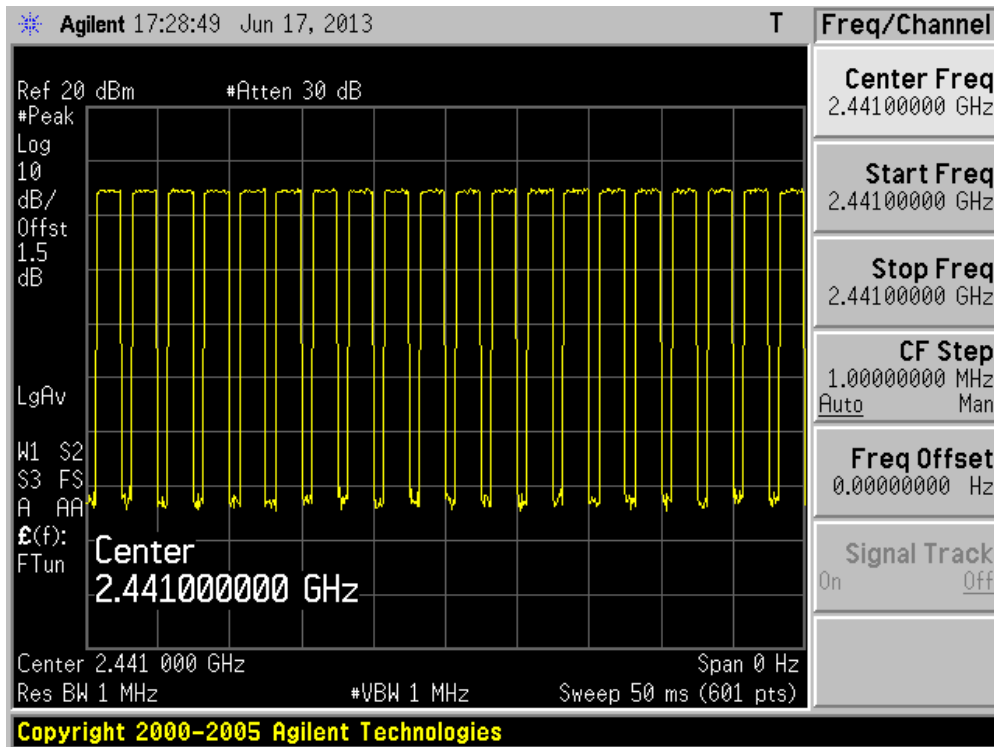
Product	:	Motorola Buds
Test Item	:	Time of Occupancy (Dwell Time)
Test Site	:	TR-8
Test Mode	:	Transmitter-3Mbps (8DPSK_DH3)

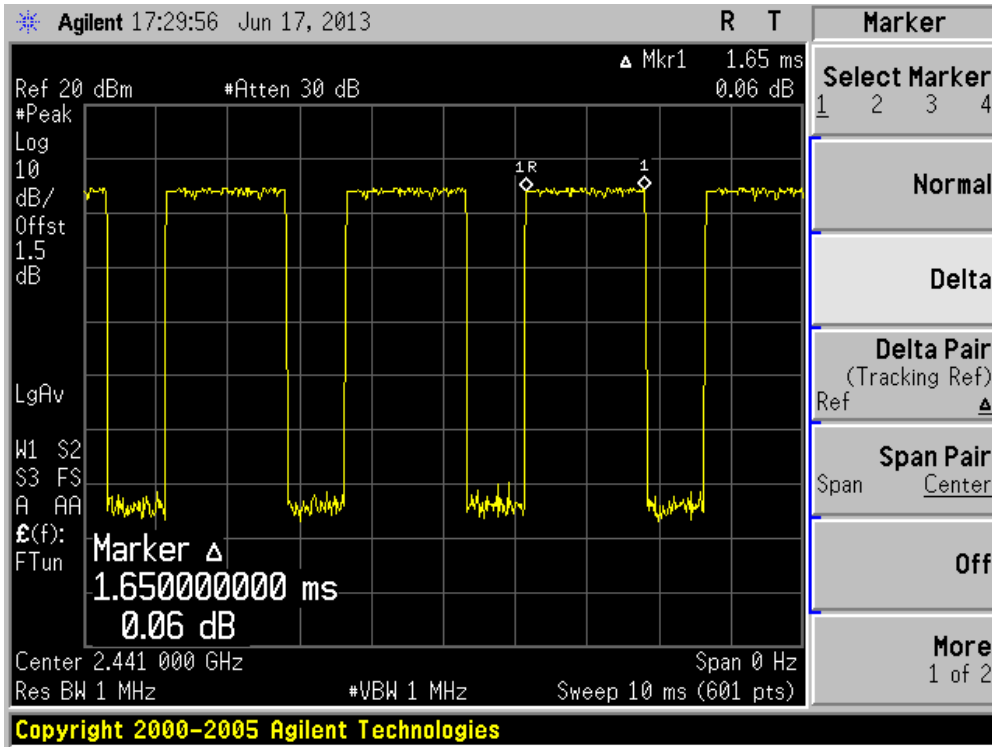
Channel No.	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	264.00	< 400	Pass

Test Time Period:  $0.4 \times 79 = 31.6$ sec, Hopping Times Within 1sec:  $20/50$ msec= $400$ hops/sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec:  $[(1.65\text{ms} \times 400)/79] \times 31.6 = 264.00$ msec

### Channel 39 (2441MHz) - (3DH3)





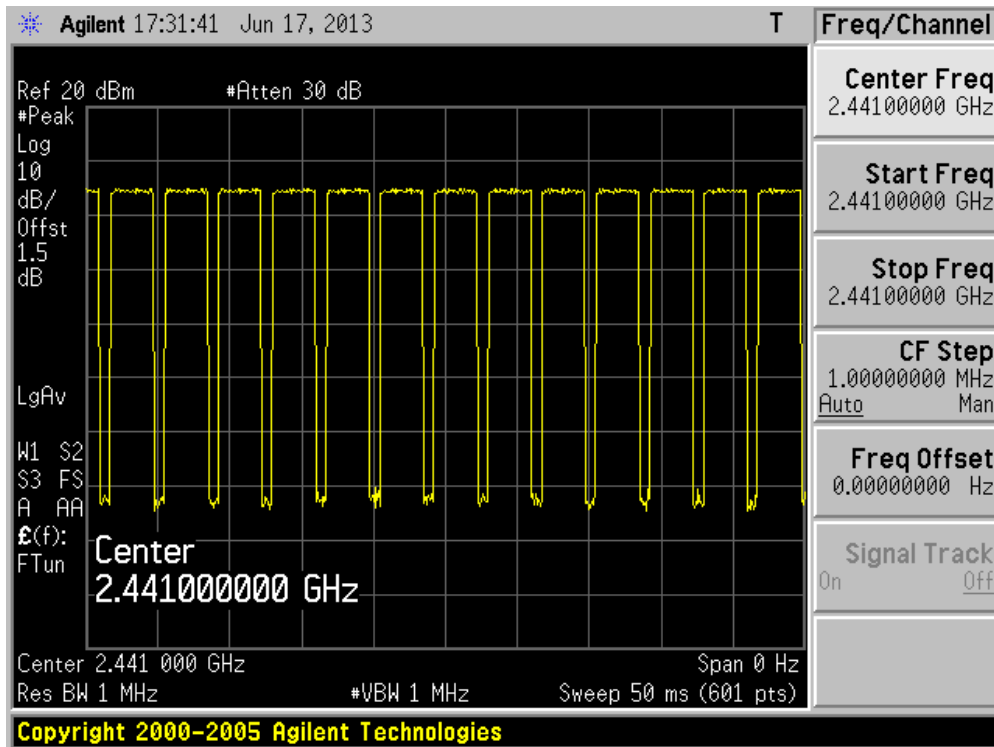
Product	:	Motorola Buds
Test Item	:	Time of Occupancy (Dwell Time)
Test Site	:	TR-8
Test Mode	:	Transmitter-3Mbps (8DPSK_DH5)

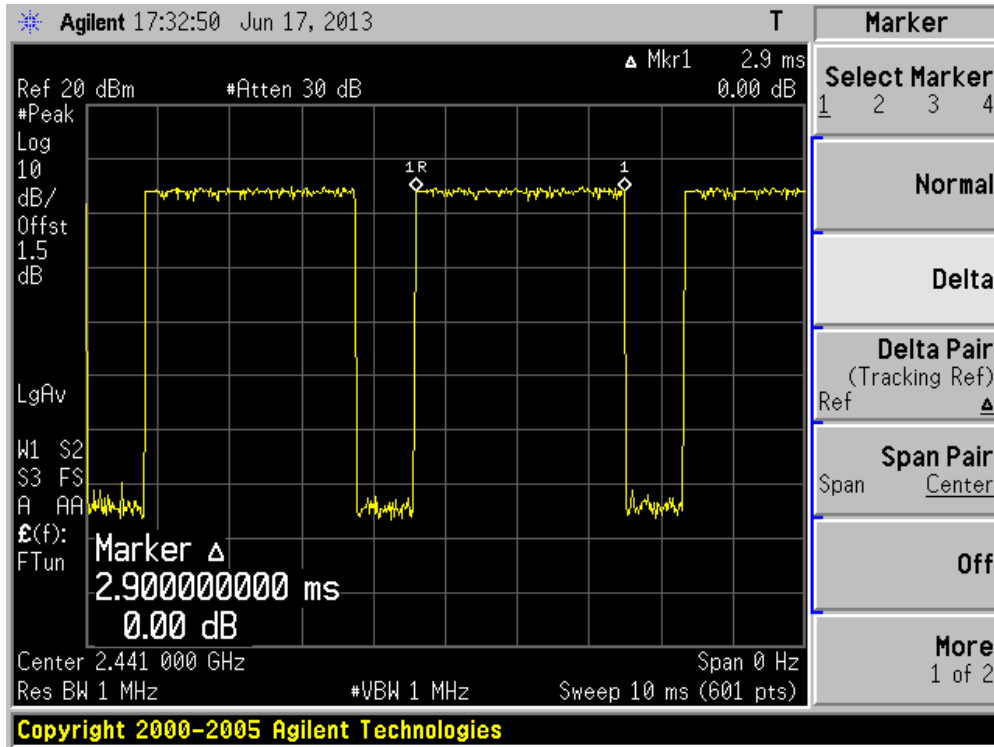
Channel No.	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
39	2441	302.03	< 400	Pass

Test Time Period:  $0.4 \times 79 = 31.6$ sec, Hopping Times Within 1sec:  $13/50$ msec= $260$  hops/sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec:  $[(2.900 \text{ ms} \times 260)/79] \times 31.6 = 302.03$ msec

### Channel 39 (2441MHz) - (3DH5)





## 9. Peak Output Power

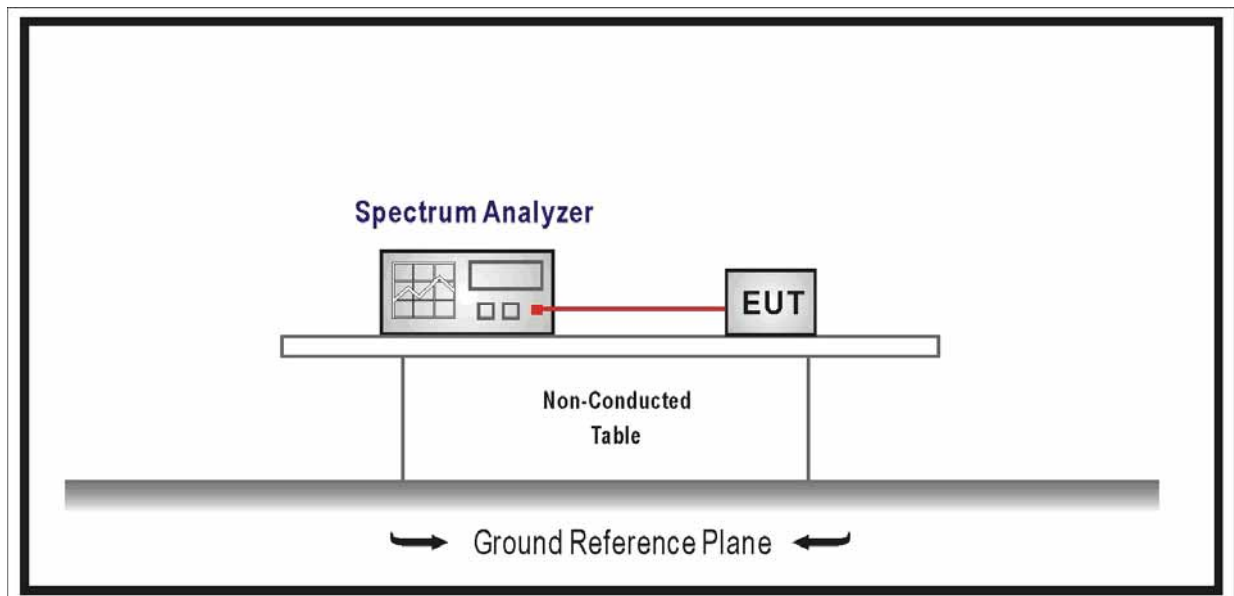
### 9.1. Test Equipment

Peak Output Power / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2014.05.07

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 9.2. Test Setup



### 9.3. Limit

- 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.
- For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Note: the conducted output power limit specified above is based on the use the antennas with

directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

#### 9.4. Test Procedure

According to ANSI C63.10: 2009.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured.

VBW  $\cong$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss).

#### 9.5. Uncertainty

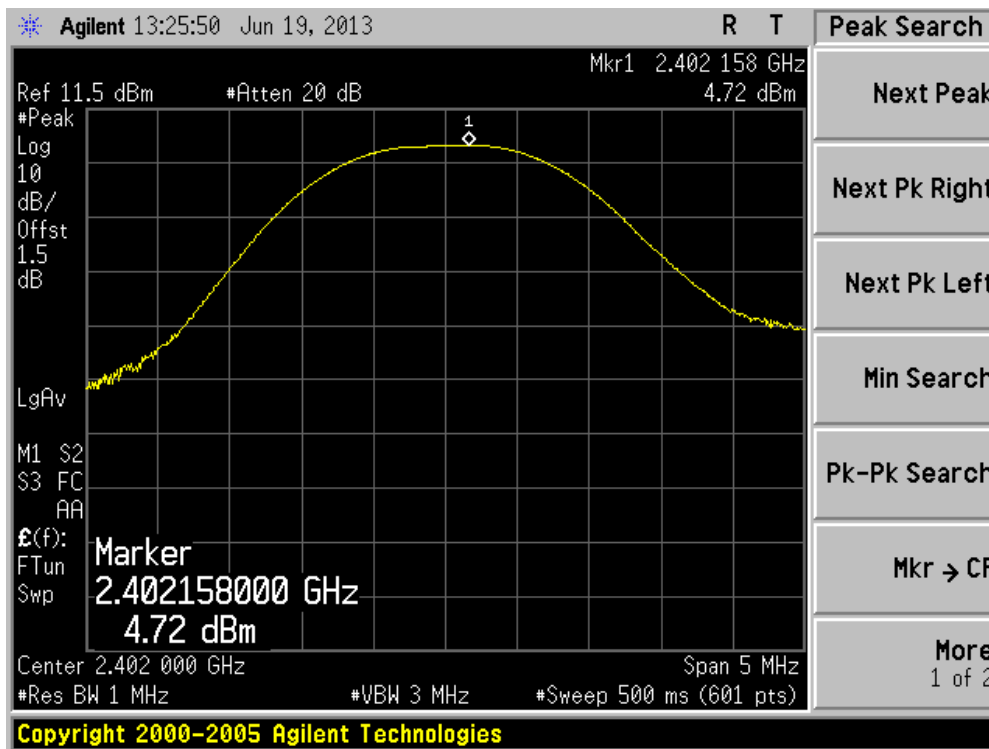
The measurement uncertainty is defined as  $\pm 1.0$  dB

9.6. Test Result

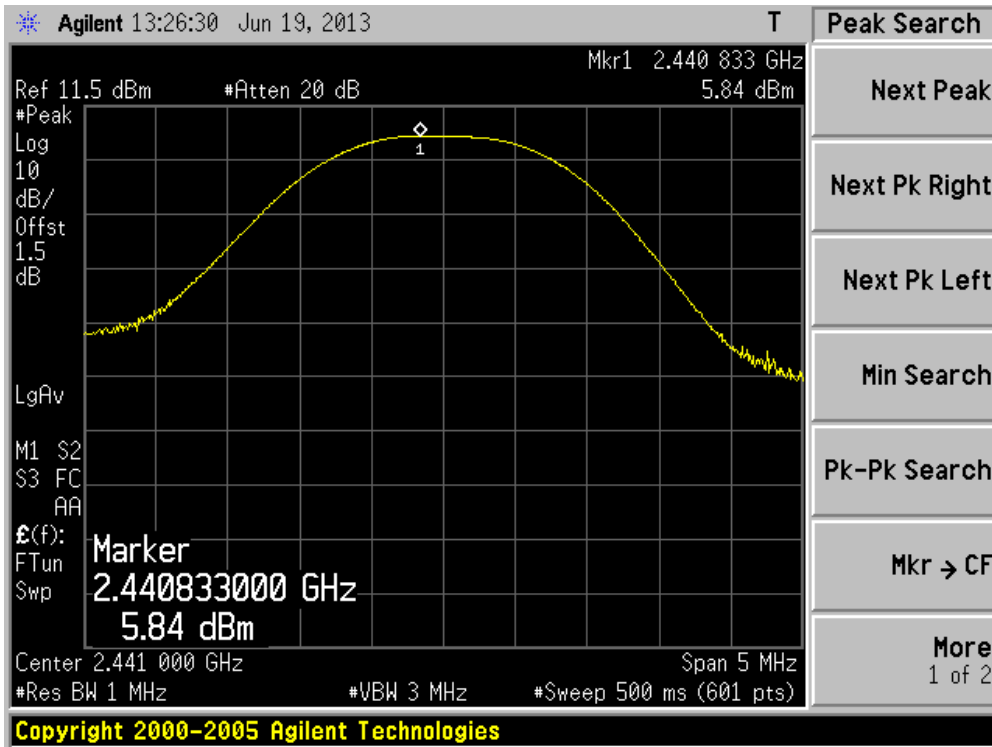
Product	:	Motorola Buds
Test Item	:	Power Output
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	4.72	30.00	Pass
39	2441	5.84	30.00	Pass
78	2480	6.02	30.00	Pass

