FCC/IC TEST REPORT

For
Kobian Canada INC.

Bluetooth Keyboard
Model No.: IPAD2KB

Test Report Number : ESTSZ121101235F/IC

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Kobian Canada INC.
Address of applicant:	560 Denison Street, Unit #5, Markham, Ontario, L3R 2M8, Canada
Manufacturer:	Bluepioneer Technology Co. Ltd
Address of manufacturer:	Flat B 6/F., Teda building, 87 Wing lok Street, Sheung Wan, H.K.

General Description of E.U.T

EUT Description:	Bluetooth Keyboard
Trade Name:	N/A
Model No.:	IPAD2KB
Test Model:	IPAD2KB
Rating:	DC 3.7V
Test Power Supply:	AC 120V/60Hz or DC 3.7V via Battery
Frequency:	2402~2480 MHz (See the table1)

Remark: *The models of EUT are identical except appearance of equipment. Unless otherwise specified, all tests were performed on model IPAD2KB to represent the other similar models.*

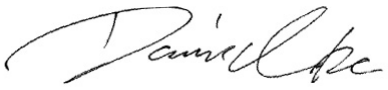
1.2 Test Standards

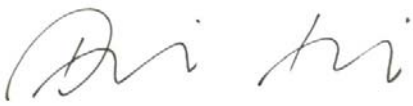
The following Declaration of Conformity report of EUT is prepared in accordance with

FCC Rules and Regulations Part 15 Subpart C: 2010
RSS-210: Issue 8, December 2010 RSS-GEN: Issue3, December 2010

The objective of the manufacturer is to demonstrate compliance with the described above standards.
Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of EST COMPLIANCE LABORATORY LIMITED

Date of Test : Nov.29~Dec. 06 , 2012

Prepared by : 
(Engineer: David He)

Reviewer : 
(Project Manager: Ronnie Liu)

Approved & Authorized Signer : 
(Manager: Alex Chen)

Table1

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

BLUETOOTH		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH00	2402
middle	CH39	2441
highest	CH78	2480

1.3 Test Summary

1.3.1 Test description

For the EUT described above. The standards used were FCC Part 15 Subpart C and RSS-210 for Emissions. The EUT was tested in accordance to the FCC's DA 00-705.

Table 1 : Tests Carried Out Under FCC Part 15 Subpart C and RSS-210

FCC Part 15 Subpart C	RSS-GEN, RSS-210	Test Items	Status
Section 15.207	7.2.2	Conduction Emission	√
Section 15.247(a)	A8.1 (a)	20dB Bandwidth	√
Section 15.247(b)(2)	A8.4 (2)	Maximum peak conducted output power	√
Section 15.205	A8.5	Spurious RF conducted emissions	√
Section 15.209	A8.5	Spurious radiated Emission	√
Section 15.247(a)(1)(iii)	A8.1 (d)	Number of Hopping Frequency	√
Section 15.247(a)	A8.1 (d)	Dwell time	√
Section 15.247(a)	A8.1 (b)	Channel Separation	√
Section 15.247(c)	A8.5	100kHz Bandwidth of Frequency Band Edges	√
Section 15.203		Antenna requirement	√

√ Indicates that the test is applicable
× Indicates that the test is not applicable

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the Operating Instructions.

The maximum emission levels emanating from the device are compared to the FCC Part 15 Subpart C limits for radiation emissions and the measurement results contained in this test report show that EUT is to be technically compliant with FCC requirements.

Global United Technology Service Co., Ltd at 2nd Floor, Block No.2, Laodong Industrial Zone,Xixiang Road, Baoan District, Shenzhen, China

1.5 Test Facility

All measurement required was performed at laboratory of Global United Technology Service Co., Ltd at 2nd Floor, Block No.2, Laodong Industrial Zone,Xixiang Road, Baoan District, Shenzhen, China

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

FCC – Registration No.: 600491
Global United Technology Service Co., Ltd 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 600491.

The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

1.5 Test Equipment List and Details

Test equipments list of Global United Technology Service Co., Ltd

Equipment	Manufacturer	Model#	Serial #	Data of Cal.	Due Data
3m Semi-Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS201	Mar. 30 2012	Mar. 30 2013
Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS202	N/A	N/A
EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Mar. 30 2012	Mar. 30 2013
EMI Test Software	AUDIX	E3	N/A	N/A	N/A
Coaxial Cable	GTS	N/A	GTS400	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS401	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS402	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS407	Apr. 01 2012	Apr. 01 2013
Coaxial Cable	GTS	N/A	GTS408	Apr. 01 2012	Apr. 01 2013
BiConiLog Antenna (26-3000MHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS204	Feb. 26 2012	Feb. 26 2013
Pre-amplifier(0.1-3000MHz)	HP	8347A	GTS210	Aug. 03 2011	Aug. 03 2012
Double-ridged horn (1-18GHz)	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS205	Feb. 26 2012	Feb. 26 2013
Pre-amplifier(1-18GHz)	Rohde & Schwarz	8349B	GTS224	Mar. 30 2012	Mar. 30 2013
Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	GTS250	Oct. 28 2011	Oct. 28 2012
Barometer	ChangChun	DYM3	GTS251	Feb. 26 2012	Feb. 26 2013
Shielding Room	ZhongYu Electron	7.0(L)*3.0(W)*3.0(H)	GTS206	Apr. 10 2012	Apr. 10 2013
EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS208	Sept. 14 2011	Sept. 14 2013
10dB Pulse Limiter	Rohde & Schwarz	N/A	GTS209	Sept. 14 2011	Sept. 14 2012
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS207	Apr. 14 2012	Apr. 14 2013
Coaxial Cable	GTS	N/A	GTS406	Apr. 01 2012	Apr. 01 2013
Loop Antenna	ETS-Lindgren	6502	00082431	Apr. 14 2012	Apr. 14 2013

2 - Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of EST COMPLIANCE LABORATORY LIMITED. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:
Freq (MHz) METER READING + ACF = FS
33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3 DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ±2.4 dB.

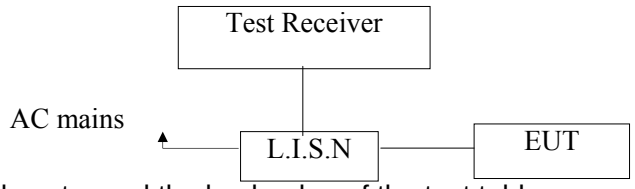
3.2 Requirements:

According to the FCC §15.207 and RSS-GEN 7.2.2, the limit value as follows:

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150～0.500	66~56	56~46
0.500～5.000	56	46
5.000～30.00	60	50

Note: (1)The tighter limit shall apply at the edge between two frequency bands.

3.3 EUT Setup



The EUT was placed center and the back edge of the test table.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

3.4 Instrument Setup

The test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range……150 KHz to 30 MHz
Detector……..Peak & Quasi-Peak & Average
Sweep Speed……Auto
IF Band Width……..9 KHz

3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dBμV of specification limits). Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with a "**AV**".

3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the FCC Part 15 Subpart B and RSS-GEN Conducted margin, with the *worst* margin reading of:

3.7 Disturbance Voltage Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	Charging

Test data see following pages.

