

FCC PART 15C TEST REPORT

REPORT NO.:VITE11110012E

MODEL NO.: BT196

FCC ID: ZOWBT196

RECEIVED: Nov. 06, 2011

TESTED: Nov.10, 2011 to Nov.18, 2011

APPLICANT: Shenzhen 3nod Electronics Co.,Ltd

ADDRESS:3NOD High-Tech Park 15# Zhongfu Road Tangxiayong Village, Industrial Zone Songgang Town, Baoan District, Shenzhen City, China

ISSUED BY: SHENZHEN UNITE-CICC SERVICES CO.,LTD.

LAB LOCATION: 21F, COFCO Building, Baoan District, Shenzhen, Guangdong, China

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SHENZHEN UNITE-CICC SERVICES CO.,LTD.

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Prepared for : Shenzhen 3nod Electronics Co.,Ltd

Address : 3NOD High-Tech Park 15# Zhongfu Road Tangxiayong Village, Industrial

Zone Songgang Town, Baoan District, Shenzhen City, China

Manufacture : Shenzhen 3nod Electronics Co.,Ltd

Address : 3NOD High-Tech Park 15# Zhongfu Road Tangxiayong Village, Industrial

Zone Songgang Town, Baoan District, Shenzhen City, China

Product : i-Station Bluetooth 2

Model No. : BT196

Trademark : Logic3

Test Standard : FCC Part 15 section 15.203, section 15.205, section 15.207, section 15.209 and

section 15.247

Prepared by : SHENZHEN UNITE-CICC SERVICES CO.,LTD.

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Prepared by :

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(Engineer)

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Approved by .

(Manager)

Report Number : VITE1111012E

Date of Test : Nov.10, 2011 to Nov.18, 2011

Date of Report : Nov.18, 2011

The device described above is tested by SHENZHEN UNITE-CICC SERVICES CO.,LTD. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. This report applies to above tested sample only and shall not be reproduced in part without written approval of SHENZHEN UNITE-CICC SERVICES CO.,LTD.

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1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT : I-Station Bluetooth 2

Brand Name : Logic3

Model Number : BT196

S/N : N/A

Hardware Version : N/A

Software Version : N/A

Power Supply : Battery DC 3.7V, USB 5V

Main Cable : USB cable, Audio-in Cable

Frequency range: : Bluetooth:2402~2480 MHz

Modulation : FHSS(GFSK)

:

Antenna Gain: : 0dBi

Type of Antenna : Integral Antenna

Manufacturer : Shenzhen 3nod Electronics Co.,Ltd

Address : 3NOD High-Tech Park 15# Zhongfu Road Tangxiayong

Village, Industrial Zone Songgang Town, Baoan District,

Shenzhen City, China

1.2. Test Standards

Tes	Test Standards/Items					
§ 15.207	Conducted Emission					
§ 15.209	Radiated Emission					
§ 15.203;§ 15.247(b)(4)(i)	Antenna Requirement					
§ 15.247(b)(1)	Max Peak Power					
§ 15.247 (c)	Band Edge Measurement					
§ 15.247(a)	20dB Bandwidth					
§ 15.247 (a) (1) (iii)	Number of Hopping Frequency Used					
§ 15.247 (a) (1) (ii)	Spectrum Bandwidth of FHSS device					
§ 15.247 (a)(1)	Hopping Channel Separation					
§ 15.247 (a)(1) (iii)	Dwell Time					

1.3. Measurement Uncertainty

Radiation Uncertainty : $Ur = \pm 3.84dB$

Conduction Uncertainty : $Uc = \pm 2.72dB$

2. MEASURING DEVICE AND TEST FACILITY

2.1. Measurement Facilities List

Item	Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal.
			No.			Interval
1	Test Receiver	Rohde & Schwarz	ESCI	100687	2011.04.07	1 Year
2	L.I.S.N	Kyoritsu	KNW-407	8-1198-1	2011.04.07	1 Year
3	L.I.S.N	Kyoritsu	KNW-407	8-1152-11	2011.04.07	1 Year
4	Horn Antenna	SCHWARZBECK	BBHA9120	B08000991-	2011.04.07	1 Year
				0001		
5	Trilog Broadband Antenna	SCHWARZBECK	VULB 9163	9163-324	2011.04.07	1 Year
6	Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495.30	2011.04.07	1 Year
7	Signal Generator	MARCONI INSTRUMENTS	2024	112260/0442	2011.04.07	1 Year
8	Amplifier	SCHWARZBECK	BBV9718	9718-182	2011.04.07	1 Year
9	Test Receiver	Advantest	R3182	14060028	2011.04.07	1 Year