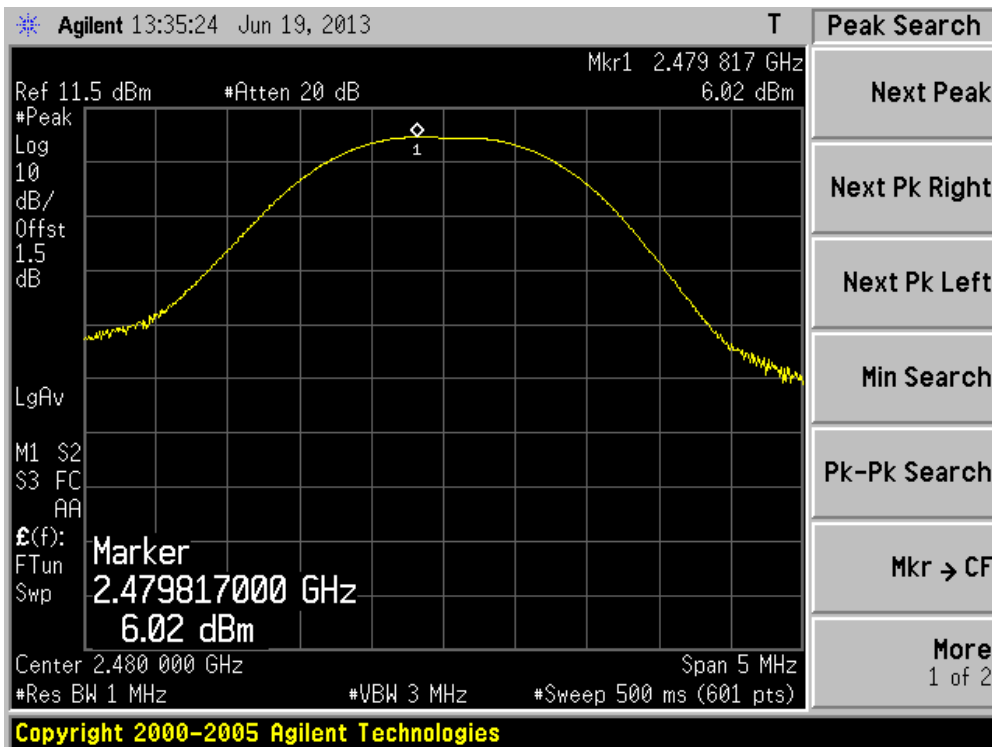
Channel 00 (2402MHz)



Channel 39 (2441MHz)



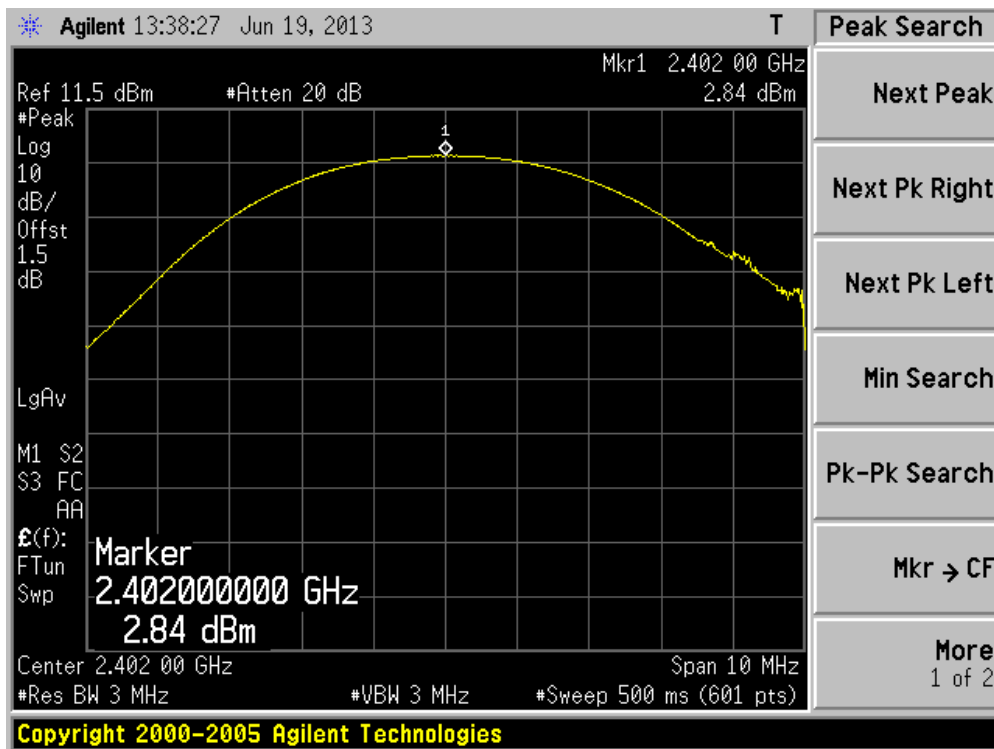
Channel 78 (2480MHz)



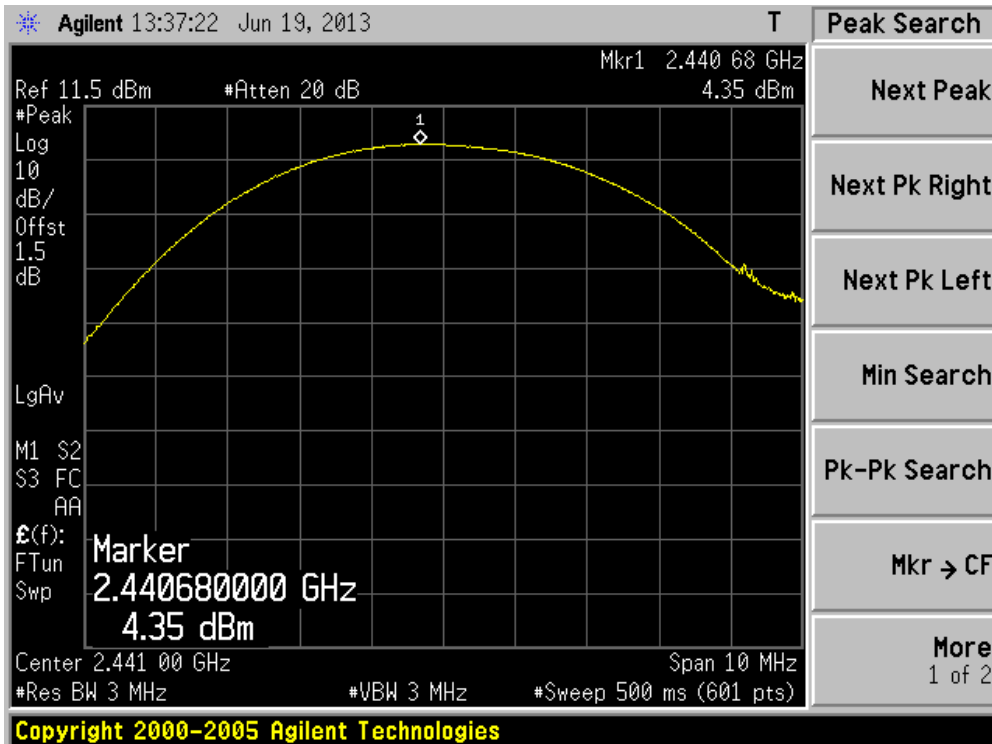
Product	:	Motorola Buds
Test Item	:	Power Output
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	2.84	30.00	Pass
39	2441	4.35	30.00	Pass
78	2480	4.40	30.00	Pass

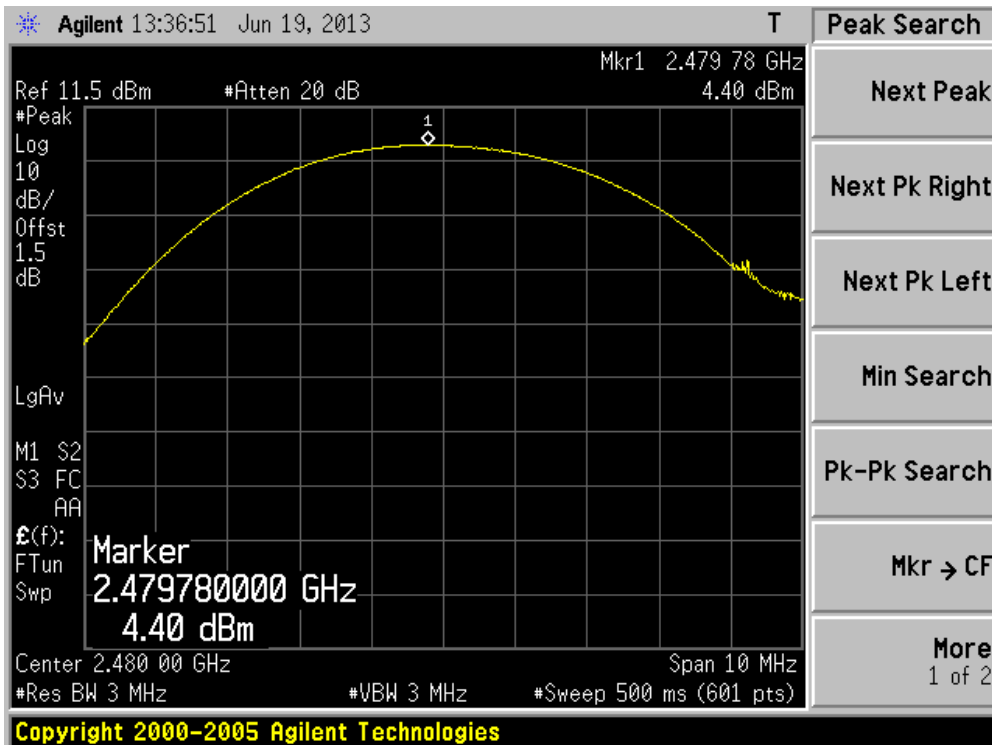
### Channel 00 (2402MHz)



Channel 39 (2441MHz)



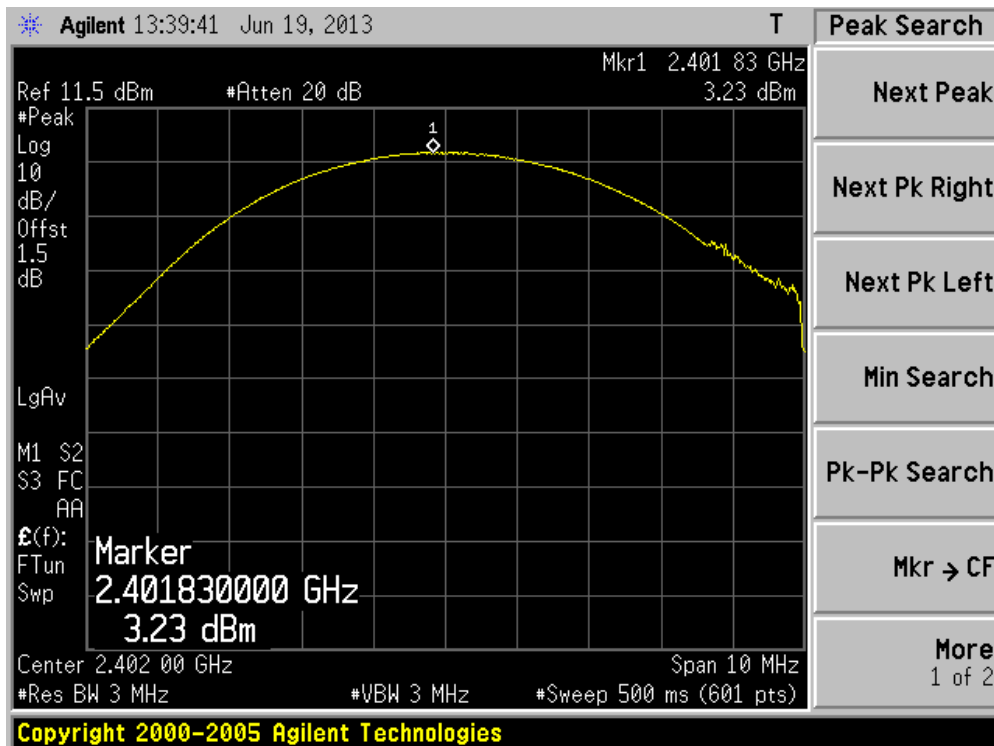
Channel 78 (2480MHz)



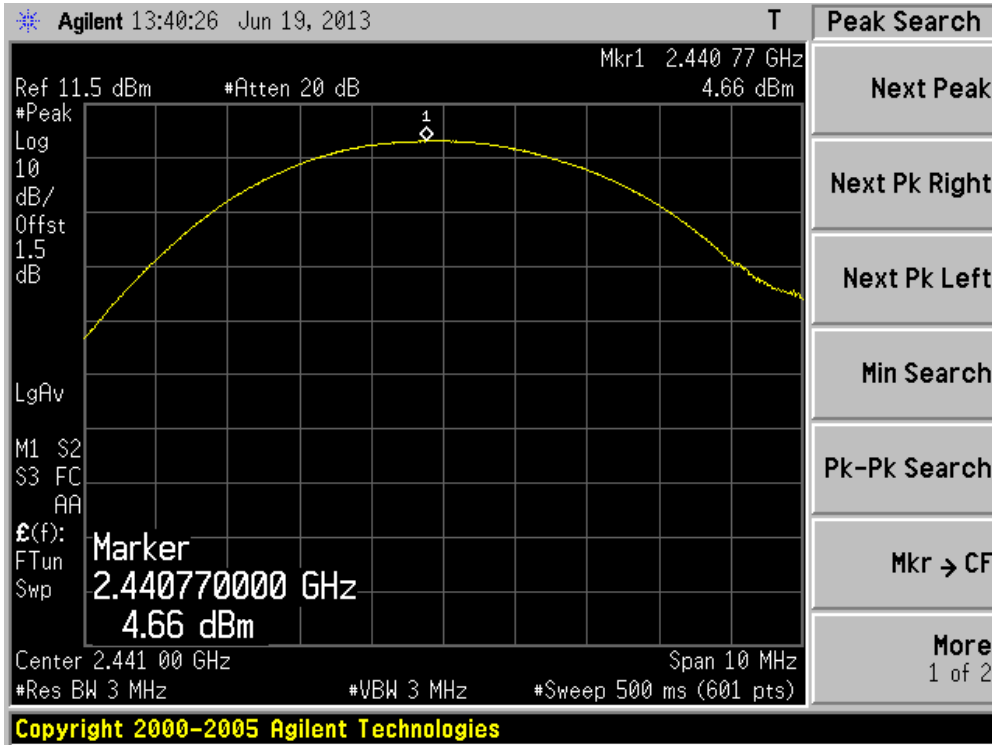
Product	:	Motorola Buds
Test Item	:	Power Output
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	3.23	30.00	Pass
39	2441	4.66	30.00	Pass
78	2480	4.64	30.00	Pass

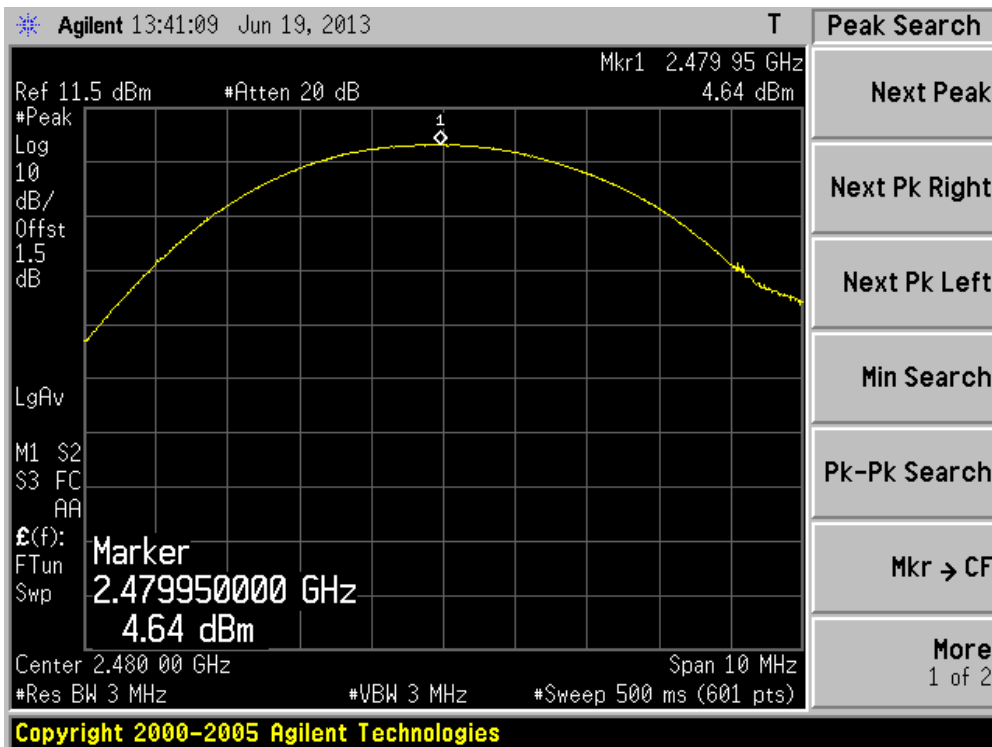
### Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



## 10. Band-edge Compliance of RF Conducted Emissions

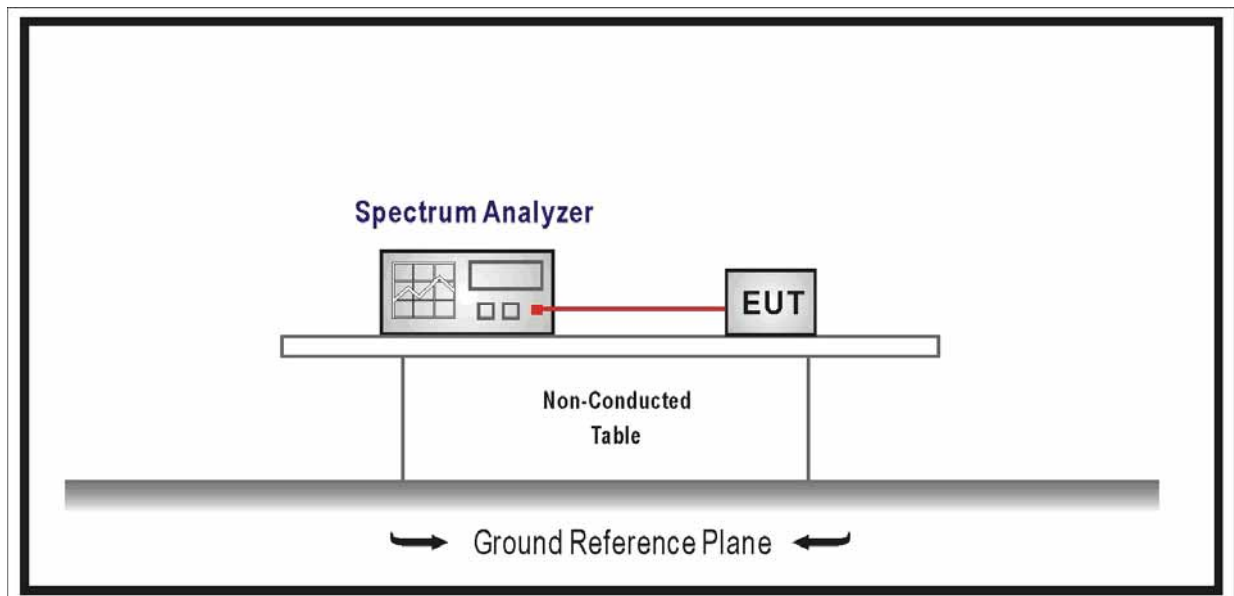
### 10.1. Test Equipment

Band-edge Compliance of RF Conducted Emissions / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2014.05.07

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 10.2. Test Setup



### 10.3. Limit

- 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 FCC part 15, must be designed to ensure that 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.
- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz

bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) of FCC part 15 is not required.

#### 10.4. Test Procedure

According to ANSI C63.10: 2009.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation.

RBW  $\cong$  1% of the span

VBW  $\cong$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge.

Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

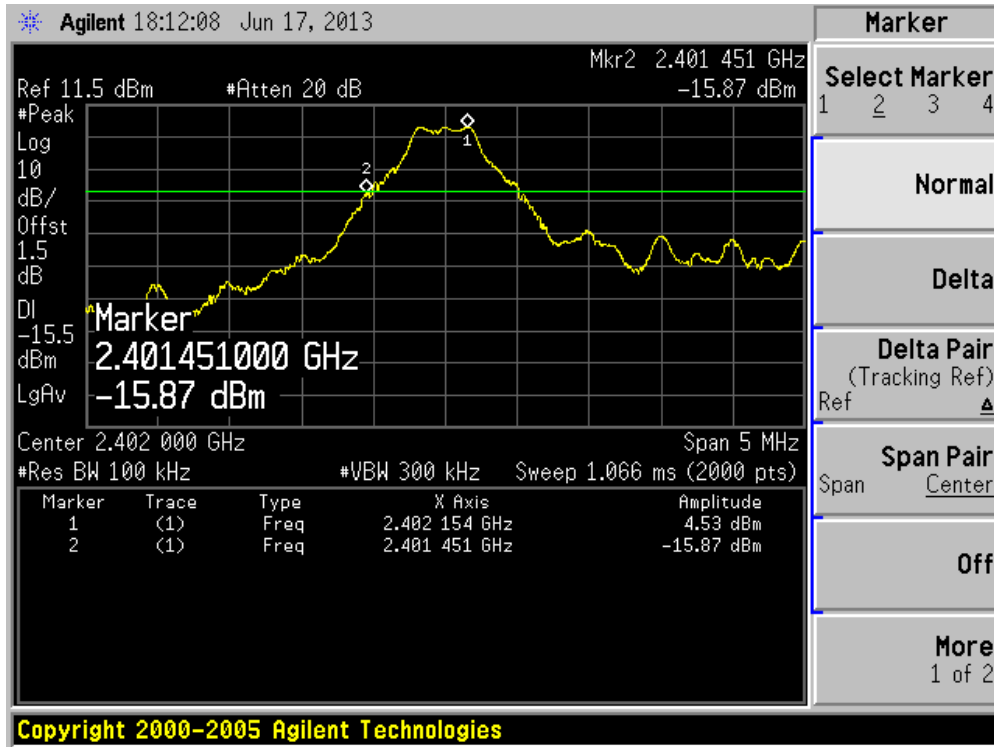
#### 10.5. Uncertainty

The measurement uncertainty is defined as  $\pm 1.0$  dB

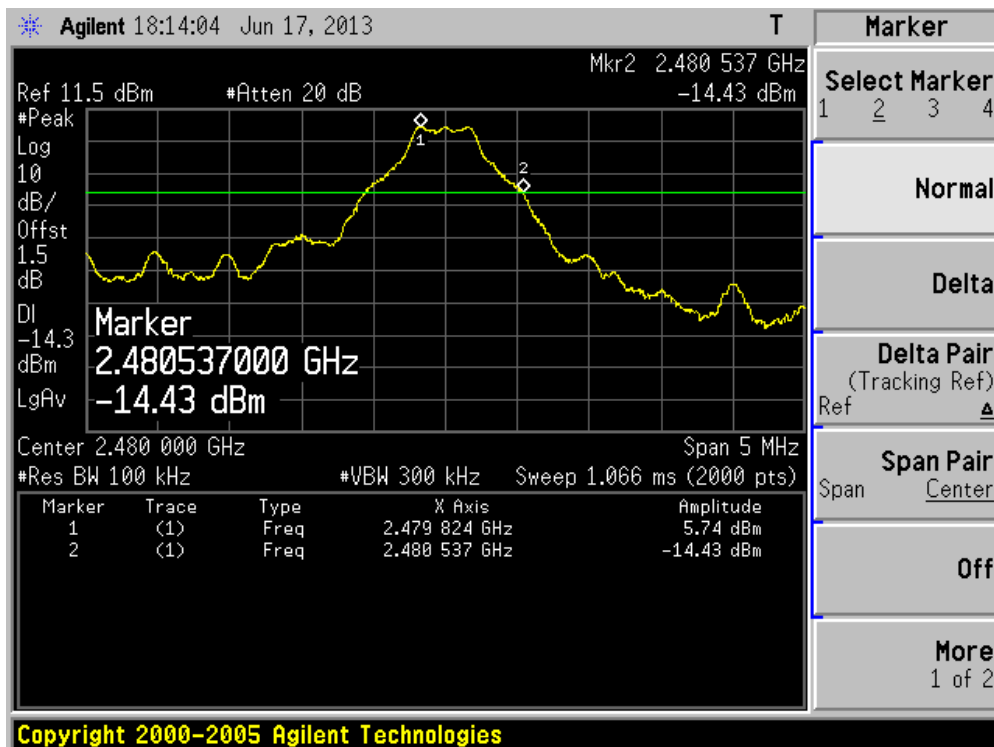
## 10.6. Test Result

Product	:	Motorola Buds
Test Item	:	Band-edge Compliance of RF Conducted Emissions
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

**Channel 00 (2402MHz)**

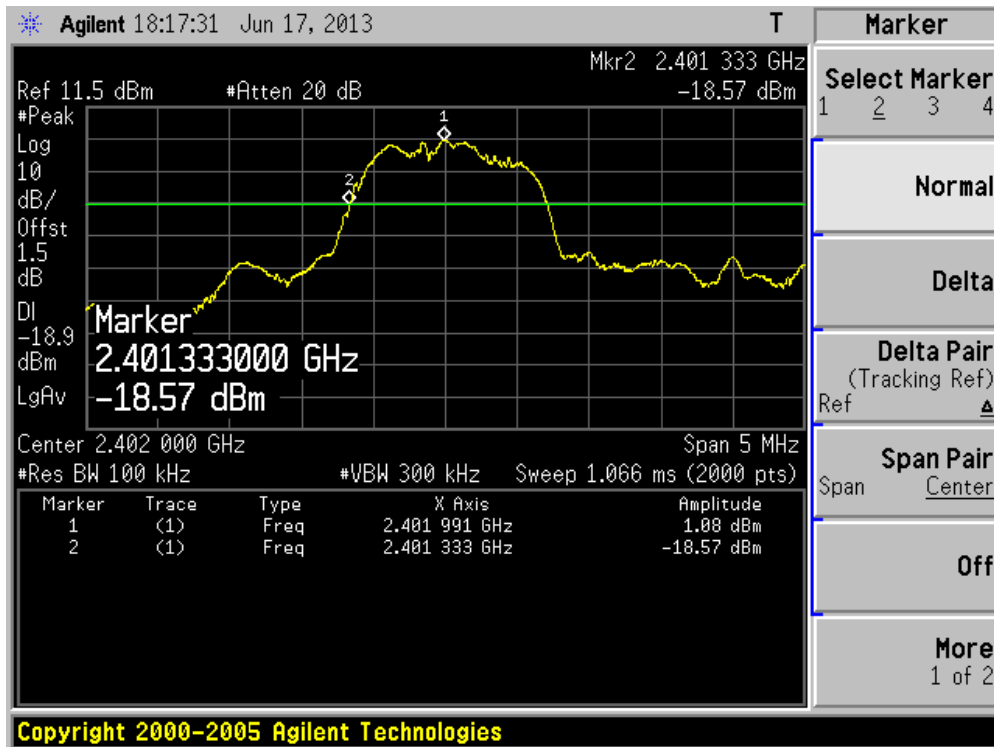


**Channel 78 (2480MHz)**

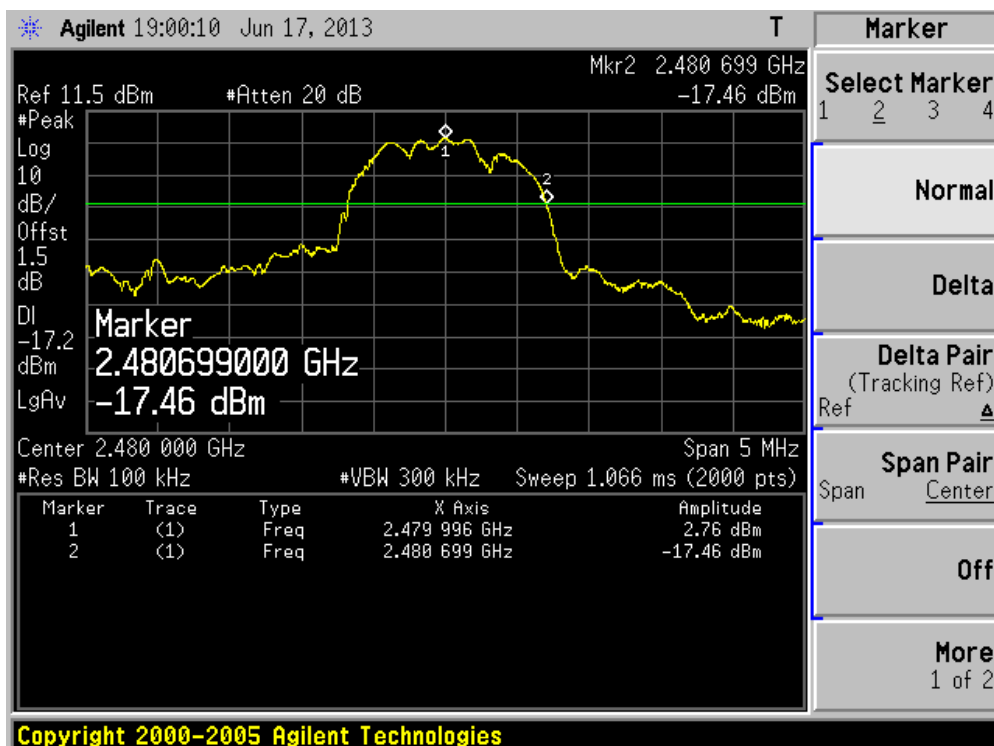


Product	: Motorola Buds
Test Item	: Band-edge Compliance of RF Conducted Emissions
Test Mode	: Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

### Channel 00 (2402MHz)

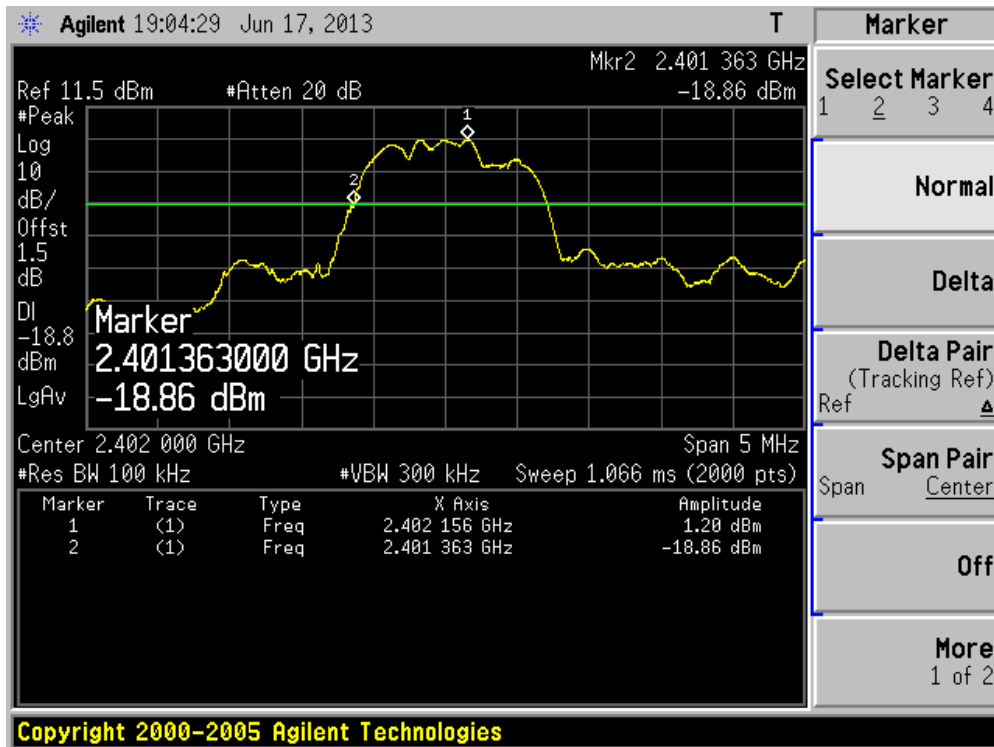


### Channel 78 (2480MHz)

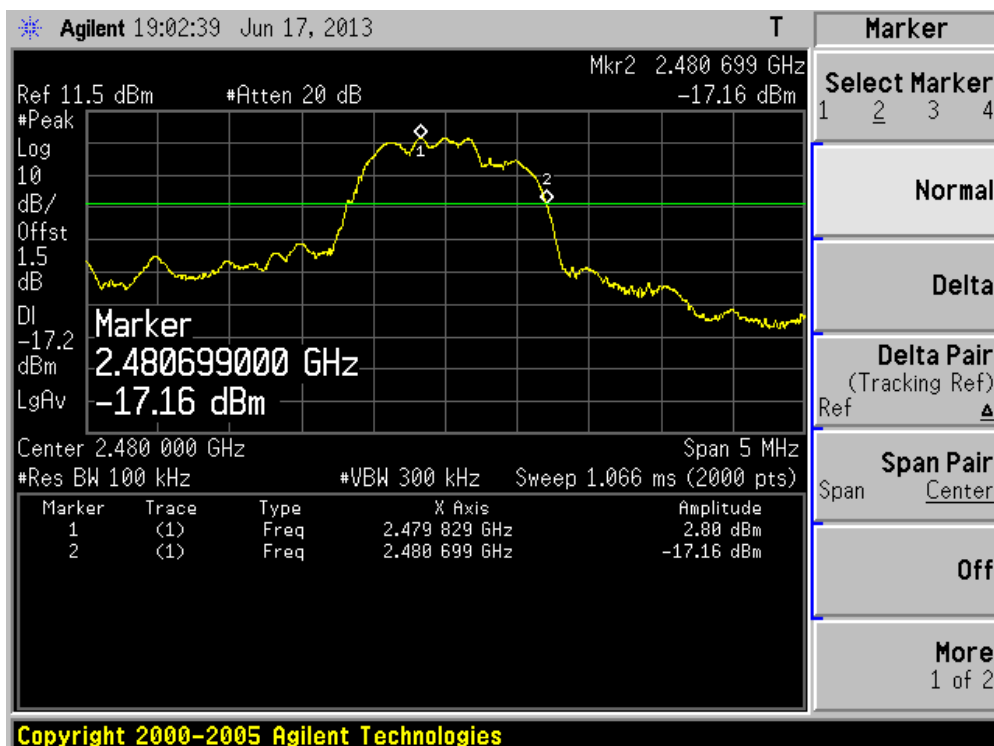


Product	: Motorola Buds
Test Item	: Band-edge Compliance of RF Conducted Emissions
Test Mode	: Mode 3: Transmitter-3Mbps (8DPSK_DH5)

### Channel 00 (2402MHz)

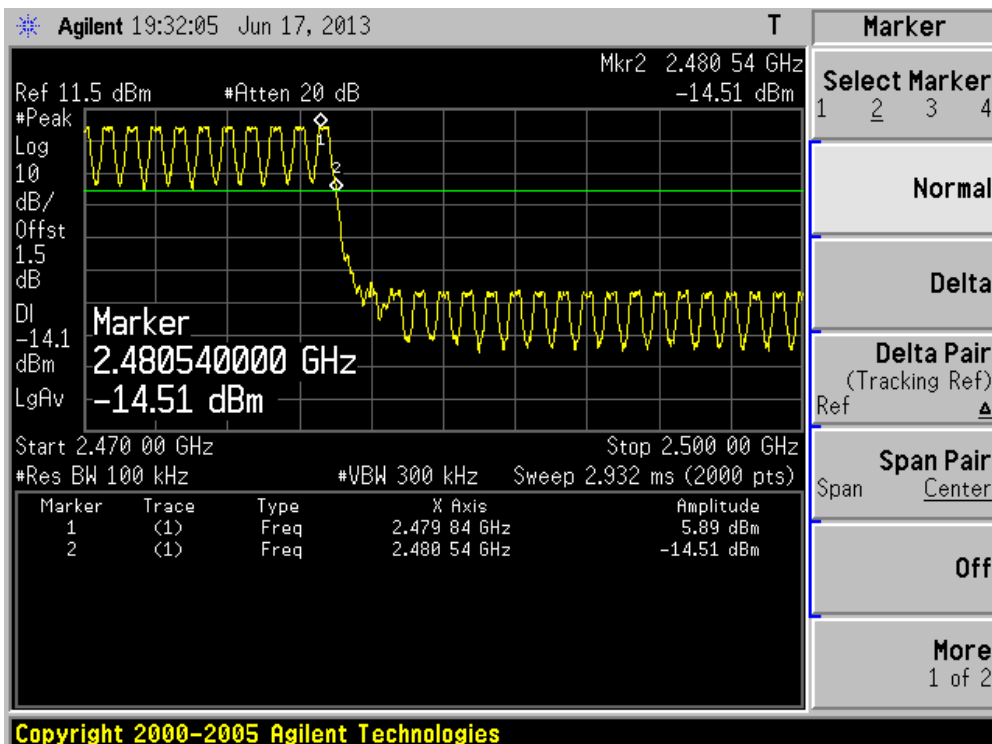
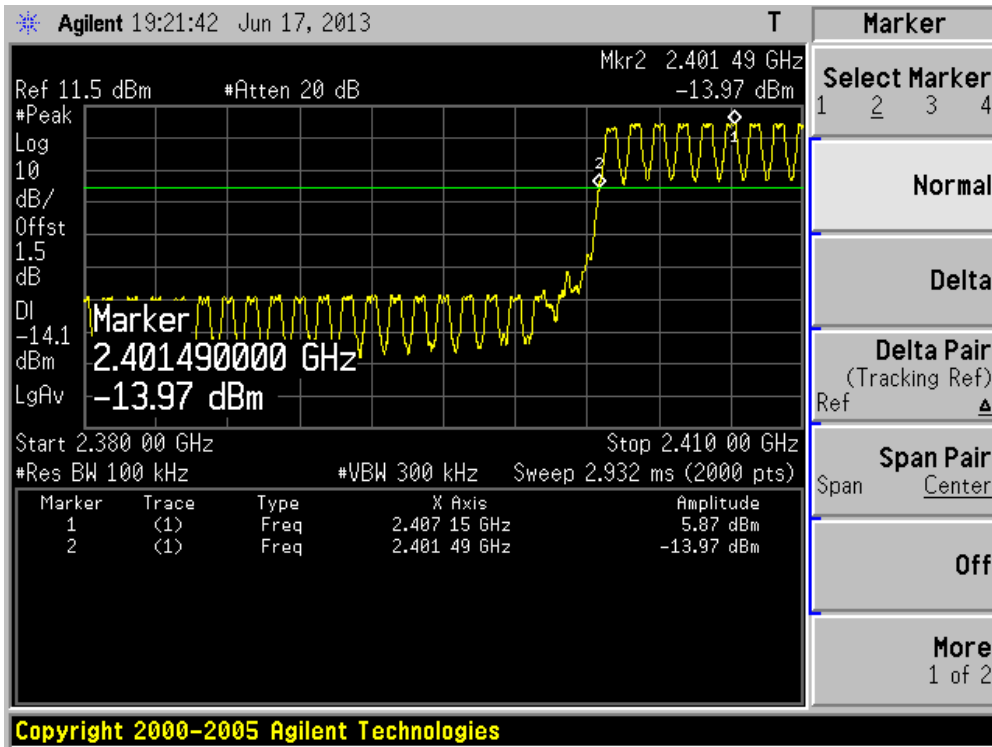


### Channel 78 (2480MHz)



Product	:	Motorola Buds
Test Item	:	Band-edge Compliance of RF Conducted Emissions
Test Mode	:	Mode 1: Hopping Mode

### Hopping Mode



## 11. Spurious RF Conducted Emissions

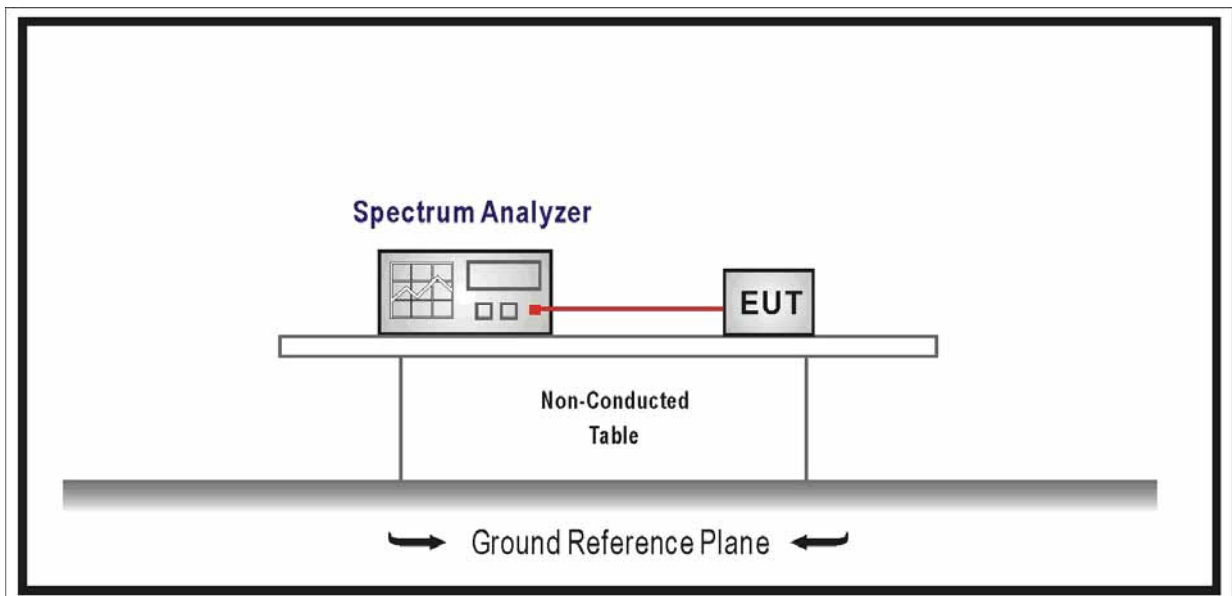
### 11.1. Test Equipment

Spurious RF Conducted Emissions / TR-8

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2014.01.21
Temperature/Humidity Meter	Zhicheng	ZC1-2	TR8-TH	2014.05.07

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

### 11.2. Test Setup



### 11.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in

Section 15.209(a) of FCC part 15 is not required.