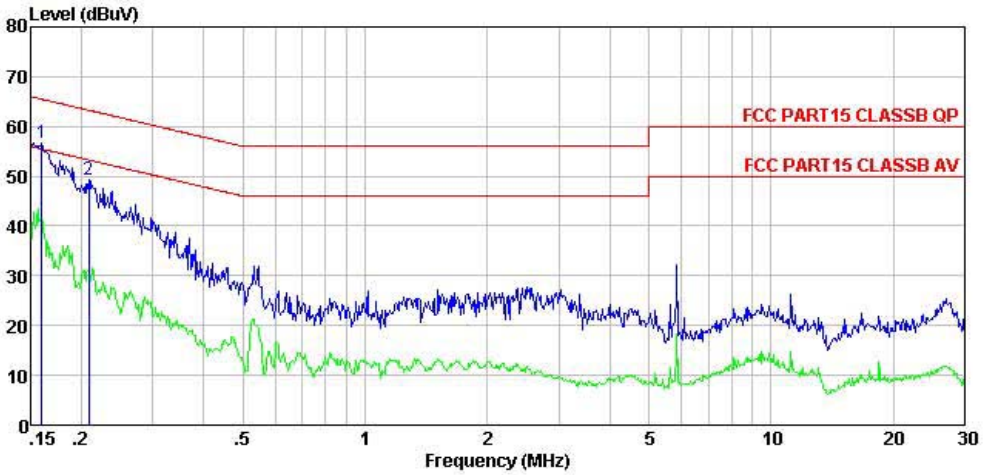
Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

3.8 Test Results

PASS.

Please refer the following pages.

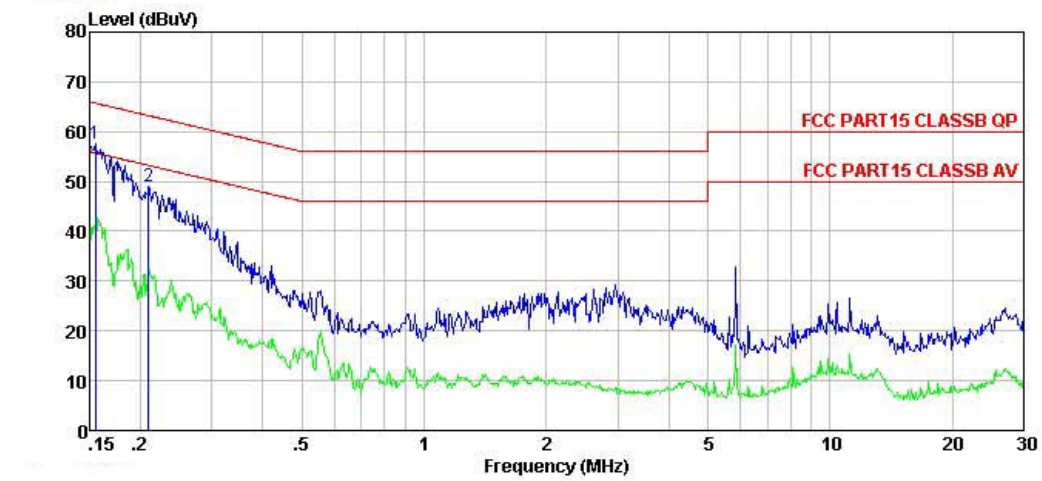
Conducted Emission Test Data



Condition : FCC PART15 CLASSB QP LISN-2012 NEUTRAL
EUT : Bluetooth Keyboard
Model : IPAD2KB
Test Load : Charging
Power : AC 120V/60Hz
Test Engineer: David

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.160	56.85	-0.13	0.10	56.82	65.47	-8.65	QP
2	0.208	49.32	-0.09	0.10	49.33	63.27	-13.94	QP

Conducted Emission Test Data



Condition : FCC PART15 CLASSB QP LISN-2012 LINE
EUT : Bluetooth Keyboard
Model : IPAD2KB
Test Load : Charging
Power : AC 120V/60Hz
Test Engineer: David

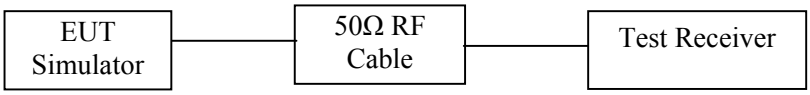
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.155	57.62	-0.26	0.10	57.46	65.74	-8.28	QP
2	0.209	49.18	-0.23	0.10	49.05	63.23	-14.18	QP

4- 20 dB Bandwidth

4.1 Requirements (15.247(a)):

According to FCC §15.247(a)(1) and RSS-210 A8.1(a), the 20dB bandwidth is known as the 99% emission bandwidth, or 20dB bandwidth (10*log1% = 20dB) taking the total RF output power.

4.2 Test Setup



4.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 300 kHz, VBW = 300kHz, Span = 3 MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Mark the peak frequency and -20dB (upper and lower) frequency.
e. Repeat until all the rest channels are investigated.

4.4 Test Results

Pass.

4.5 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	TX

Test data as follows

Channel	Frequency(MHz)	20dB Down BW(kHz)
CH00	2402	1135.32
CH39	2441	1105.33
CH78	2480	1127.54

So the maximum 20dB Bandwidth is 925.33kHz.

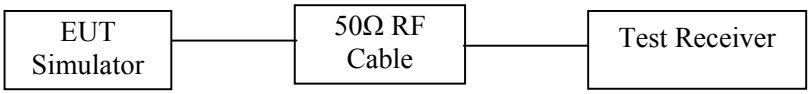
5- Maximum peak conducted output power

5.1 Requirements:

According to FCC Part 15 C, Section 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.

According to RSS 210 A8.4(2)
For frequency hopping systems operating in the band 2400-2483.5 MHz employing at least 75 hopping channels, the maximum peak conducted output power shall not exceed 1 W; for all other frequency hopping systems in the band, the maximum peak conducted output power shall not exceed 0.125 W

5.2 Test Setup



5.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 1MHz, VBW = 1MHz, Span =5 MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Mark the peak power
e. Repeat until all the rest channels are investigated.

5.4 Test Results

Pass.