2.2.Test Facility

Test Laboratory:

FCC – Registration No.: 338263

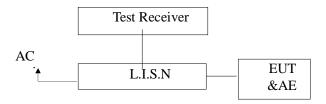
Shenzhen Bontek Compliance Testing Laboratory Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March, 2008.

IC Registration No.: 7631A

The 3m alternate test site of Shenzhen Bontek Compliance Testing Laboratory Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on August, 2009.

3. CONDUCTED EMISSION MEASUREMENT

3.1 Block Diagram of Test Setup



3.2 Measuring Standard

According as FCC 15.207 requirements and testing conducted refer to ANSI C63.4, American national Standard for methods of measurement of radio-noise emission from low voltage electrical and electronic equipment in the range of 9kHz to 40GHz.

3.3 Conducted Emission Limits

Frequency	Limit (dBµV)				
(MHz)	Quasi-peak	Average Level			
	Level				
0.15 0.50	66.0 ~ 56.0 *	59.0 ~ 46.0 *			
0.50 5.00	56.0	46.0			
5.00 30.00	60.0	50.0			

Remark: * means decreasing linearly with logarithm of frequency.

3.4 EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet ANSI C63.4 requirements and operating in a manner, which tends to maximize its emission characteristics in a normal application.

3.5 Operating Condition of EUT

- 3.5.1. Setup the EUT as shown on Section 3.1.
- 3.5.2. Turn on the power of all equipments.
- 3.5.3. Let the EUT work in measuring mode (NORMAL) and measure it.

3.6 Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through a Line Impedance Stability Network (L.I.S.N). This provided 50ohm-coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the ANSI C63.4 regulations during conducted emission measurement.

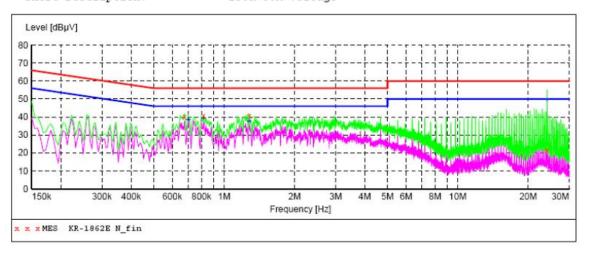
The bandwidth of the field strength meter (R&S Test Receiver ESCI) is set at 9KHz. The frequency range from 150kHz to 30MHz is investigated.

3.7 Measuring Results

Following Diagram/Table of Conducted Emissions Test

Neutral Port

SCAN TABLE: "Voltage (9K-30M)FIN" Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "KR-1862E N fin"

11/10/2011 17	:05						
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.676500	40.00	10.2	56	16.0	QP	N	GND
0.816000	40.50	10.1	56	15.5	QP	N	GND
1.279500	40.50	10.1	56	15.5	QP	N	GND
24.049500	21.40	10.8	60	38.6	QP	N	GND

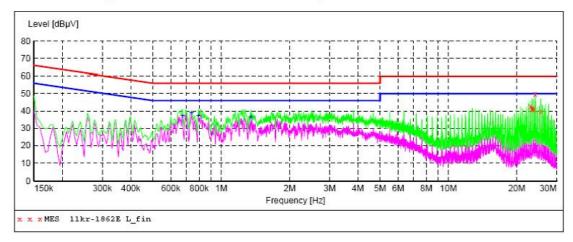
MEASUREMENT RESULT: "KR-1862E N_fin2"