#### **11.4. Test Procedure**

According to ANSI C63.10: 2009.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10<sup>th</sup> harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW  $\cong$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

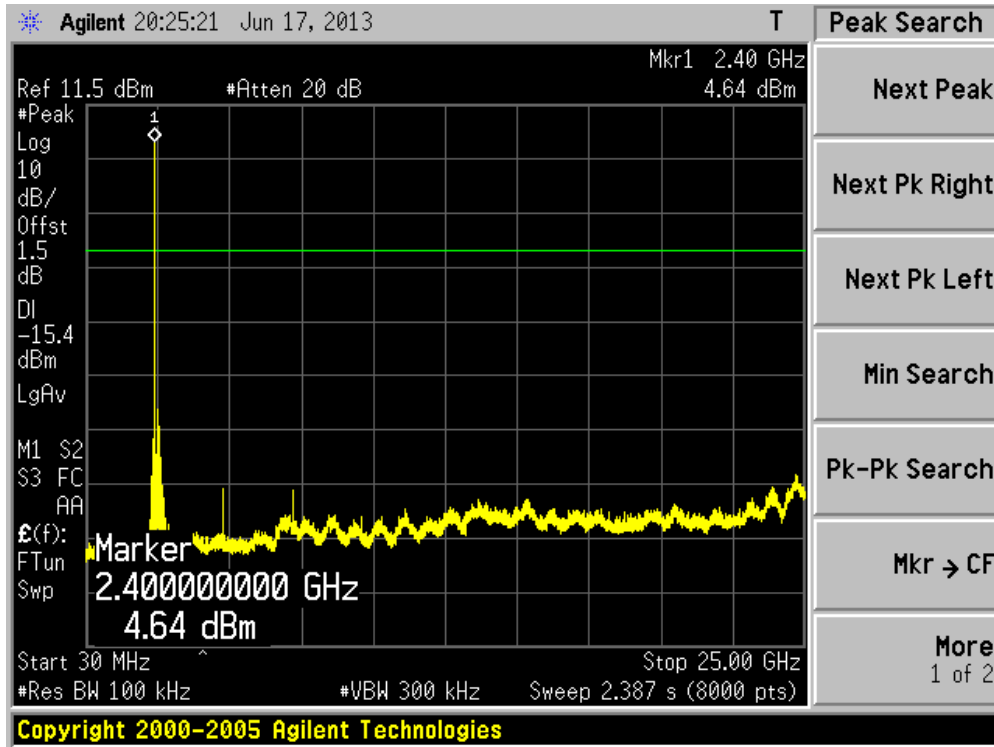
#### **11.5. Uncertainty**

The measurement uncertainty is defined as  $\pm 1.0$  dB

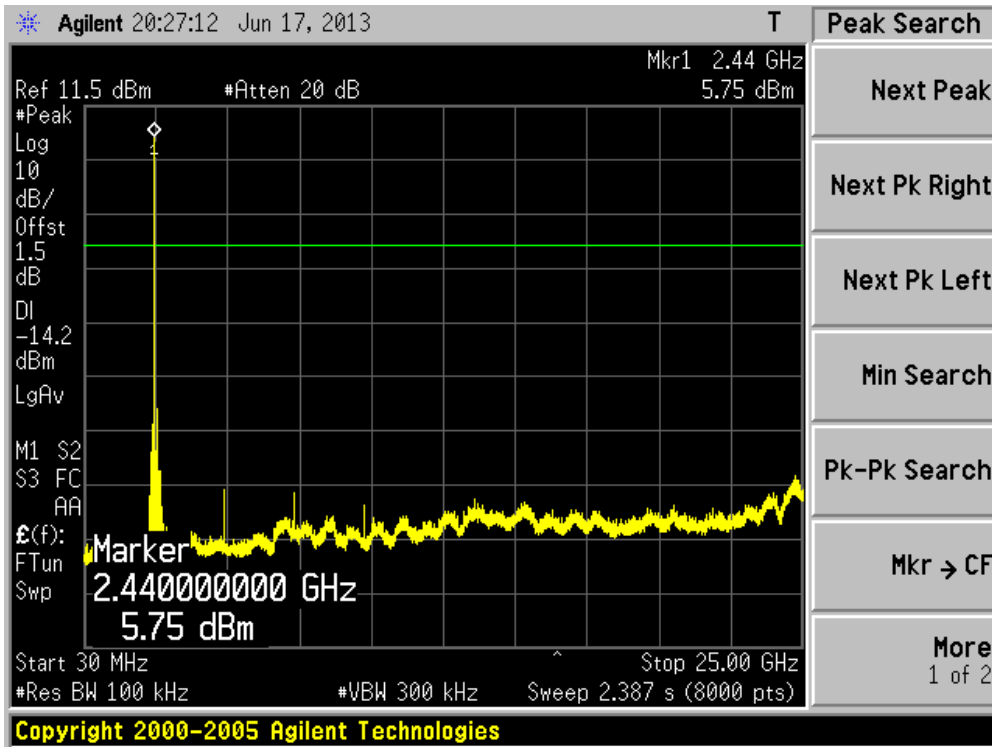
11.6. Test Result

Product	:	Motorola Buds
Test Item	:	Spurious RF Conducted Emissions
Test Mode	:	Mode 1: Transmitter-1Mbps (GFSK_DH5)

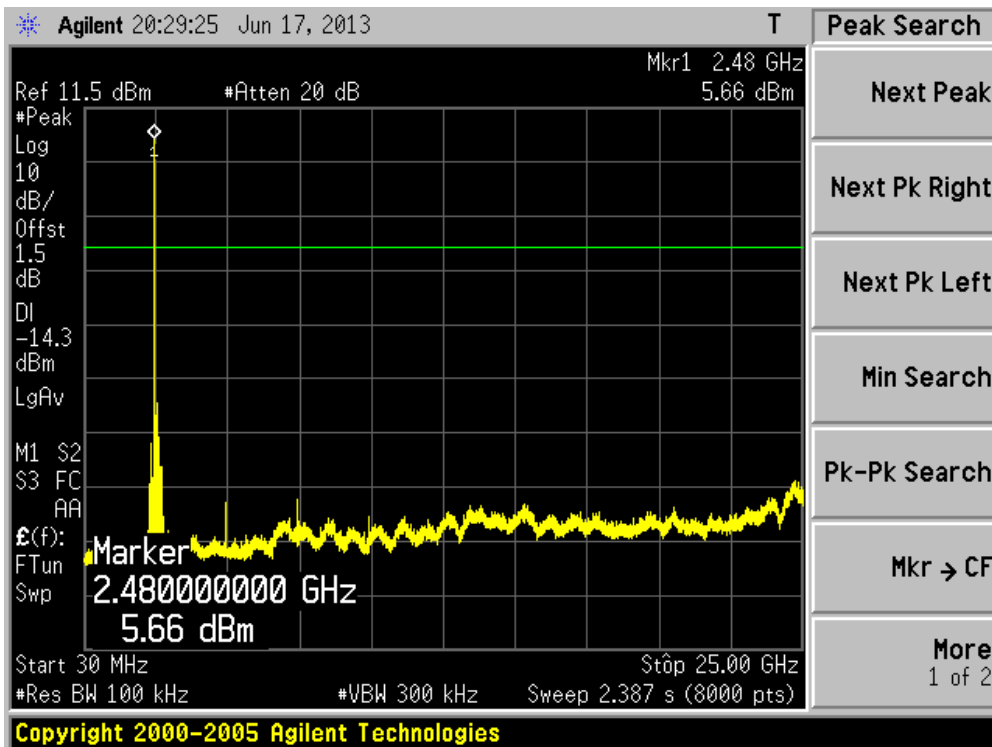
Channel 00 (2402MHz)



Channel 39 (2441MHz)

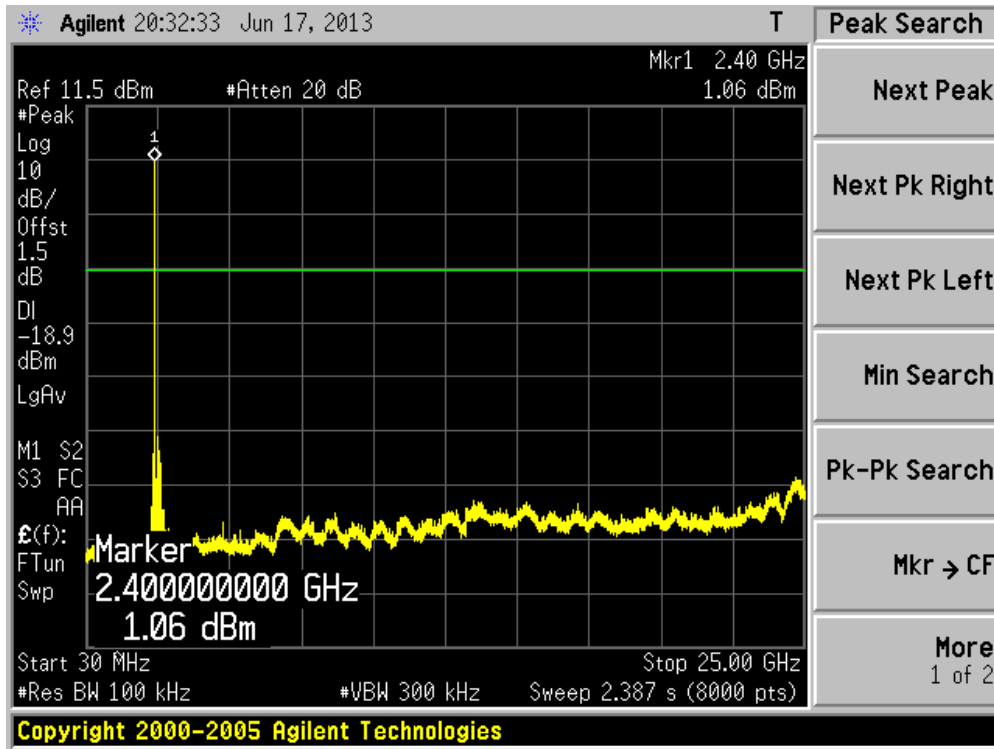


Channel 78 (2480MHz)

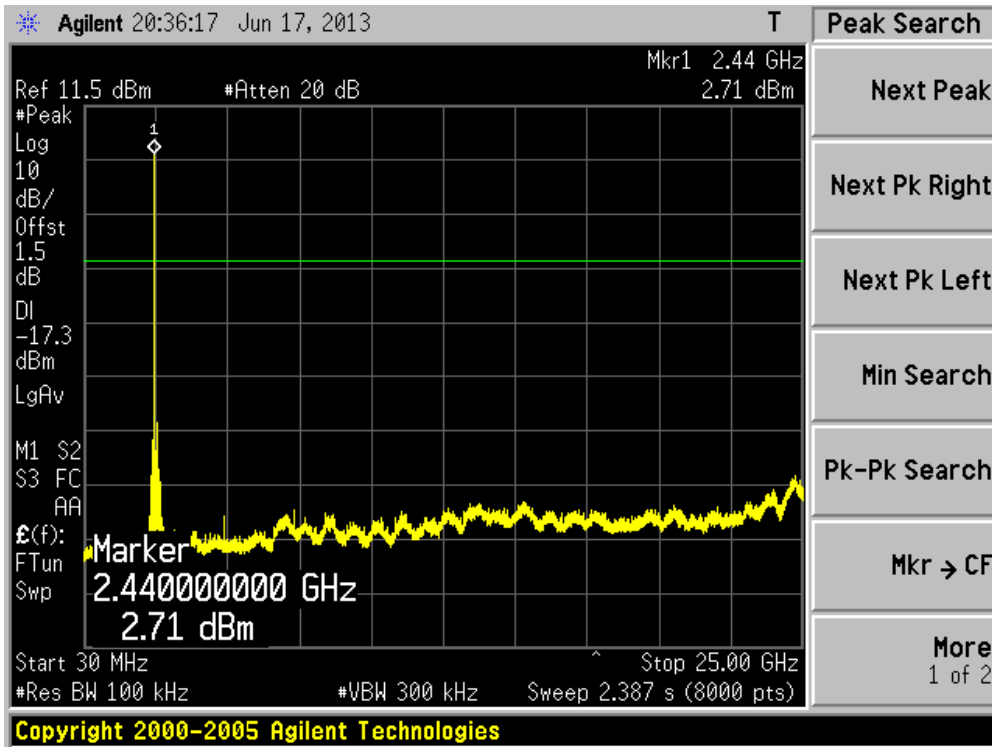


Product	:	Motorola Buds
Test Item	:	Spurious RF Conducted Emissions
Test Mode	:	Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5)

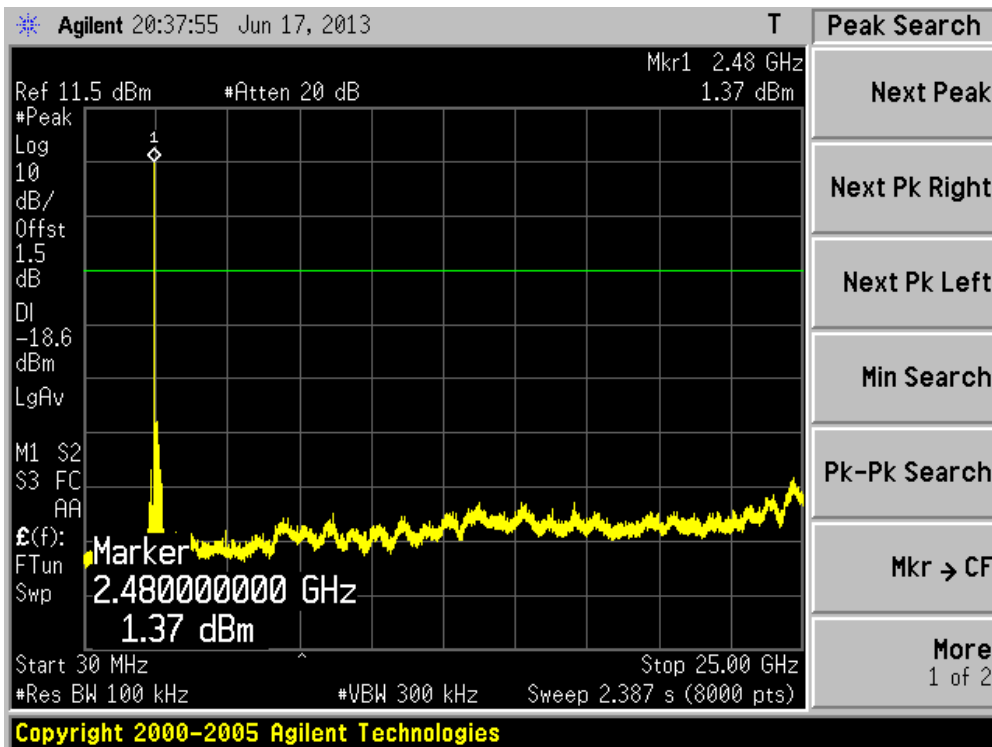
Channel 00 (2402MHz)



Channel 39 (2441MHz)

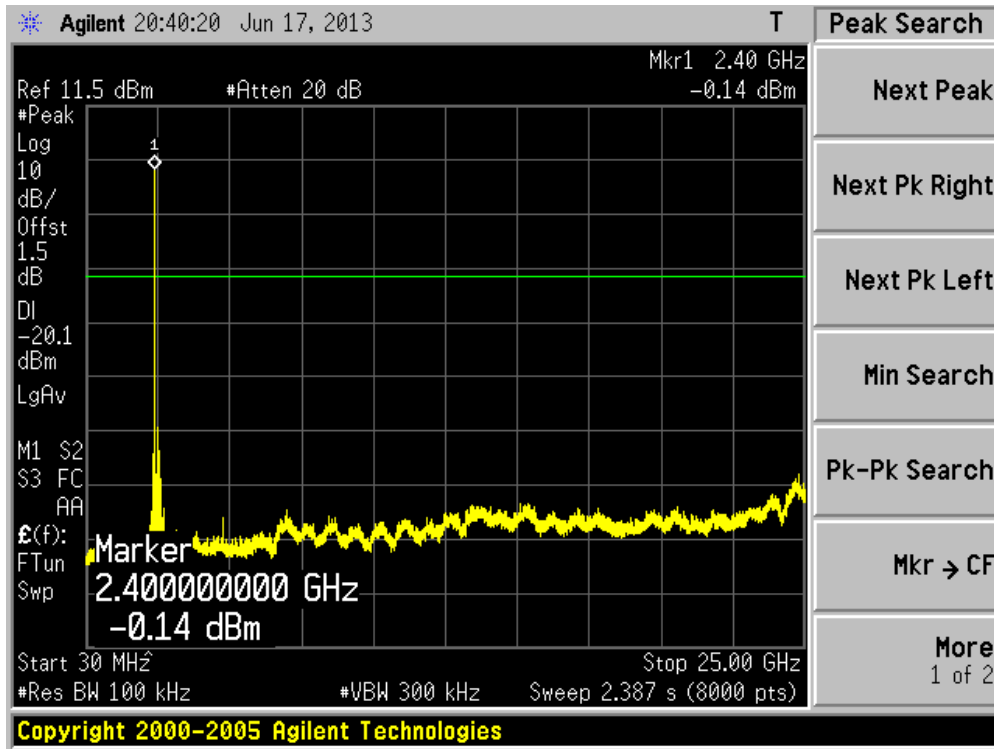


Channel 78 (2480MHz)