5.5 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	TX

Test data as follows

Channel	Frequency(MHz)	Output Power(dBm)	Output Power(W)	Limit(FCC)(W)	Limit(IC)(W)
CH00	2402	2.042	0.00160	0.125	1
CH39	2441	2.384	0.00171	0.125	1
CH78	2480	1.989	0.00158	0.125	1

6- Spurious radiated Emission

6.1 Requirements:

According to FCC section 15.247(d) and RSS-A8.5, radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to RSS- Gen section 7.2.3. Those emissions generated in a receiver and radiated from the receiver either via the antenna path or via the control, power, and audio cables that may be used with the receiver. All spurious emissions shall comply with the limits of next table:

15.205(a) – Restricted Frequency Bands

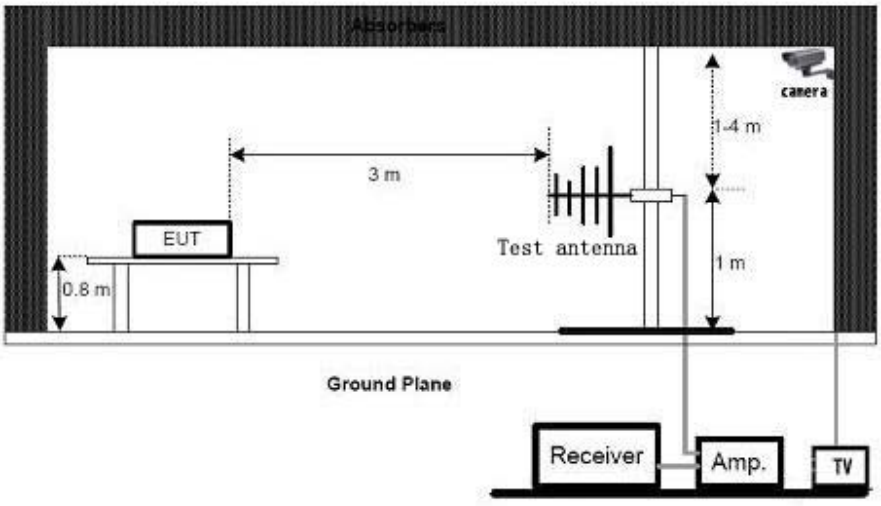
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

15.209(a) – Field Strength Limits within Restricted Frequency Bands

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

6.2 Test Setup



The EUT is located in a 3m Semi-Anechoic Chamber, the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna: In the frequency range above 30MHz, Bi-log Test Antenna (30 MHz, to 1GH) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength, the azimuth range of turntable was 0° to 360° , the receive antenna has two polarizations horizontal and vertical. When doing measurements above 1GHz, the EUT was placed within the 3dB beam width range of the horn antenna, and the EUT was tested in orthogonal positions as recommended in ANSI C63.4 for Radiated Emissions and the worst-case data was presented.

6.3 Test Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

6.4 Test Results

Pass.

6.4 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	TX

Test data as follows

6.3.1 Radiated emission test f<1GHz

From 9KHz ~ 30MHz:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
11.69	52.30	5.31	0.30	25.16	32.75	69.5	-36.75	QP	-
20.52	50.79	5.51	0.36	25.66	31.00	69.5	-38.50	QP	
26.01	53.29	5.68	0.42	25.69	33.70	69.5	-35.80	QP	-

Emissions attenuated more than 20 dB below the permissible value are not reported.

Data (From 30MHz ~ 1GHz):

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
53.318	38.19	16.19	0.80	31.95	23.23	40.00	-16.77	QP	H
97.115	38.82	16.05	1.17	31.75	24.29	43.5	-19.21	QP	H
321.061	41.69	16.32	2.47	32.11	28.37	46.00	-17.63	QP	H
					0				
52.391	38.98	16.23	0.79	31.95	24.05	40.00	-15.95	QP	V
103.080	38.64	15.96	1.22	31.78	24.04	43.50	-19.46	QP	V
292.058	40.48	15.92	2.32	32.18	26.54	46.00	-19.46	QP	V

Emissions attenuated more than 20 dB below the permissible value are not reported.

6.3.2 From 1GHz ~ 25GHz):

CH Low(2402MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
4804	25.23	31.78	5.33	24.08	38.26	54	-15.74	Average	H
7206	23.35	36.18	6.88	26.4	40.01	54	-13.99	Average	H
9608	20.18	38.07	8.95	25.36	41.84	54	-12.16	Average	H
4804	24.23	31.79	5.34	24.09	37.27	54	-16.73	Average	V
7206	25.89	36.19	6.89	26.42	42.55	54	-11.45	Average	V
9608	18.92	38.06	8.95	25.37	40.56	54	-13.44	Average	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
4804	29.23	31.78	5.33	24.08	42.26	74	-31.74	Peak	H
7206	30.35	36.18	6.88	26.4	47.01	74	-26.99	Peak	H
9608	28.18	38.07	8.95	25.36	49.84	74	-24.16	Peak	H
4804	30.23	31.79	5.34	24.09	43.27	74	-30.73	Peak	V
7206	31.89	36.19	6.89	26.42	48.55	74	-25.45	Peak	V
9608	30.92	38.06	8.95	25.37	52.56	74	-21.44	Peak	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

CH Middle(2441MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
4882	24.39	31.84	5.40	24.01	37.62	54	-16.38	Average	H
7323	23.64	36.36	6.91	26.62	40.29	54	-13.71	Average	H
9767	19.49	38.35	9.01	25.30	46.55	54	-12.45	Average	H
4882	23.56	31.84	5.4	24.01	36.79	54	-17.21	Average	V
7323	23.87	36.37	6.91	26.62	40.53	54	-13.47	Average	V
9767	19.26	38.35	9.01	25.30	41.32	54	-12.68	Average	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
4882	31.25	31.84	5.4	24.01	44.48	74	-29.52	Peak	H
7323	32.69	36.36	6.91	26.62	49.34	74	-24.66	Peak	H
9767	30.57	38.35	9.01	25.3	52.63	74	-21.37	Peak	H
4882	30.56	31.84	5.4	24.01	43.79	74	-30.21	Peak	V
7323	31.42	36.37	6.91	26.62	48.08	74	-25.92	Peak	V
9767	30.53	38.35	9.01	25.3	52.59	74	-21.41	Peak	V

CH High(2480MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
4960	26.22	31.92	5.48	23.98	39.64	54	-14.35	Average	H
7740	23.69	36.49	6.93	26.82	40.29	54	-12.92	Average	H
9920	21.58	38.74	9.06	25.24	44.14	54	-11.11	Average	H
4960	25.51	31.92	5.48	23.98	38.93	54	-14.26	Average	V
7740	25.95	36.49	6.93	26.82	42.55	54	-11.42	Average	V
9920	19.37	38.74	9.06	25.24	41.91	54	-12.09	Average	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark	Direction (H/V)
4960	32.69	31.92	5.48	23.98	46.11	74	-27.89	Peak	H
7740	33.57	36.49	6.93	26.82	50.17	74	-23.83	Peak	H
9920	34.86	38.74	9.06	25.24	57.42	74	-16.58	Peak	H
4960	34.51	31.92	5.48	23.98	47.93	74	-26.07	Peak	V
7740	33.59	36.49	6.93	26.82	50.19	74	-23.81	Peak	V
9920	33.24	38.74	9.06	25.24	55.8	74	-18.20	Peak	V
Note: The 5^{th}-10^{th} harmonic value are too small to be measured.									

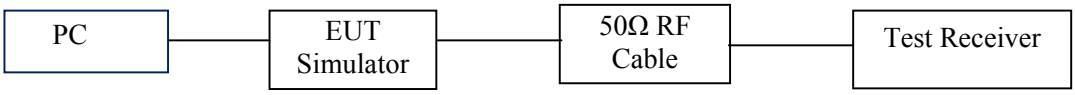
Emissions attenuated more than 20 dB below the permissible value are not reported.