11/10/2011 17	:05						
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.703500	38.30	10.2	46	7.7	AV	N	GND
0.816000	39.10	10.1	46	6.9	AV	N	GND
1.279500	37.60	10.1	46	8.4	AV	N	GND
24.094500	49.80	10.8	50	0.2	AV	N	GND

Line Port

SCAN TABLE: "Voltage (9K-30M) FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "11kr-1862E L fin"

11/10/2011 1	16:59						
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
22.942500	42.80	10.7	60	17.2	QP	L1	GND
23.361000	41.10	10.7	60	18.9	QP	L1	GND
23.379000	42.00	10.7	60	18.0	QP	L1	GND
23.797500	40.80	10.8	60	19.2	QP	L1	GND
24.094500	49.70	10.8	60	10.3	QP	L1	GND
25.489500	39.60	10.8	60	20.4	QP	L1	GND

MEASUREMENT RESULT: "11kr-1862E L_fin2"

11/10/2011	16:59						
Frequency MH2		Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.676500	37.10	10.2	46	8.9	AV	L1	GND
0.739500	38.90	10.2	46	7.1	AV	L1	GND
0.793500	37.40	10.1	46	8.6	AV	L1	GND
1.351500	36.40	10.1	46	9.6	AV	L1	GND
24.094500	49.90	10.8	50	0.1	AV	L1	GND

4. ANTENNA REQUIREMENT

4.1 Standard Requirement

According to FCC 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 this section.

4.2 Measuring Result

This product antenna is the integral antenna, fulfill the requirement of this section.

5. NUMBER OF HOPPING CHANNELS AND CHANNEL SPACING

5.1 Standard applicable

According to §15.247(a)(1), frequency hopping system 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. and frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

5.2 Measuring Standard

According to FCC 22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.3 Test Procedure

The bandwidth of the SA/Receiver is set at 100 kHz. Bandwidth Test Procedure The Transmitter output of EUT was connected to the spectrum analyzer. The 20 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows:

Equipment mode Spectrum analyzer

Detector function Peak mode

RBW 100KHz ($\geq 1\%$ of the 20 dB bandwidth)

VBW 300KHz

Hopping Channel Separation Test Procedure

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.

Equipment mode: Spectrum analyzer

RBW: 100 KHz VBW: 300 KHz SPAN: 3MHz

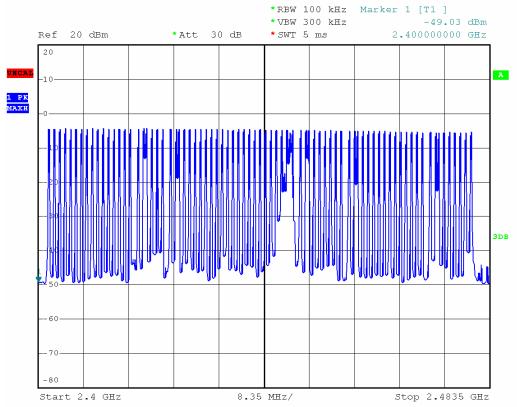
- 2. By using the Max-Hold function record the separation of two adjacent channels.
- 3. Measure the frequency difference of these two adjacent channels by spectrum analyzer Marker function.
- 4. Repeat above procedures until all frequencies measured were complete.

Test 26dB down emission bandwidth and record.