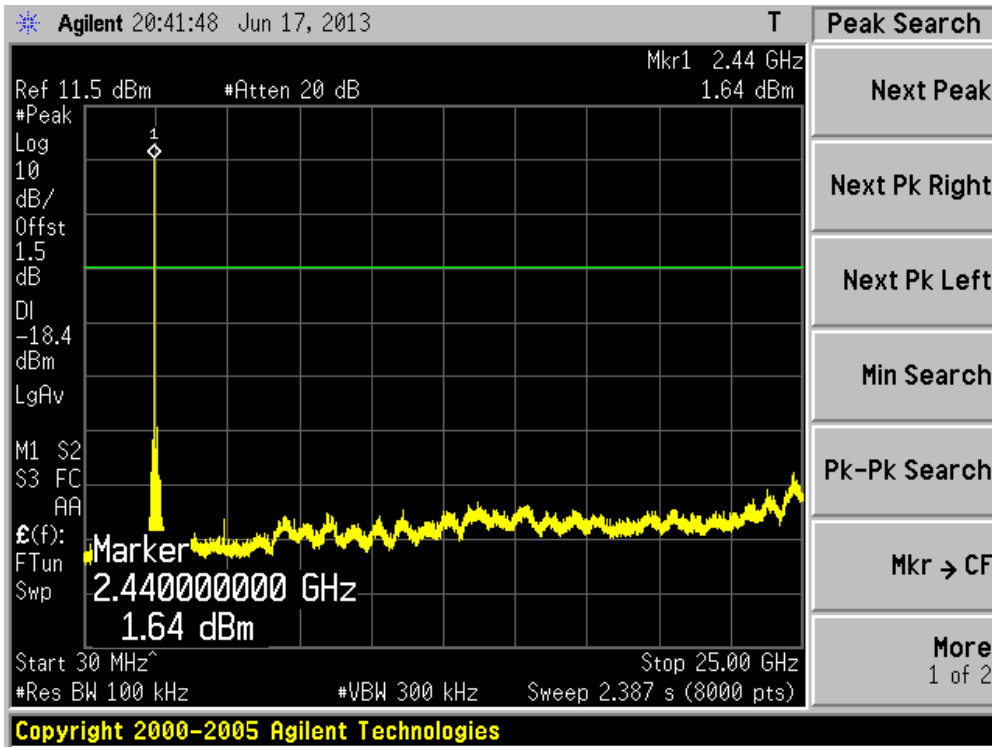


Product	:	Motorola Buds
Test Item	:	Spurious RF Conducted Emissions
Test Mode	:	Mode 3: Transmitter-3Mbps (8DPSK_DH5)

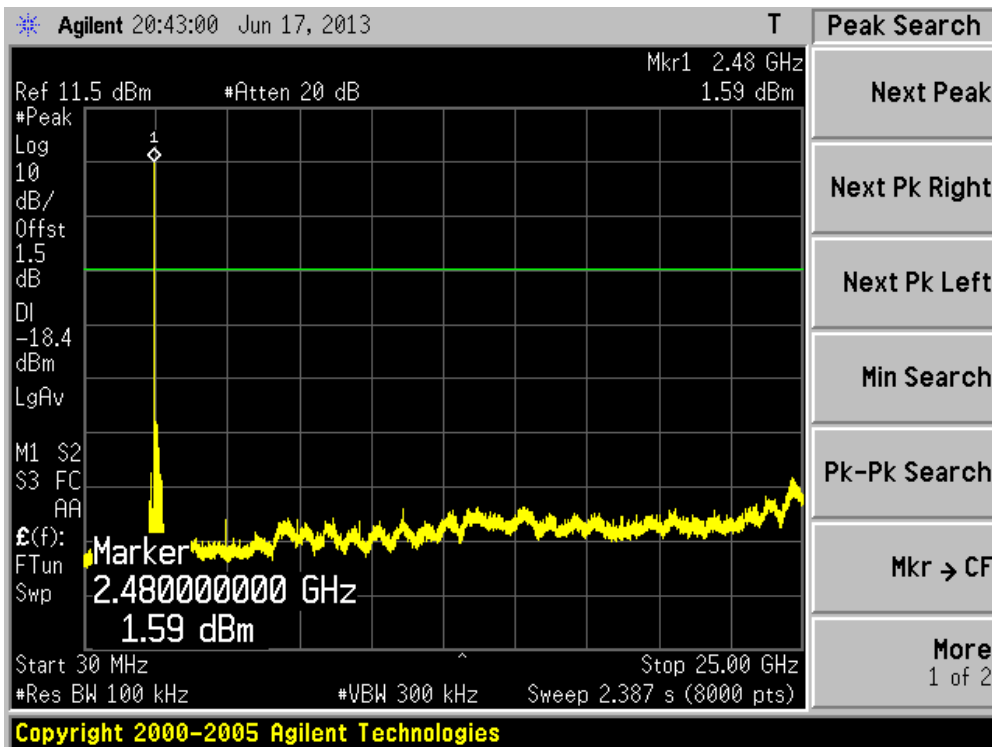
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



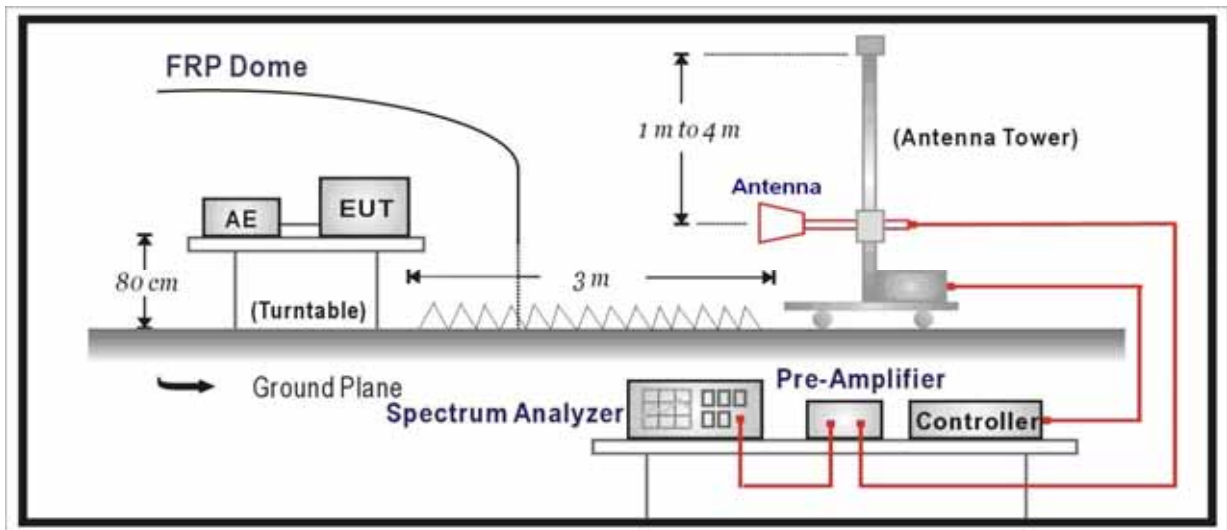
**12. Radiated Emission Band Edge**

**12.1. Test Equipment**

Radiated Emission Band Edge / AC-5

Instrument	Manufacturer	Type No.	Serial No.	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2014.03.30
EMI Test Receiver	R&S	ESCI	100573	2014.03.30
Preamplifier	Miteq	NSP1800-25	1364185	2014.05.03
Preamplifier	QuieTek	AP-040G	CHM-0906001	2014.05.03
Bilog Antenna	Teseq GmbH	CBL6112D	27612	2013.10.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	499	2014.06.08
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2014.03.01
Temperature/Humidity Meter	zhicheng	ZC1-2	AC5-TH	2014.01.11

12.2. Test Setup



12.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) of FCC part 15.

12.4. Test Procedure

According to ANSI C63.10: 2009.

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being

corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from  $20\log(\text{dwell time}/100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit of FCC part 15.

If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

## 12.5. Uncertainty

The measurement uncertainty above 1G is defined as  $\pm 3.9 \text{ dB}$

below 1G is defined as  $\pm 3.8 \text{ dB}$

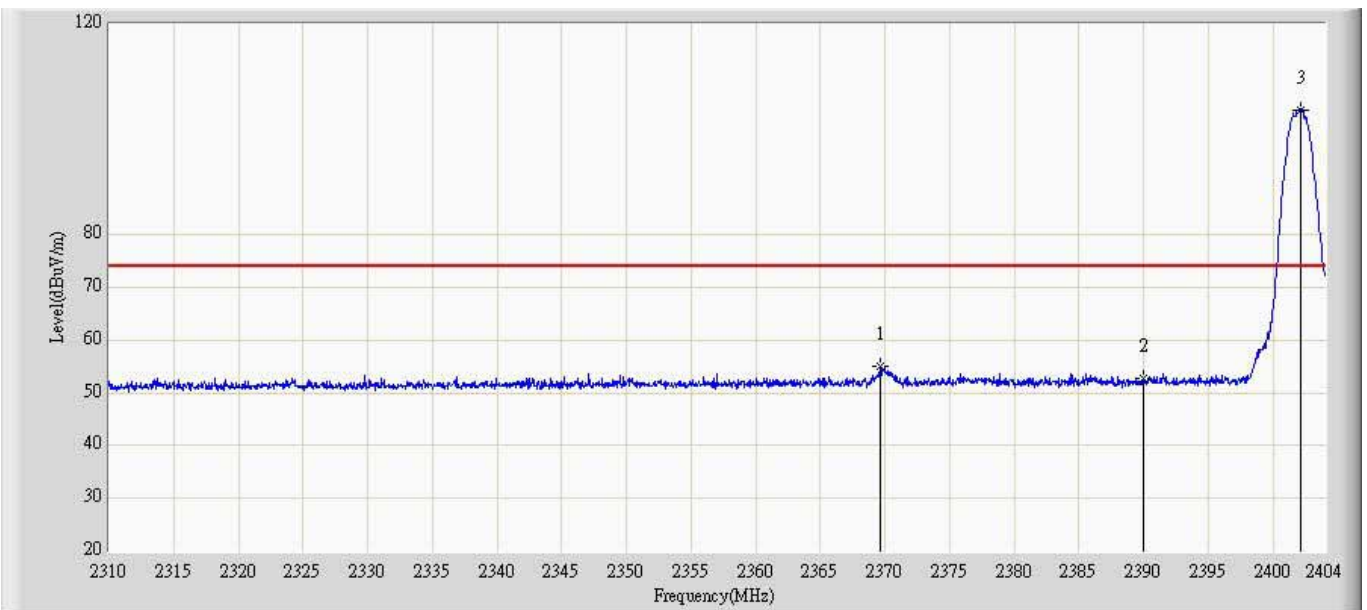
12.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

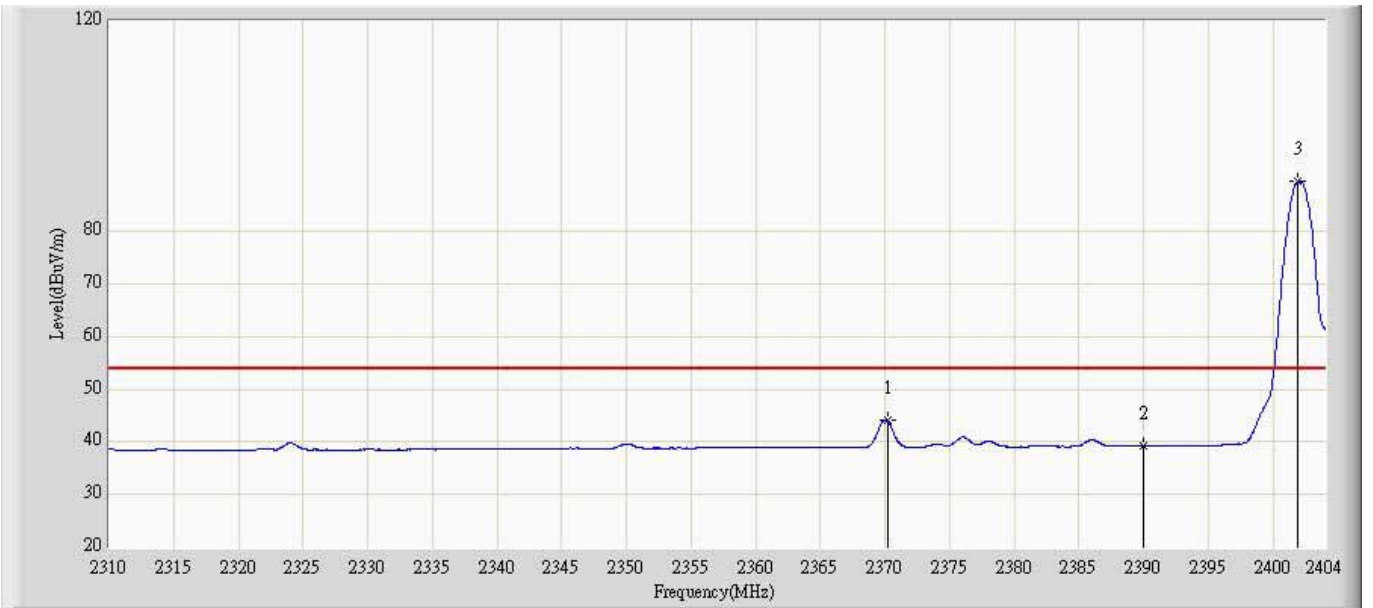
Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz by DH5	



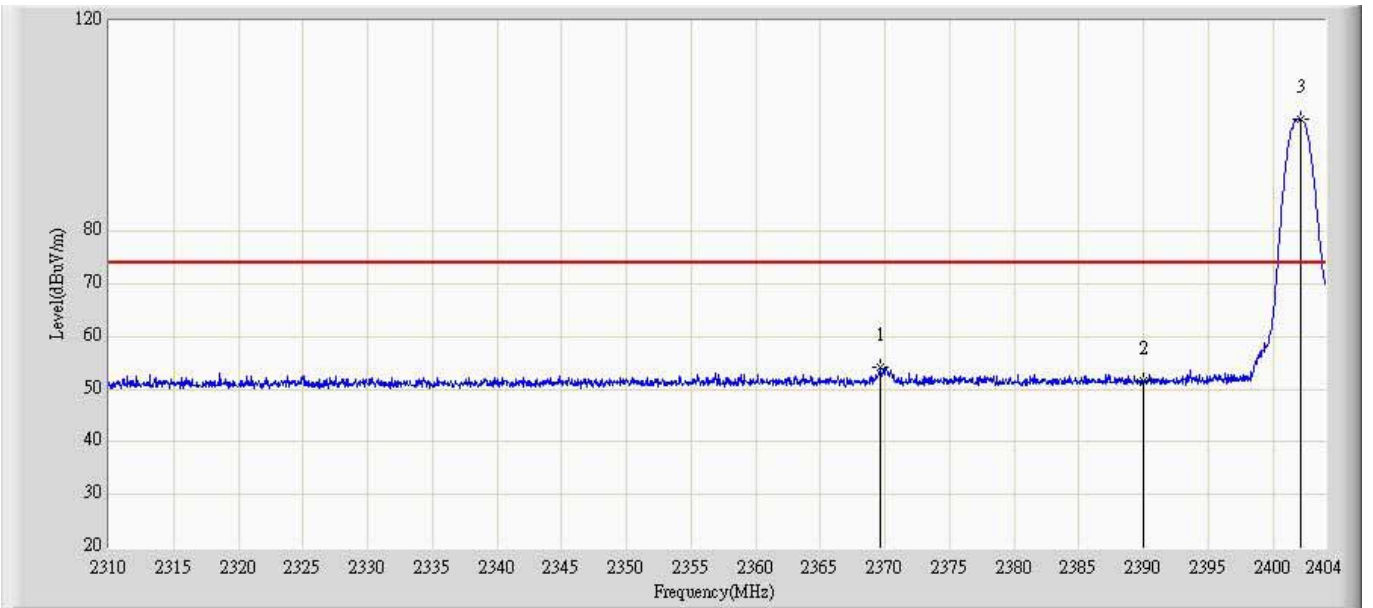
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2369.643	55.023	18.042	-18.977	74.000	36.980	PK
2			2390.000	52.620	15.461	-21.380	74.000	37.159	PK
3		*	2402.073	103.749	66.484	N/A	N/A	37.265	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz by DH5	



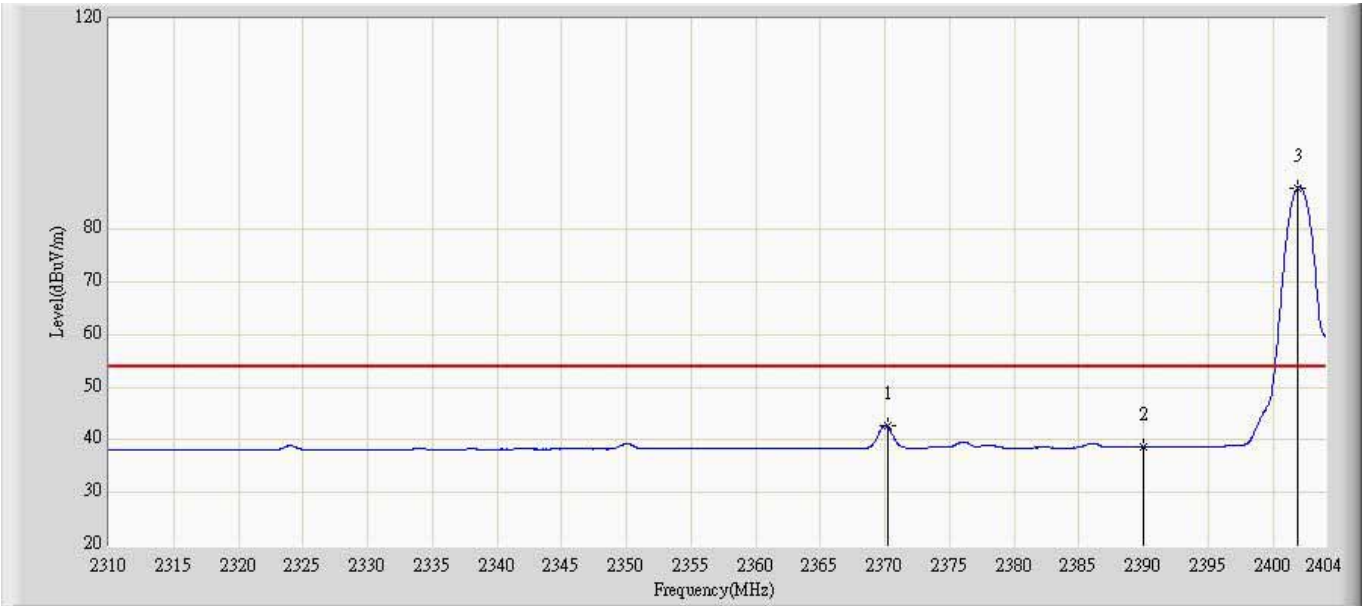
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2370.160	44.069	7.084	-9.931	54.000	36.985	AV
2			2390.000	39.328	2.169	-14.672	54.000	37.159	AV
3		*	2401.885	89.481	52.217	N/A	N/A	37.263	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:33
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz by DH5	