7- Spurious RF conducted emissions

7.1 Requirements:

According to FCC §15.247(c) and RSS-A8.5, in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

7.2 Test Setup



7.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 100kHz, VBW = 300kHz, Sweep = auto, Detector function = peak, Trace = max hold
d. Mark the peak power
e. Repeat until all the rest channels are investigated.

7.4 Test Results

Pass.

7.5 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	TX

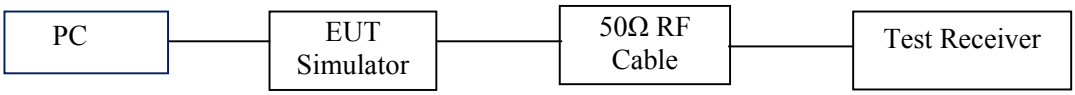
Channel	Frequency(MHz)	Measured Max. Out of band Emission (dBm)	Limit(dBm)		Test Result
			Carrier level	Calculated -20dBm Limit	
CH00	2402	-38.35	2.04	-17.96	Pass
CH39	2441	-39.29	2.38	-17.62	Pass
CH78	2480	-39.57	1.98	-18.02	Pass

8- Hopping sequence

8.1 Requirements (15.247(a)):

According to FCC §15.247(a)(1)(iii) and RS 210 A8.1(d), frequency hopping systems operating in the 2400MHz to 2483.5MHz bands shall use at least 15 hopping frequencies.

8.2 Test Setup



8.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set spectrum analyzer Start = 2400.00MHz, Stop = 2483.00MHz, Span=83MHz, RBW = 1MHz, VBW = 1MHz, Sweep = auto.
d. Max hold, view and count how many channel in the band.

8.4 Test Results

PASS

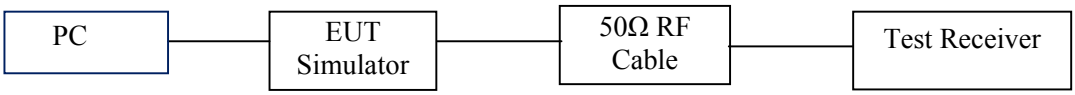
The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF-channels.

9- Dwell time

9.1 Requirements (15.247(a)):

According to FCC §15.247(a)(1)(iii) and RSS-210 A8.1 (d), frequency hopping systems in the 2400 - 2483.5MHz band shall use at least 15 non-overlapping 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.

9.2 Test Setup



9.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set center frequency of spectrum analyzer = operating frequency, Span = 0, RBW = 1MHz, VBW = 1MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Repeat above procedures until all frequency measured were complete.

9.4 Test Results

Pass.

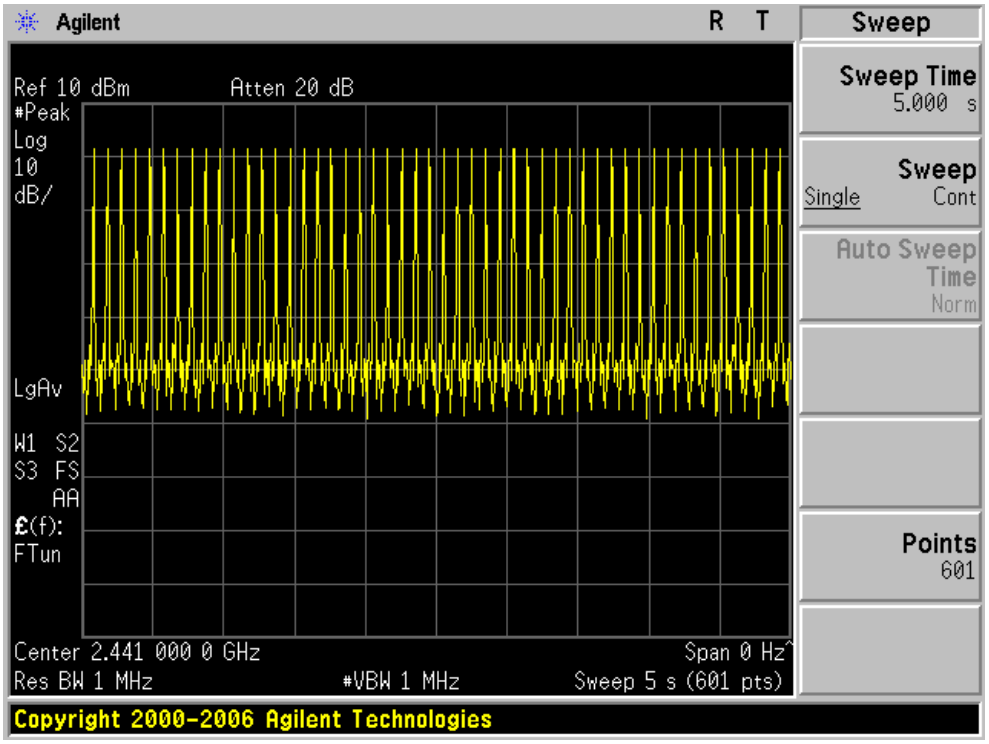
9.5 Test Data

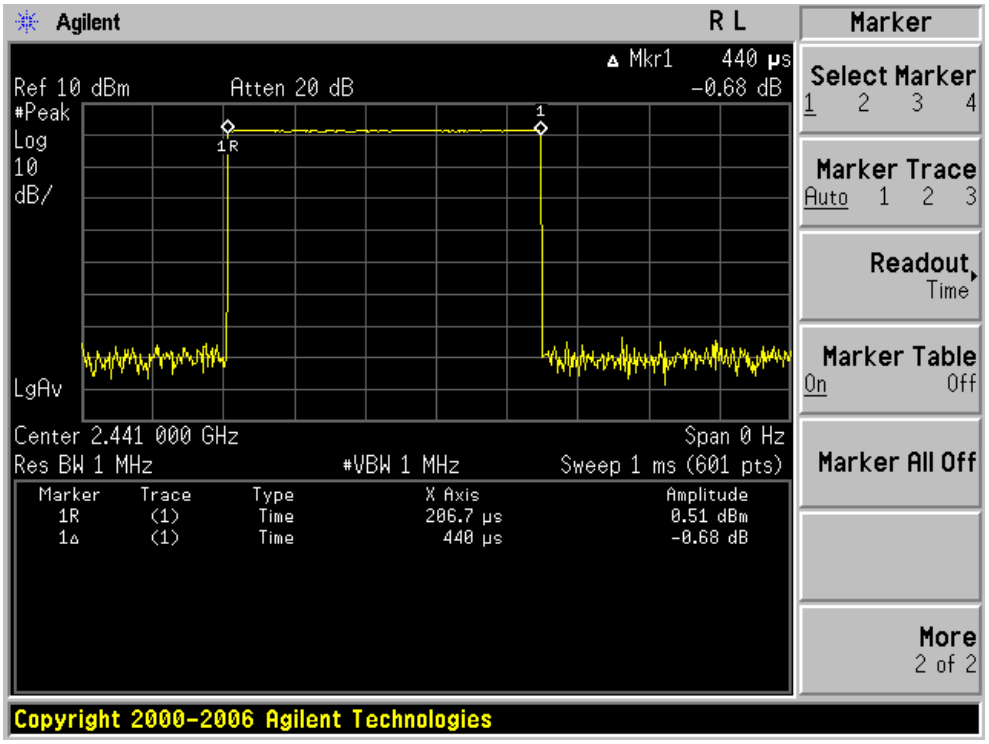
Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	TX

	Test Frequency	Number of transmission 5s	Length of transmission Time(ms)	Total of Dwell (ms)	Limit(ms)	Result
DH1	2441MHz	50	0.440	69.52	400	PASS
DH3	2441MHz	50	1.695	133.90	400	PASS
DH5	2441MHz	50	2.942	154.84	400	PASS

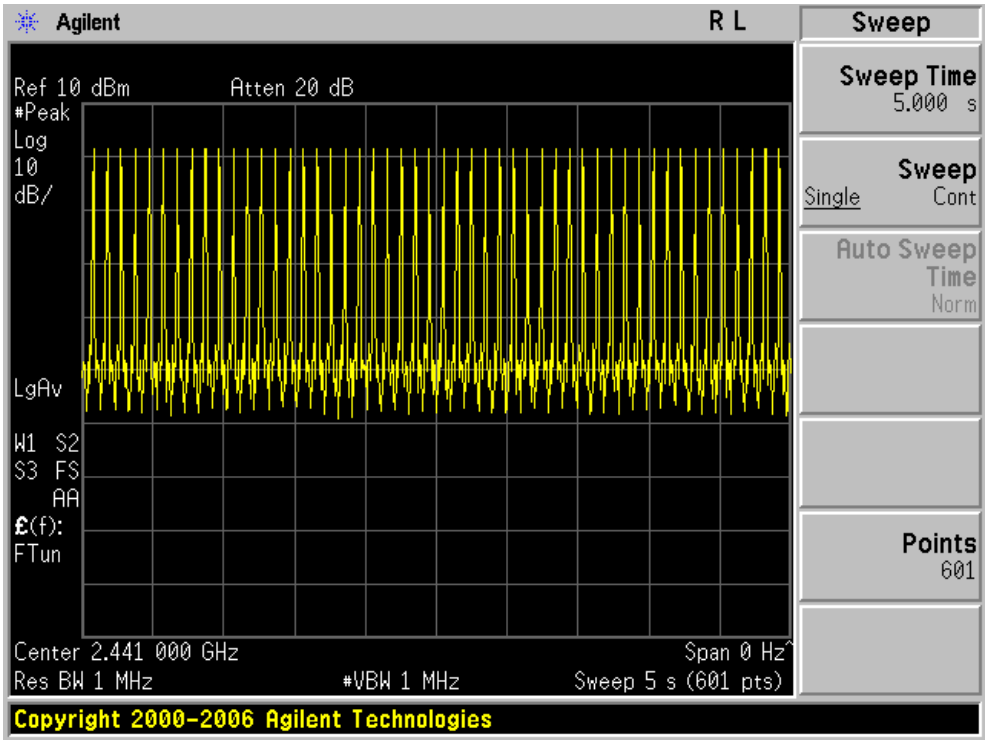
Plot see the following page

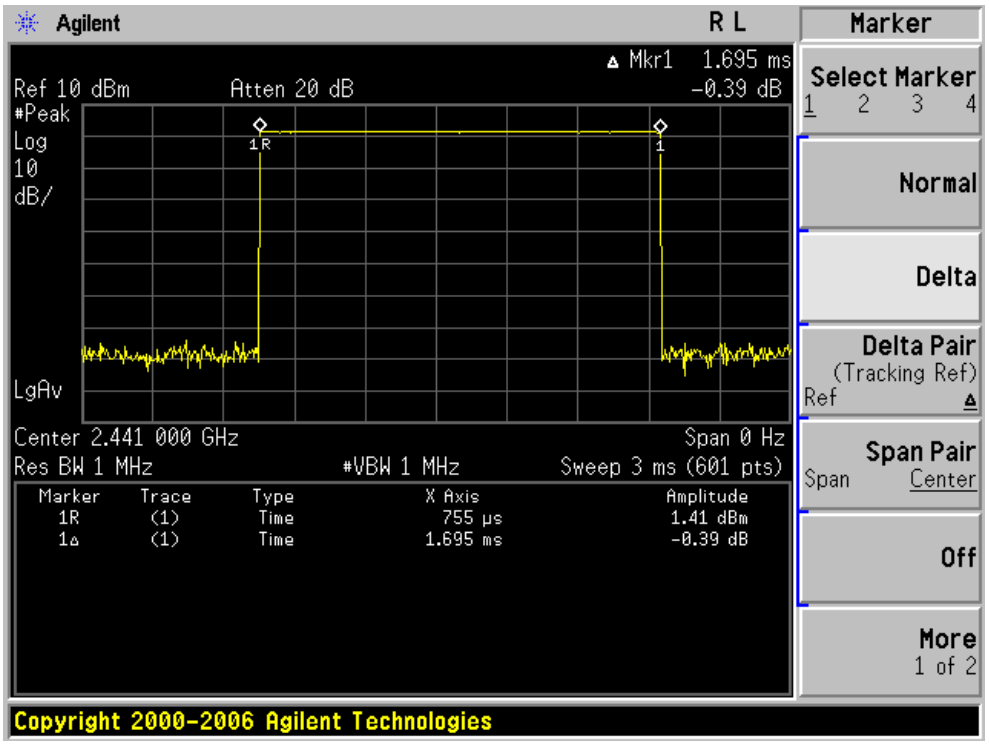
For DH1


Agilent
R T
Sweep
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Sweep Time
5.000 s
Sweep
Single Cont
Auto Sweep Time
Norm
Points
601
Center 2.441 000 0 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (601 pts)
Copyright 2000-2006 Agilent Technologies