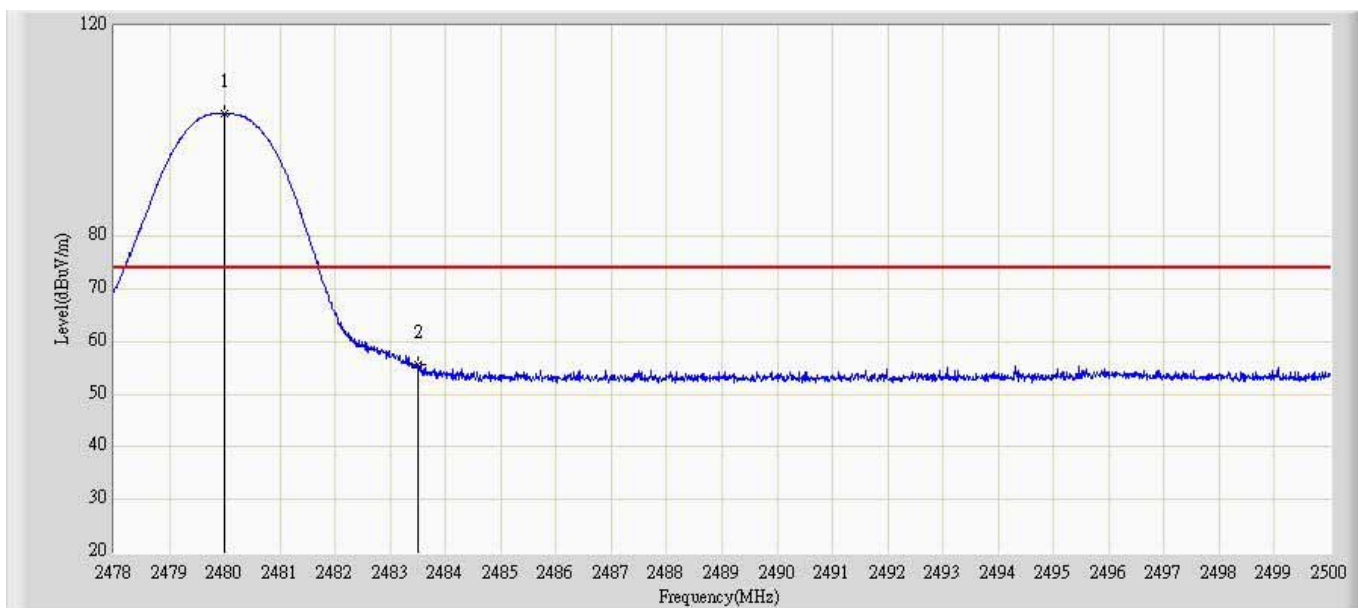
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2369.596	54.154	17.752	-19.846	74.000	36.401	PK
2			2390.000	51.702	15.203	-22.298	74.000	36.499	PK
3		*	2402.073	101.347	64.790	N/A	N/A	36.556	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz by DH5	



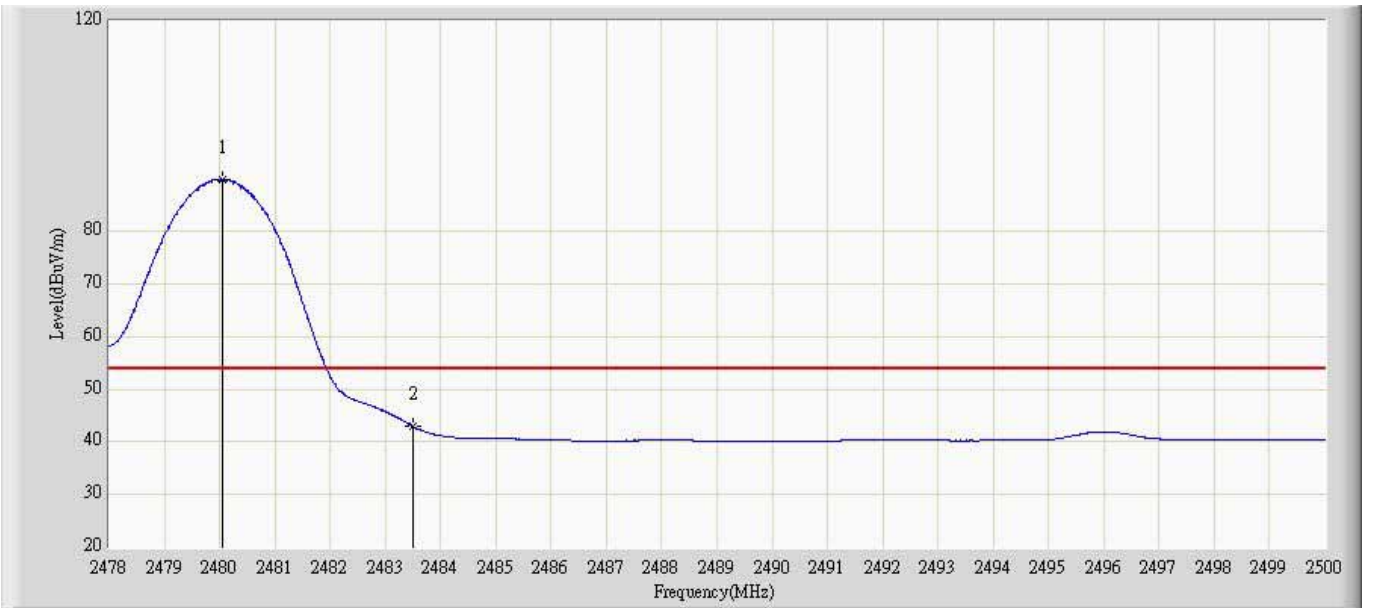
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2370.160	42.575	6.171	-11.425	54.000	36.404	AV
2			2390.000	38.682	2.183	-15.318	54.000	36.499	AV
3		*	2401.885	87.910	51.354	N/A	N/A	36.556	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:36
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz by DH5	



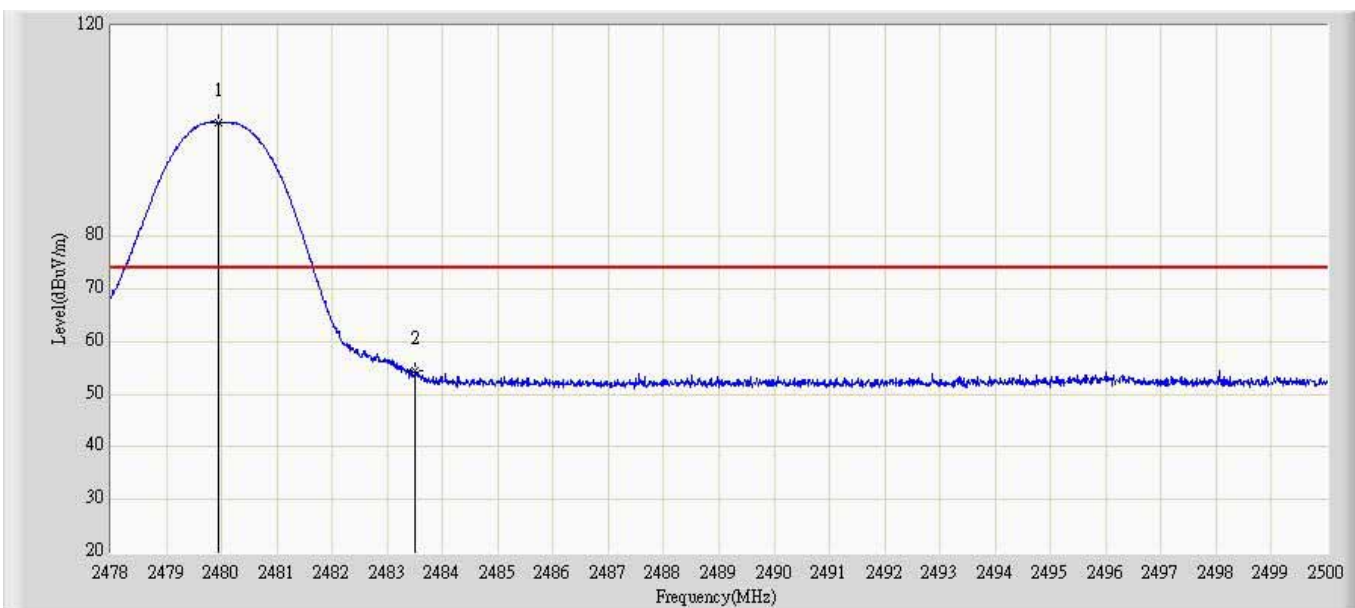
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.002	103.254	65.315	N/A	N/A	37.939	PK
2			2483.500	55.516	17.546	-18.484	74.000	37.969	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:39
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz by DH5	



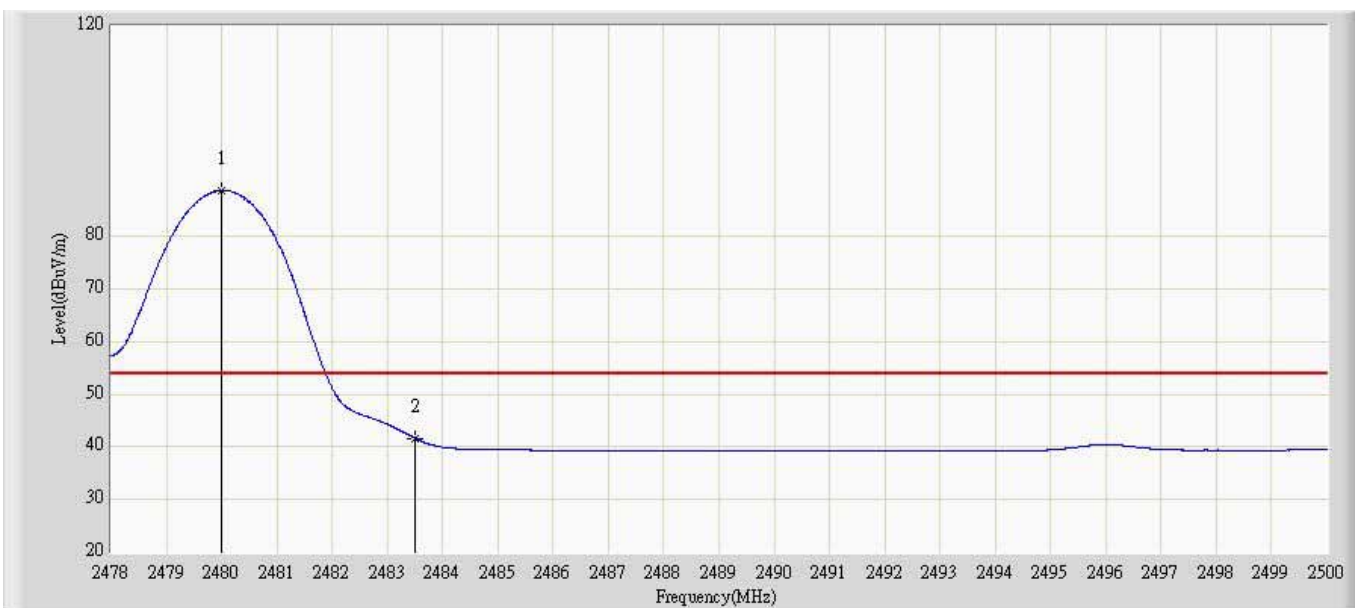
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.046	89.946	52.007	N/A	N/A	37.939	AV
2			2483.500	42.940	4.970	-11.060	54.000	37.969	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:40
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz by DH5	



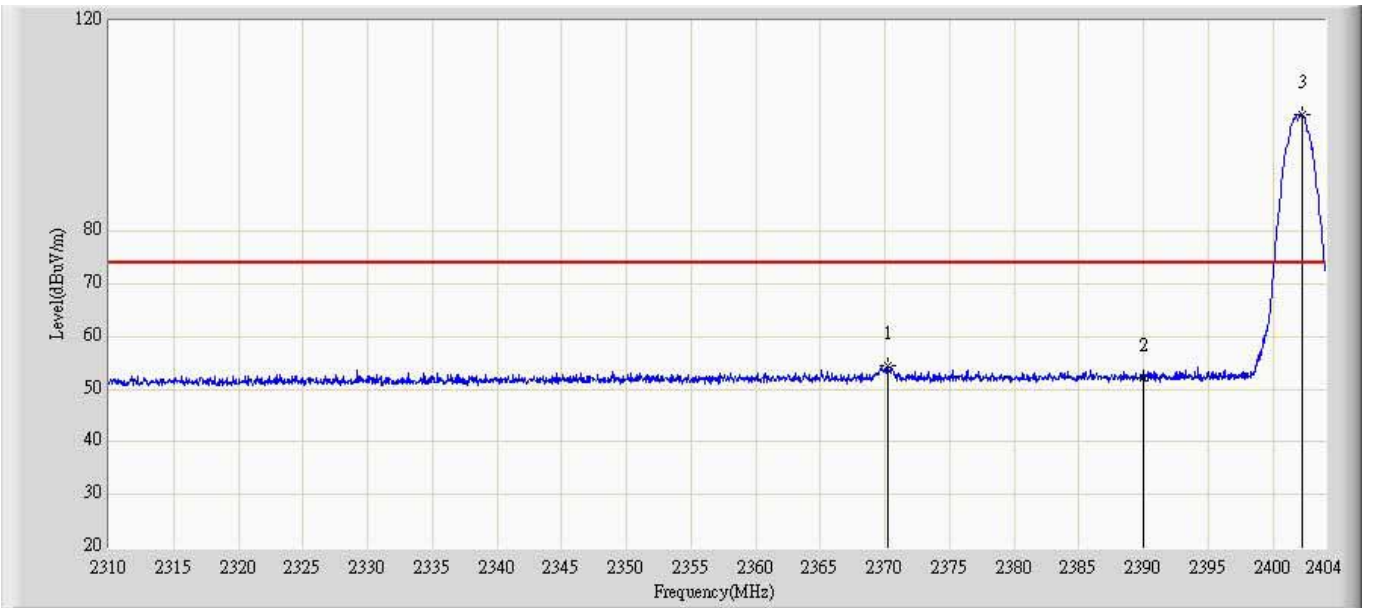
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.936	101.732	64.813	N/A	N/A	36.918	PK
2			2483.500	54.389	17.453	-19.611	74.000	36.935	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:42
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz by DH5	



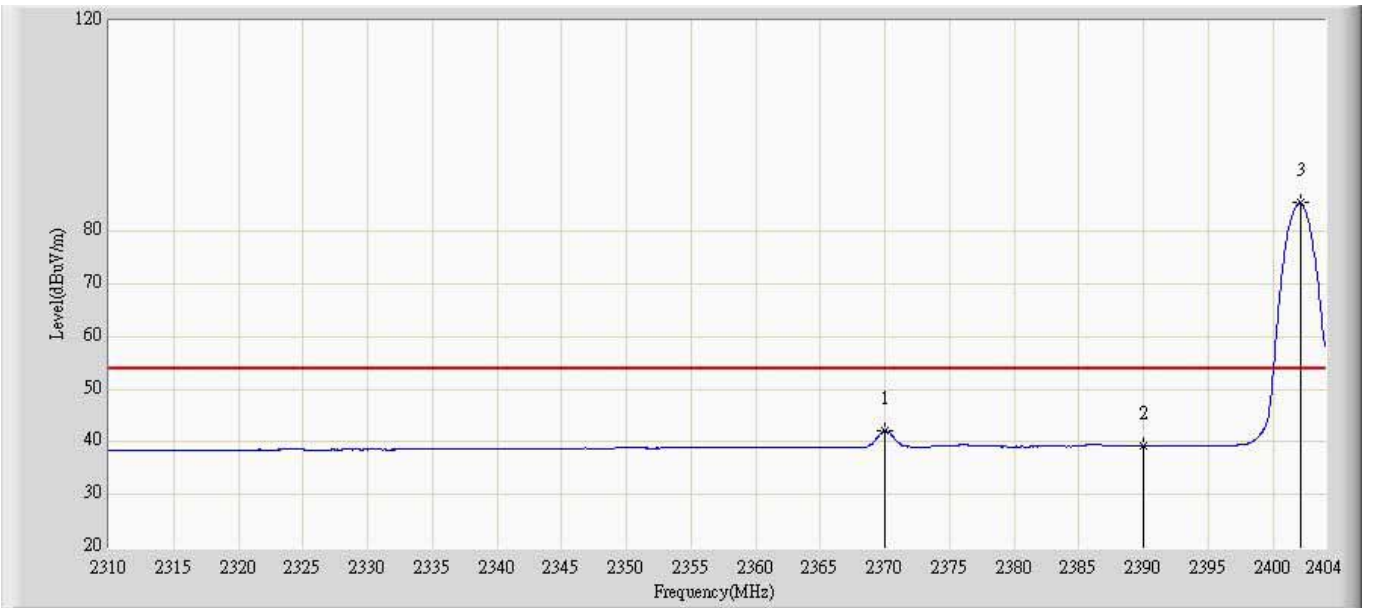
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.002	88.743	51.824	N/A	N/A	36.919	AV
2			2483.500	41.629	4.693	-12.371	54.000	36.935	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2402MHz by 2DH5	



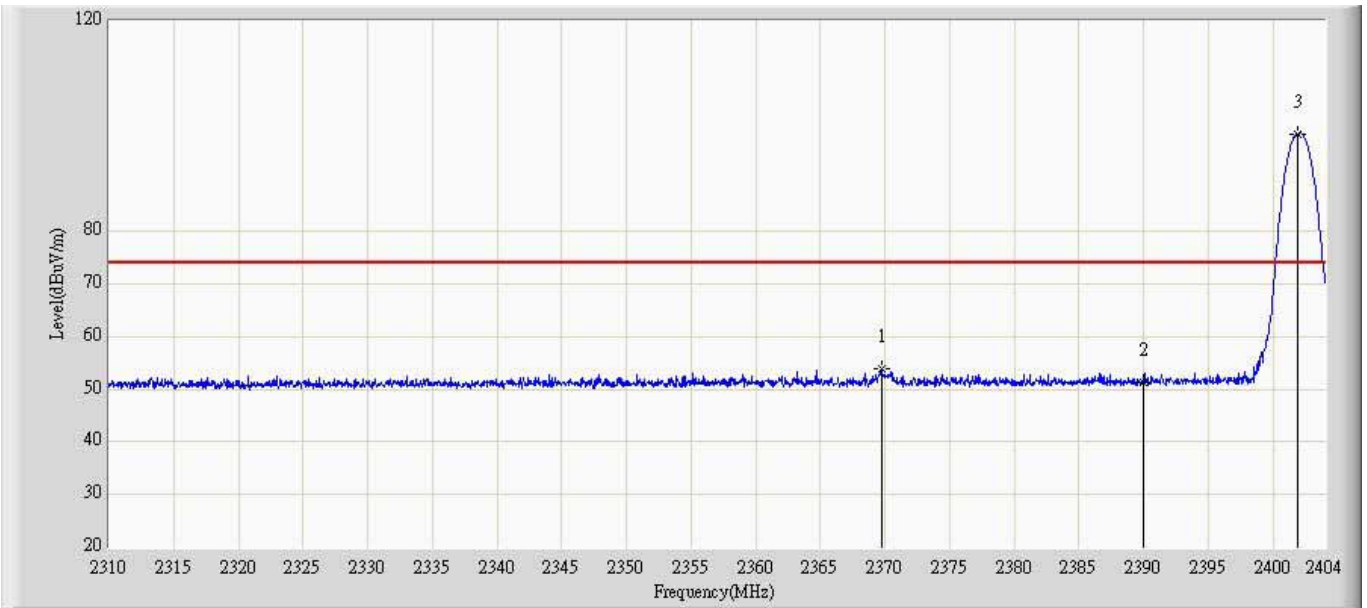
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2370.160	54.458	17.473	-19.542	74.000	36.985	PK
2			2390.000	52.326	15.167	-21.674	74.000	37.159	PK
3		*	2402.214	102.177	64.911	N/A	N/A	37.267	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:47
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2402MHz by 2DH5	