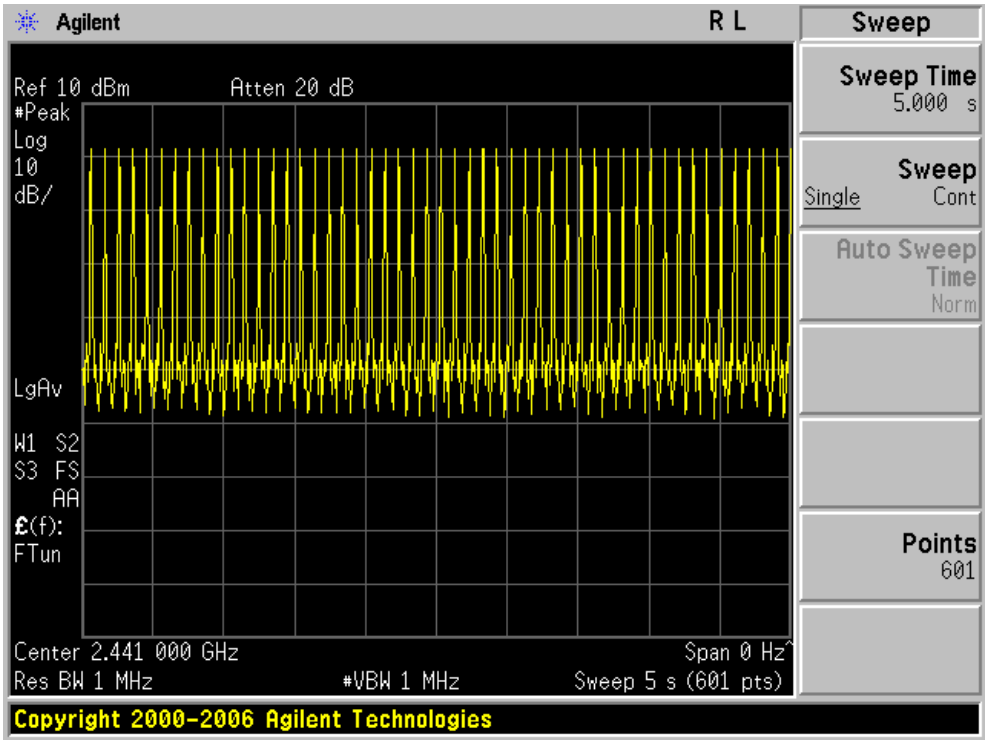

Agilent
R L
Marker
Δ Mkr1 440 µs
-0.68 dB
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
LgAv
1R
1
Select Marker
1 2 3 4
Marker Trace
Auto 1 2 3
Readout
Time
Marker Table
On Off
Marker All Off
More
2 of 2
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 1 ms (601 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 206.7 µs 0.51 dBm
1Δ (1) Time 440 µs -0.68 dB
Copyright 2000-2006 Agilent Technologies

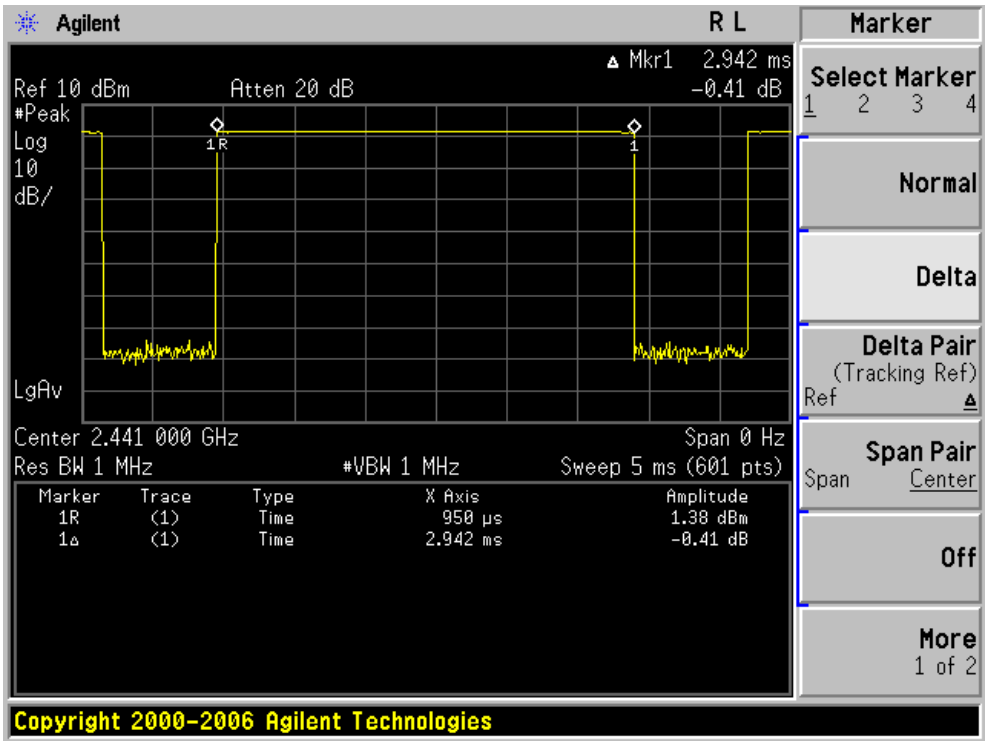
For DH3


Agilent
R L
Sweep
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Sweep Time
5.000 s
Sweep
Single
Cont
Auto Sweep Time
Norm
Points
601
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (601 pts)
Copyright 2000-2006 Agilent Technologies


Agilent
R L
Marker
Mkr1 1.695 ms
-0.39 dB
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
1R
1
LgAv
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 3 ms (601 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 755 µs 1.41 dBm
1Δ (1) Time 1.695 ms -0.39 dB
Copyright 2000-2006 Agilent Technologies

For DH5


Agilent
R L
Sweep
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Sweep Time
5.000 s
Sweep
Single
Cont
Auto Sweep Time
Norm
Points
601
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 s (601 pts)
Copyright 2000-2006 Agilent Technologies


Agilent
R L
Marker
Mkr1 2.942 ms
-0.41 dB
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
1R
1
LgAv
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 5 ms (601 pts)
Marker Trace Type X Axis Amplitude
1R (1) Time 950 µs 1.38 dBm
1Δ (1) Time 2.942 ms -0.41 dB
Copyright 2000-2006 Agilent Technologies

10- Channel separation

10.1 Requirements (15.247):

According to FCC §15.247(a)(1) RSS-210 A8.1 (b), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

10.2 Test Setup

PC	EUT Simulator	50Ω RF Cable	Test Receiver

10.3 Test Procedure

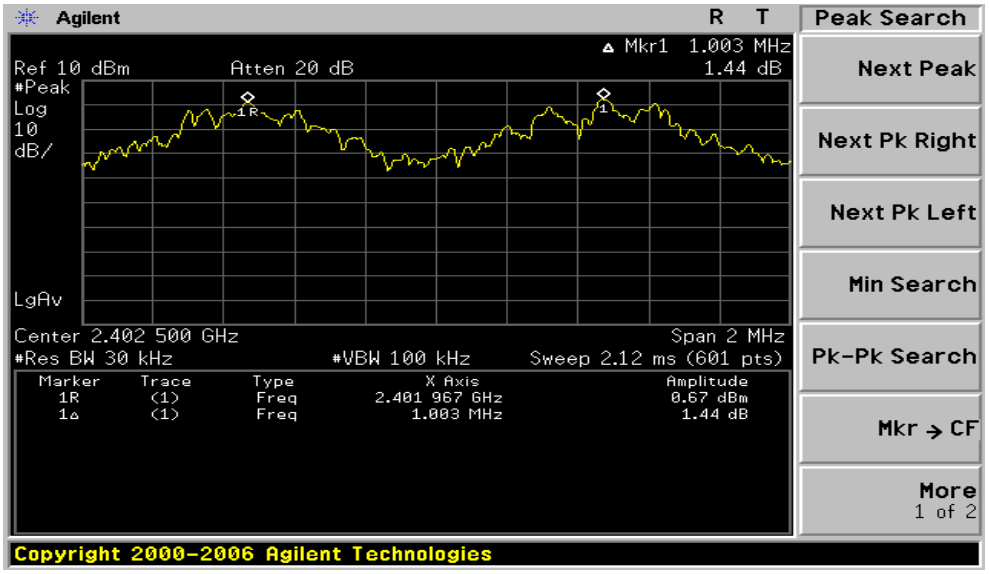
a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 30kHz, VBW =100kHz, Span = 2MHz, Sweep = auto. Detector function = peak, Trace = max hold
d. Set center frequency spectrum analyzer = middle of hopping channel.

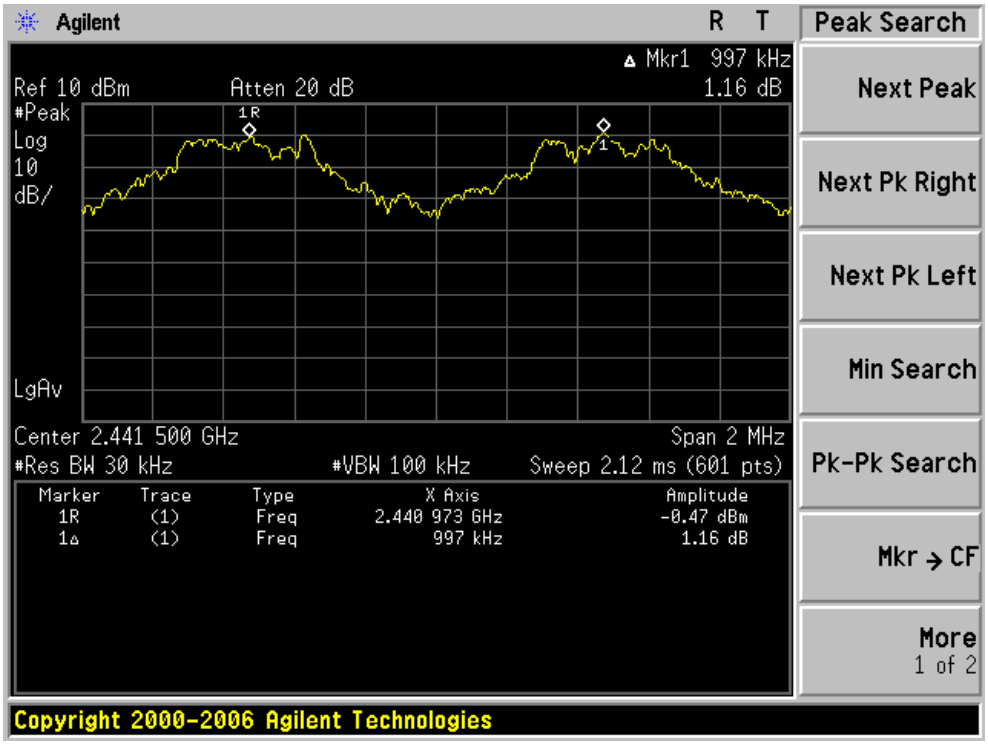
10.4 Test Results

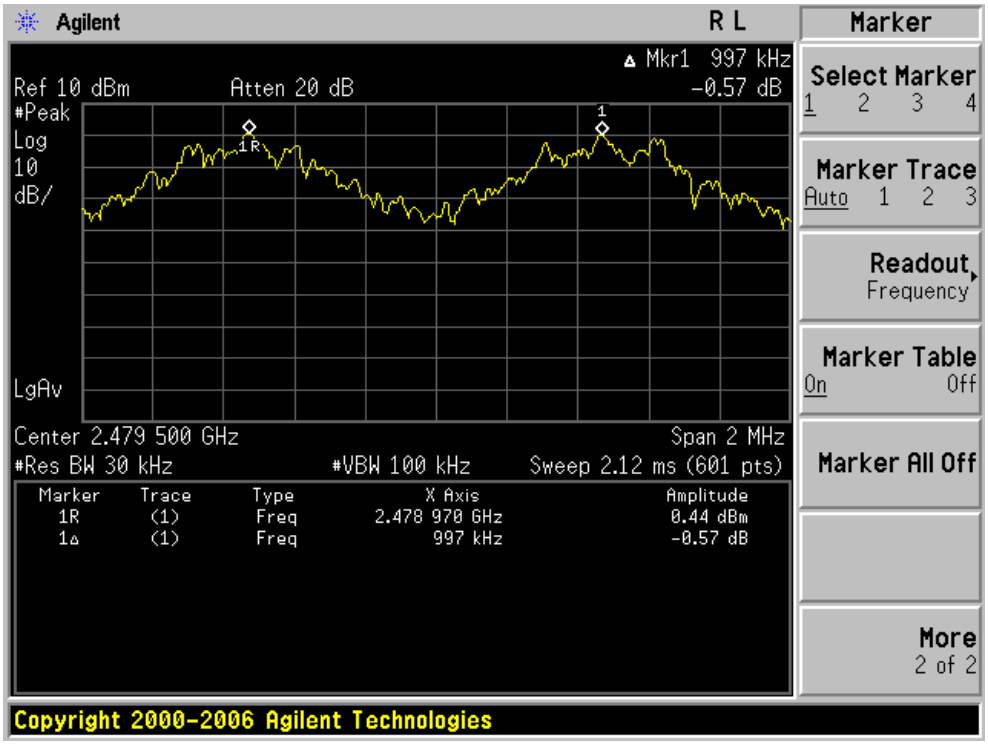
Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	TX

For any adjacent channels (e.g. the channel 37 and 38), the Module does have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of the hopping channel (1135.2kHz, refer to section 4.5), whichever is greater.

So the Test Result is PASS.




Agilent
R T
Peak Search
Mkr1 997 kHz
Ref 10 dBm
Atten 20 dB
1.16 dB
#Peak
Log
10
dB/
LgAv
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 2.441 500 GHz
Span 2 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 2.12 ms (601 pts)
Marker Trace Type X Axis Amplitude
1R (1) Freq 2.440 973 GHz -0.47 dBm
1Δ (1) Freq 997 kHz 1.16 dB
Copyright 2000-2006 Agilent Technologies


Agilent
R L
Marker
Mkr1 997 kHz
Ref 10 dBm
Atten 20 dB
-0.57 dB
#Peak
Log
10
dB/
LgAv
Select Marker
1 2 3 4
Marker Trace
Auto 1 2 3
Readout
Frequency
Marker Table
On Off
Marker All Off
More
2 of 2
Center 2.479 500 GHz
Span 2 MHz
#Res BW 30 kHz
#VBW 100 kHz
Sweep 2.12 ms (601 pts)
Marker Trace Type X Axis Amplitude
1R (1) Freq 2.478 970 GHz 0.44 dBm
1Δ (1) Freq 997 kHz -0.57 dB
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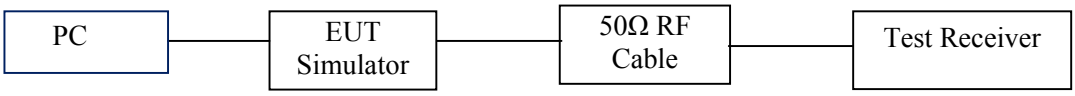
11- 100kHz Bandwidth of Frequency Band Edges

11.1 Requirements (15.247(d)):

According to FCC section 15.247(c) and RSS- A8.5, in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

11.2 Test Setup



11.3 Test Procedure

a. Place the EUT on the table and set it in the transmitting mode.
b. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
c. Set the spectrum analyzer as RBW = 100kHz, VBW =300kHz, Span = 10MHz, Sweep = auto.
d. The band edges was measured and recorded.