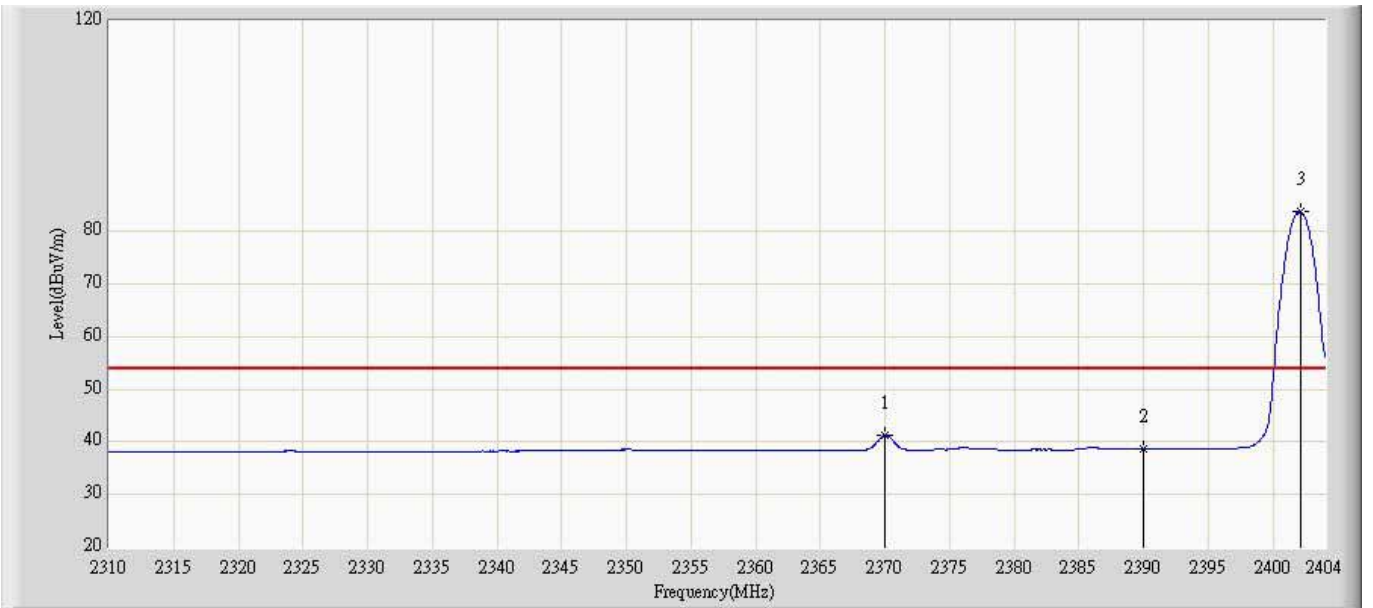
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2370.019	42.070	5.086	-11.930	54.000	36.984	AV
2			2390.000	39.278	2.119	-14.722	54.000	37.159	AV
3		*	2402.073	85.428	48.163	N/A	N/A	37.265	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:48
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2402MHz by 2DH5	



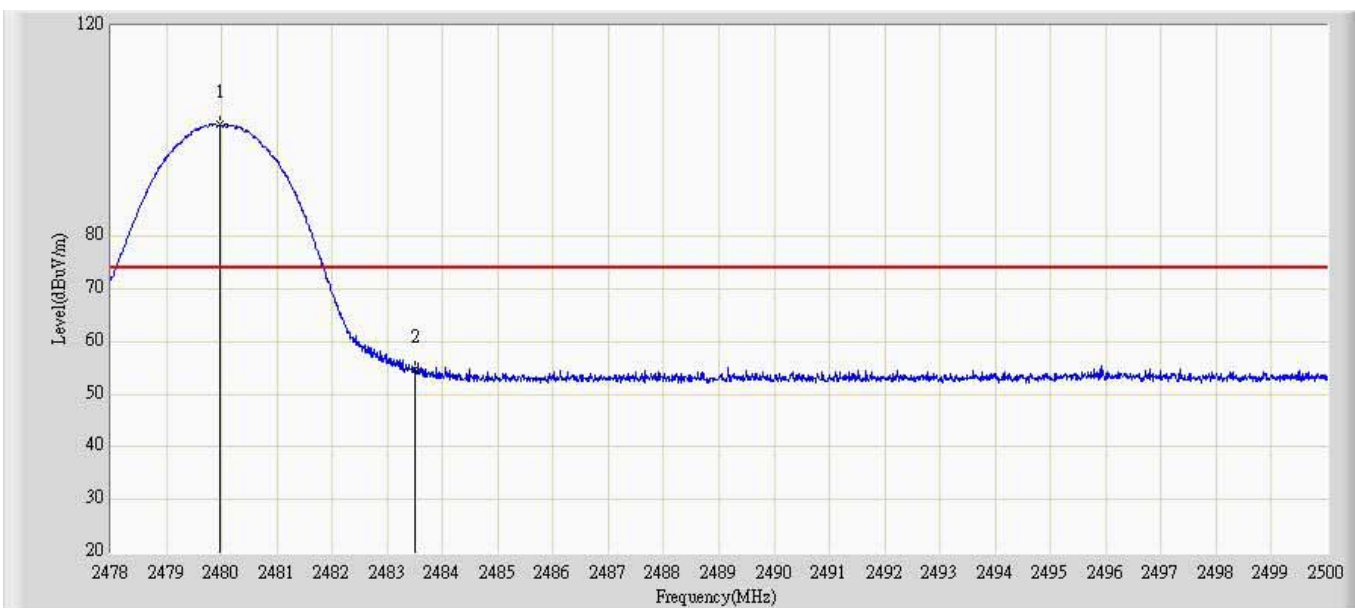
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2369.690	53.913	17.511	-20.087	74.000	36.402	PK
2			2390.000	51.455	14.956	-22.545	74.000	36.499	PK
3		*	2401.885	98.568	62.012	N/A	N/A	36.556	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:50
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2402MHz by 2DH5	



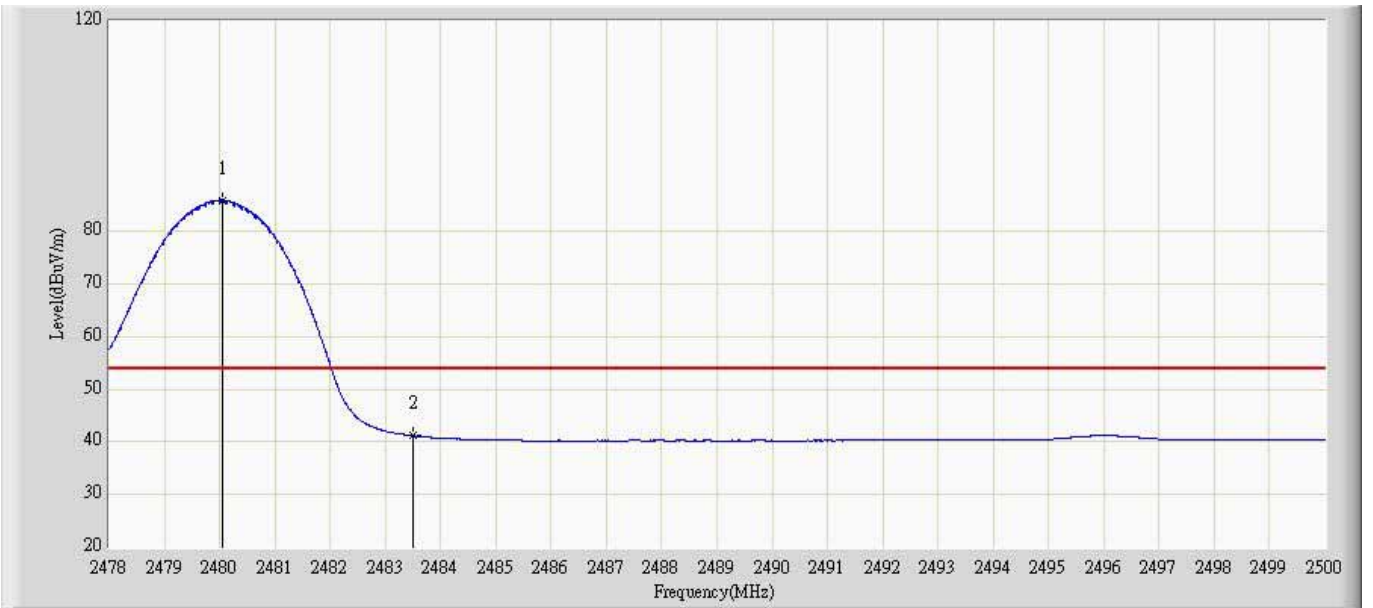
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2370.019	41.224	4.820	-12.776	54.000	36.404	AV
2			2390.000	38.574	2.075	-15.426	54.000	36.499	AV
3		*	2402.073	83.746	47.189	N/A	N/A	36.556	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2480MHz by 2DH5	



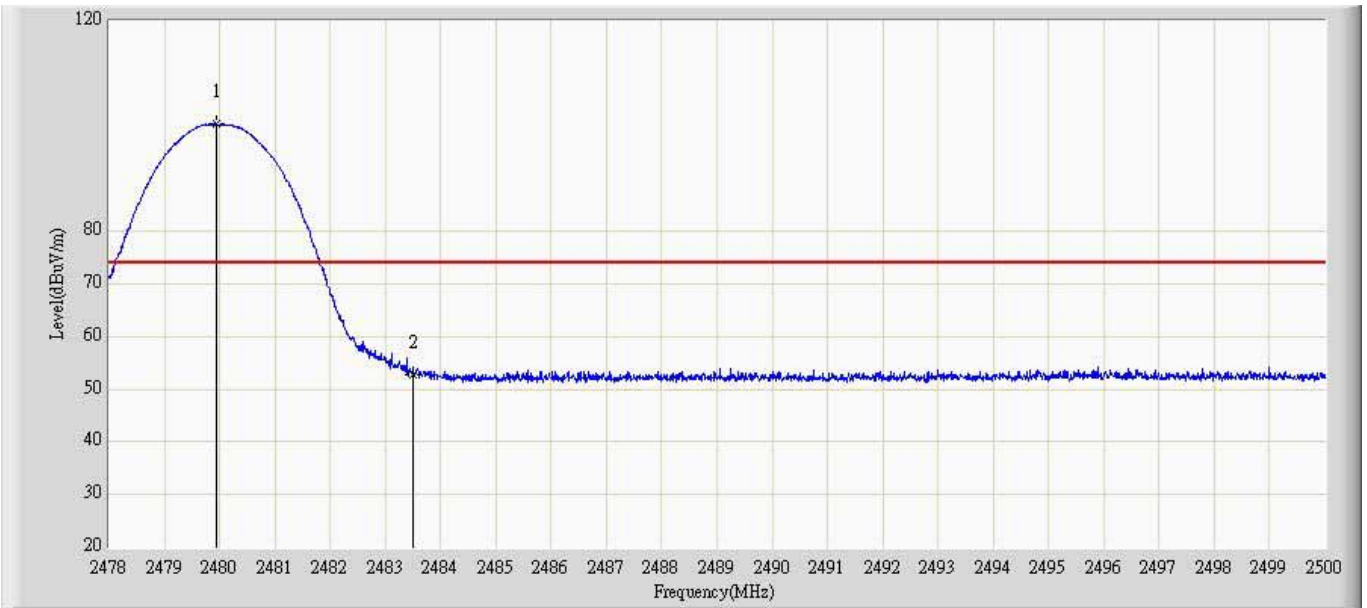
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.958	101.233	63.295	N/A	N/A	37.938	PK
2			2483.500	54.903	16.933	-19.097	74.000	37.969	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:54
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2480MHz by 2DH5	



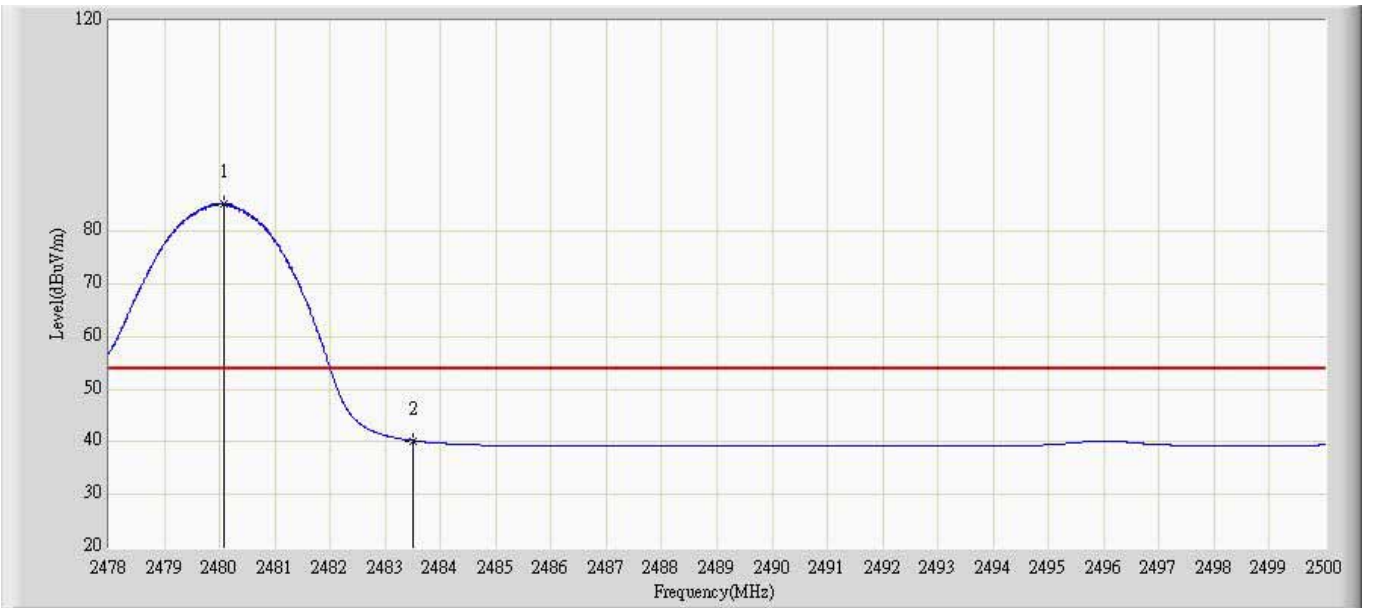
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.046	85.862	47.923	N/A	N/A	37.939	AV
2			2483.500	41.156	3.186	-12.844	54.000	37.969	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:55
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2480MHz by 2DH5	



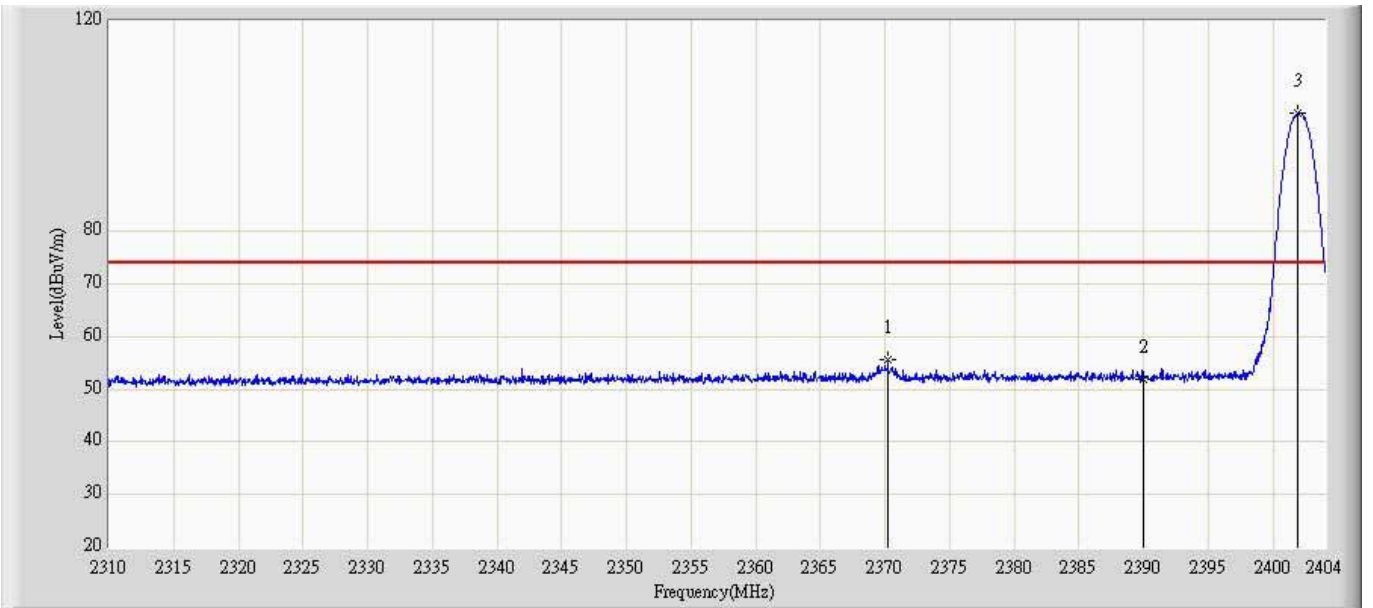
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.936	100.322	63.403	N/A	N/A	36.918	PK
2			2483.500	52.874	15.938	-21.126	74.000	36.935	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:57
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode2: Transmit at channel 2480MHz by 2DH5	