11.4 Test Data

Temperature (℃)	26
Humidity (%RH)	58
Barometric Pressure (mbar)	1001.1
EUT	Bluetooth Keyboard
M/N	IPAD2KB
Operating Mode	TX

Data as follows

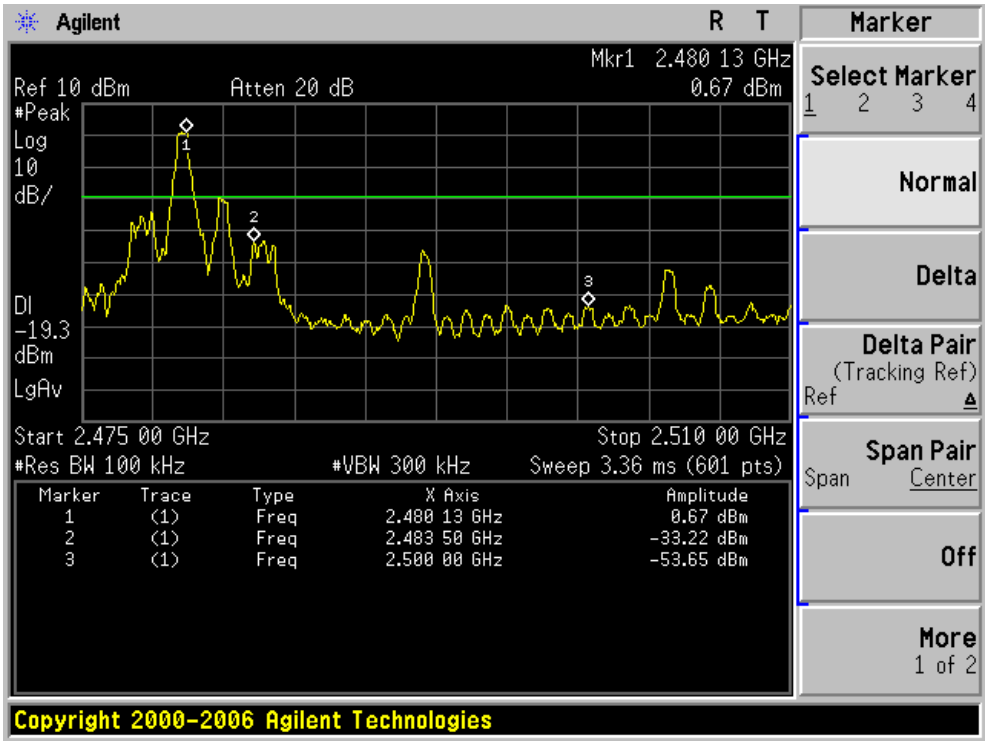
11.4.1 For radiated method.

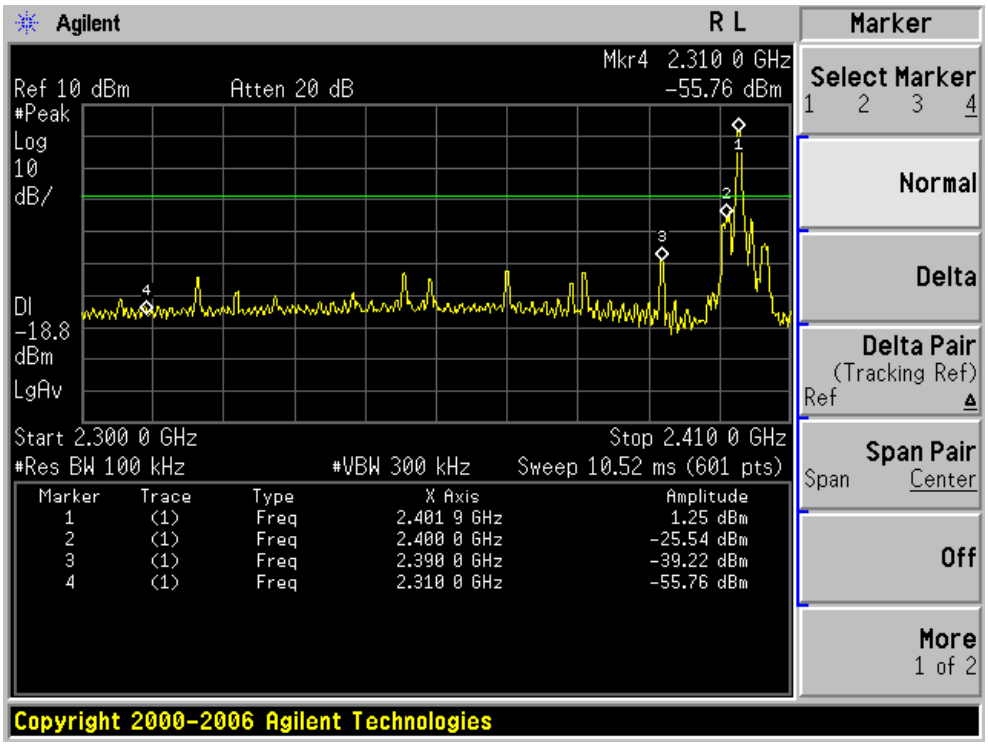
Out of Band Edge Results					
Operating Channel (MHz)	Max. Emission in the Restricted Bands (dBμV/m)		Limit(dBμV/m)		Test Result
	PK	AV	PK	AV	
2402	43.58	38.47	74	54	pass
2480	42.61	37.29	74	54	pass

11.4.2 For conducted method

Test Result: Passed

Plots, see the following page


Agilent
R T
Marker
Mkr1 2.480 13 GHz
0.67 dBm
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
Dl
-19.3
dBm
LgAv
Start 2.475 00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.510 00 GHz
Sweep 3.36 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.480 13 GHz 0.67 dBm
2 (1) Freq 2.483 50 GHz -33.22 dBm
3 (1) Freq 2.500 00 GHz -53.65 dBm
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2006 Agilent Technologies


Agilent
R L
Marker
Mkr4 2.310 0 GHz
-55.76 dBm
Ref 10 dBm
Atten 20 dB
#Peak
Log
10
dB/
Dl
-18.8
dBm
LgAv
Start 2.300 0 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.410 0 GHz
Sweep 10.52 ms (601 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.401 9 GHz 1.25 dBm
2 (1) Freq 2.400 0 GHz -25.54 dBm
3 (1) Freq 2.390 0 GHz -39.22 dBm
4 (1) Freq 2.310 0 GHz -55.76 dBm
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
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12 Antenna

12.1 Antenna requirement

FCC 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited

According to FCC Part 15, Section 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.

13.2 Antenna Type

Antenna is on the PCB. See the APPENDIX A-EUT Inside view.

Table2: The antenna gain

	Antenna gain(dBi)
Antenna	0