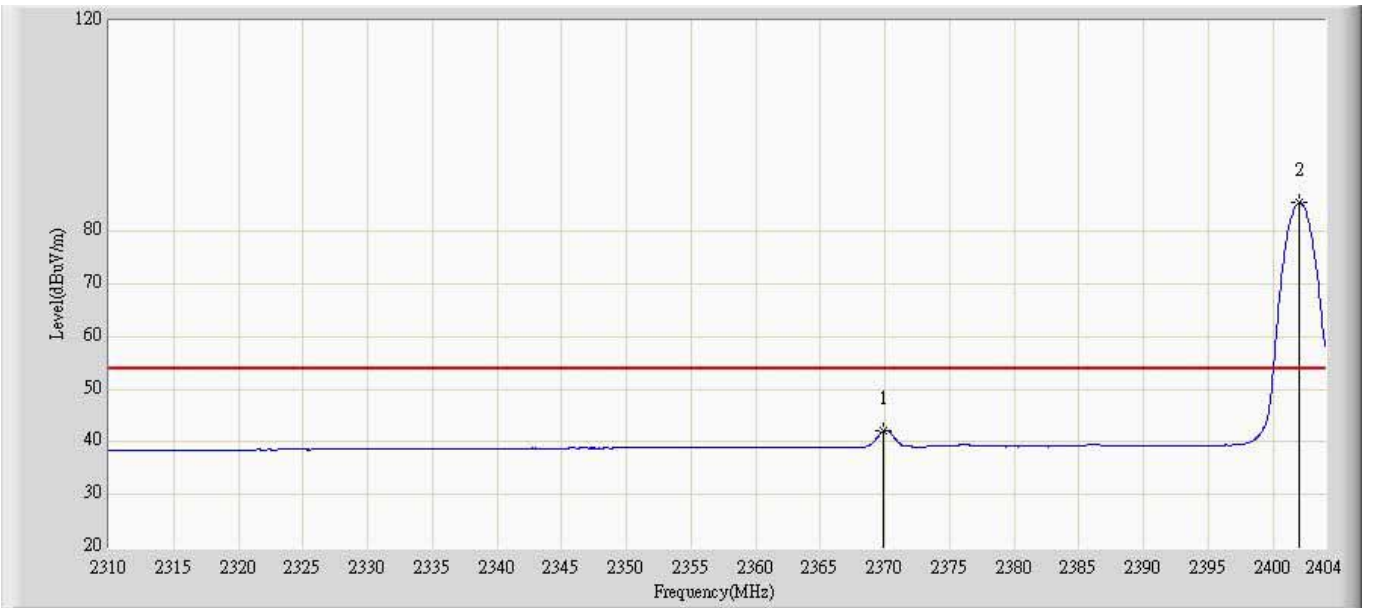
No	Fla g	Ma rk	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.090	85.229	48.310	N/A	N/A	36.919	AV
2			2483.500	40.257	3.321	-13.743	54.000	36.935	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 13:58
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2402MHz by 3DH5	



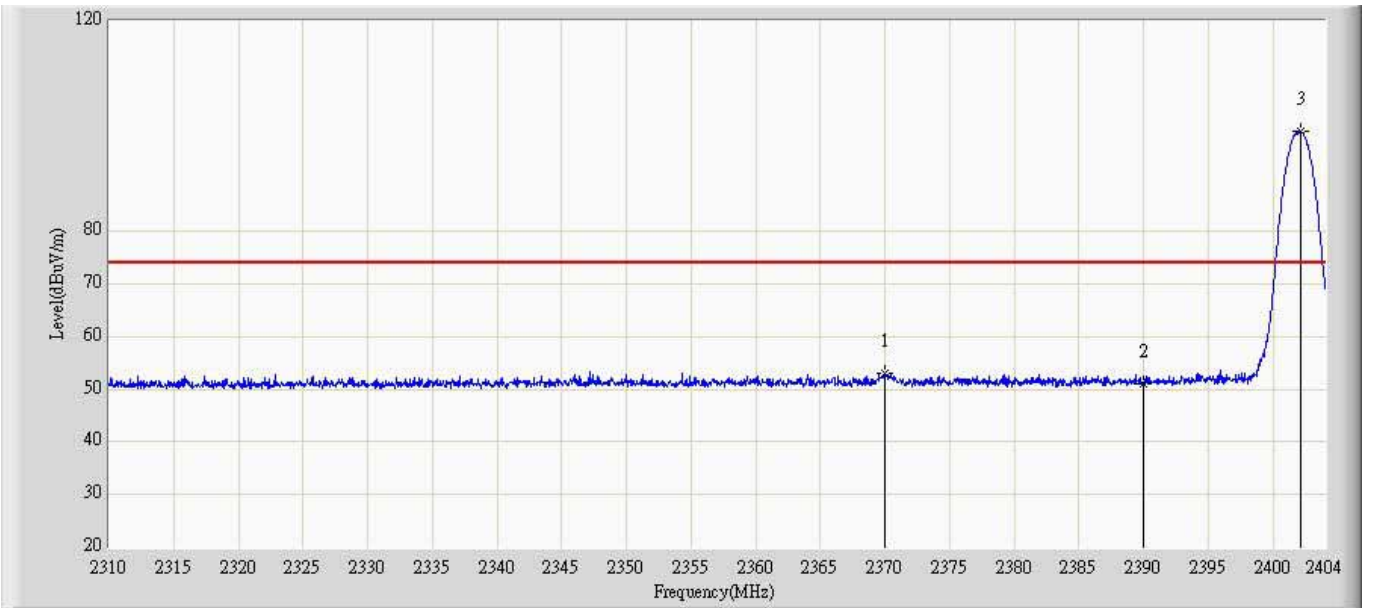
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2370.207	55.544	18.559	-18.456	74.000	36.985	PK
2			2390.000	51.960	14.801	-22.040	74.000	37.159	PK
3		*	2401.885	102.559	65.295	N/A	N/A	37.263	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 14:02
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2402MHz by 3DH5	



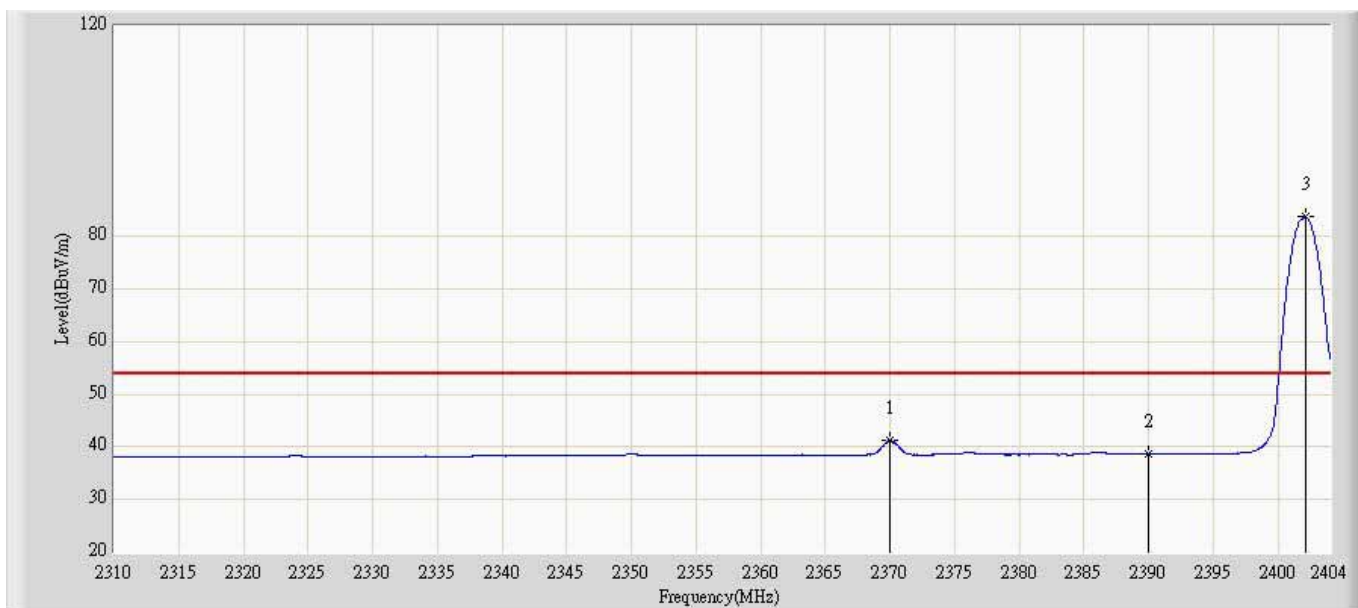
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2369.878	42.127	5.144	-11.873	54.000	36.983	AV
2		*	2401.979	85.438	48.174	N/A	N/A	37.264	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 14:02
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2402MHz by 3DH5	



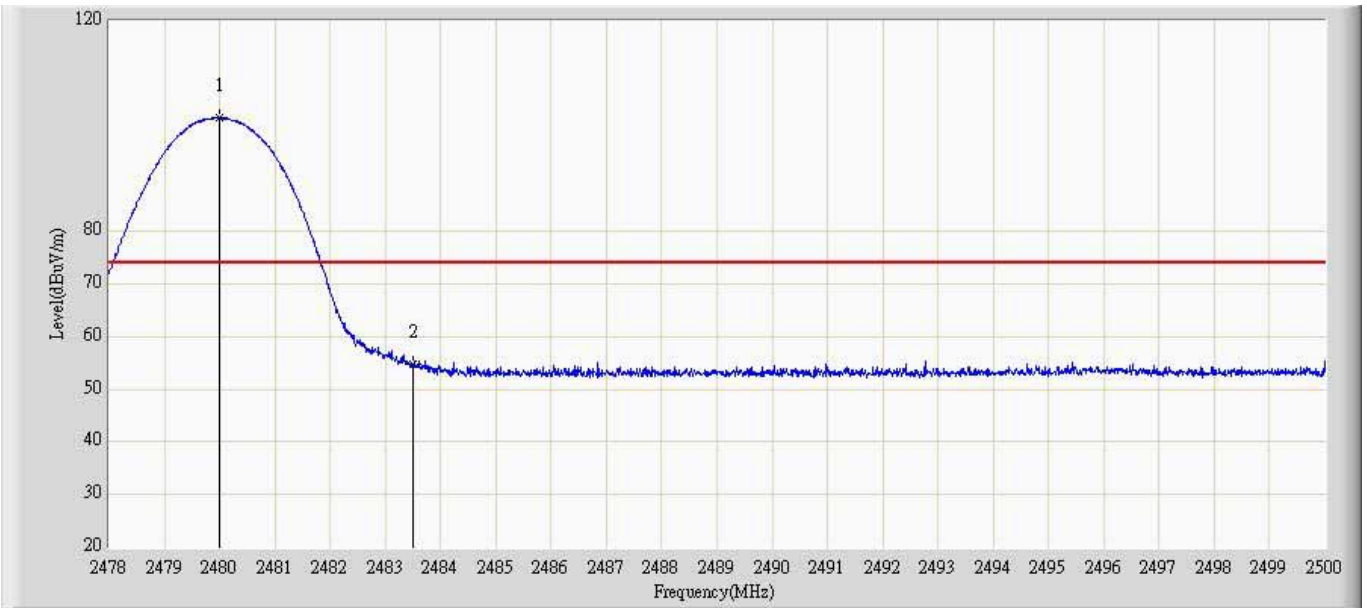
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2369.925	53.088	16.685	-20.912	74.000	36.404	PK
2			2390.000	51.127	14.628	-22.873	74.000	36.499	PK
3		*	2402.073	98.940	62.383	N/A	N/A	36.556	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 14:04
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2402MHz by 3DH5	



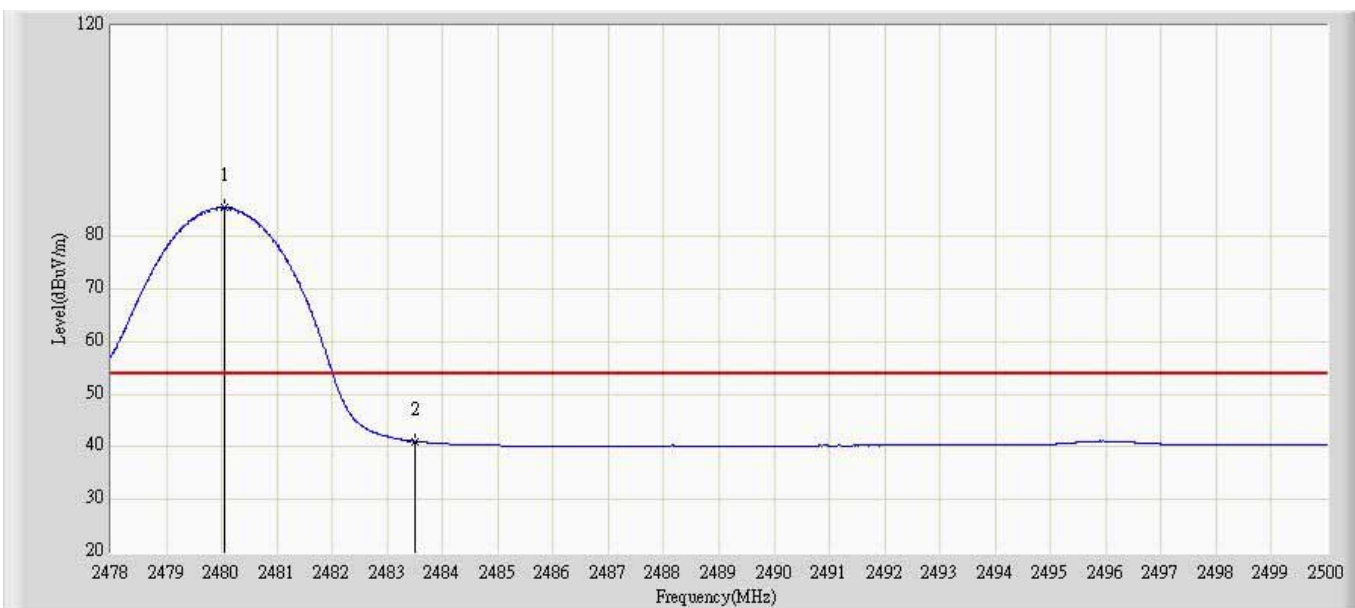
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2370.019	41.193	4.789	-12.807	54.000	36.404	AV
2			2390.000	38.673	2.174	-15.327	54.000	36.499	AV
3		*	2402.073	83.772	47.215	N/A	N/A	36.556	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 14:05
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2480MHz by 3DH5	



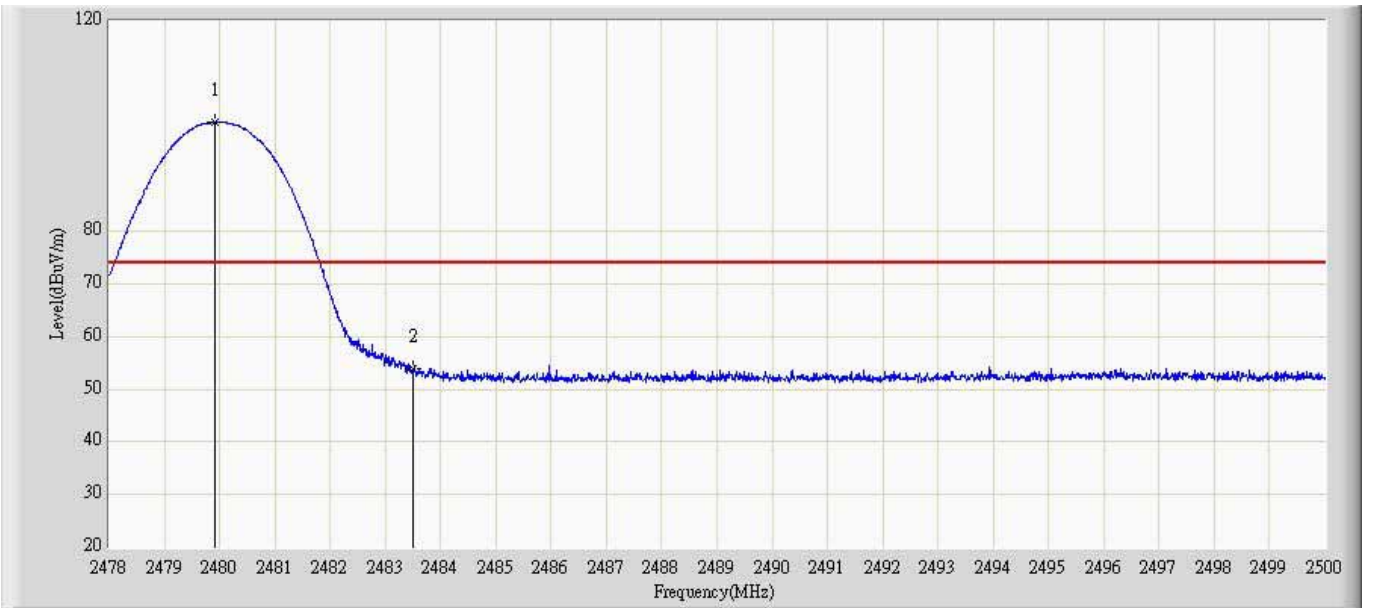
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.002	101.619	63.680	N/A	N/A	37.939	PK
2			2483.500	54.655	16.685	-19.345	74.000	37.969	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 14:08
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2480MHz by 3DH5	



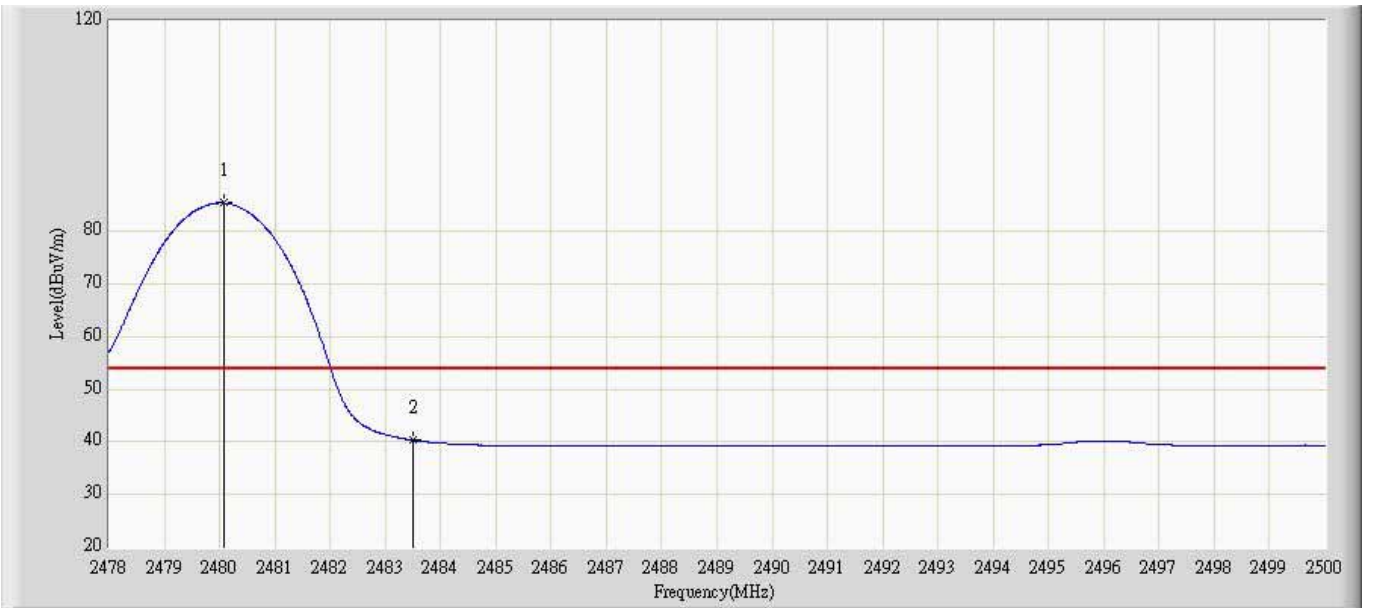
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.046	85.426	47.487	N/A	N/A	37.939	AV
2			2483.500	41.060	3.090	-12.940	54.000	37.969	AV

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 14:09
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2480MHz by 3DH5	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.903	100.743	63.825	N/A	N/A	36.918	PK
2			2483.500	53.868	16.932	-20.132	74.000	36.935	PK

Engineer: Milo	
Site: AC5	Time: 2013/06/22 - 14:11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: Motorola Buds	Power: DC 3.7V
Note: Mode3: Transmit at channel 2480MHz by 3DH5	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.079	85.378	48.459	N/A	N/A	36.919	AV
2			2483.500	40.341	3.405	-13.659	54.000	36.935	AV

The End