5.4 Measuring Results

Number of Hopping Frequency Used

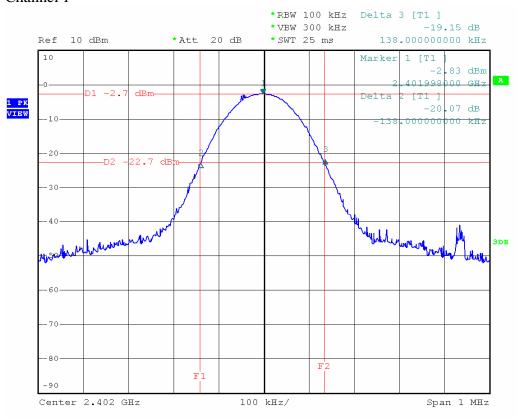
Flowing the test diagram



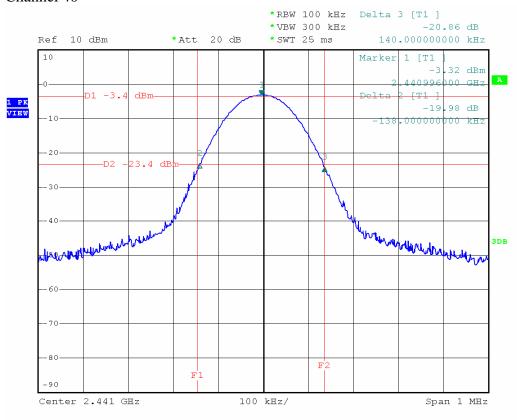
Test condition: DH1 20dB Bandwidth

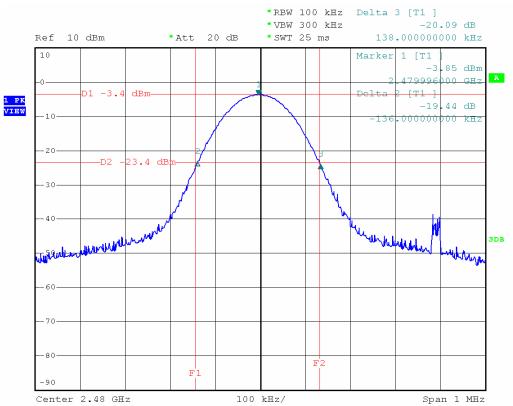
Channel	Frequency (MHz)	20dB Emission Bandwidth (kHz)
1	2402	276
40	2441	278
79	2480	274

Following the test diagram Channel 1



Channel 40

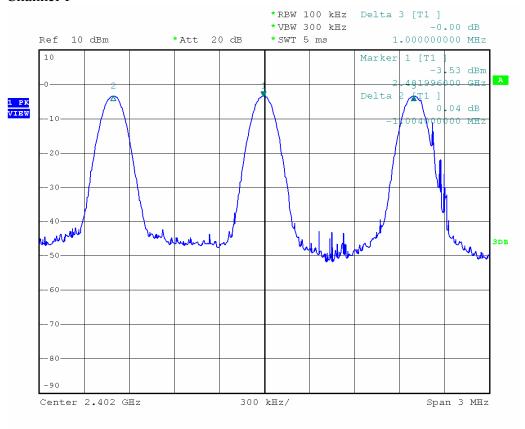




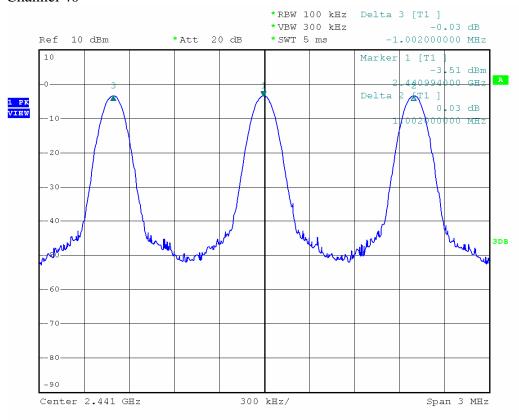
Hopping Channel Separation

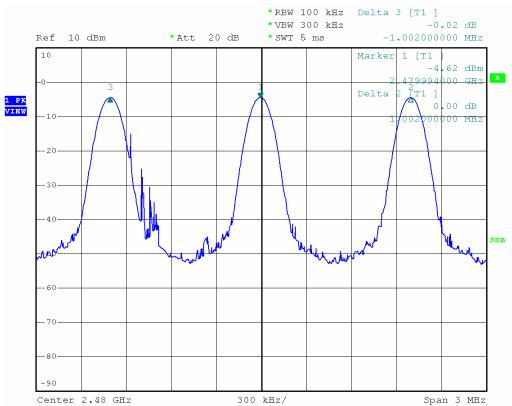
<u>_</u>			
	Channel	Frequency (MHz)	Separation (kHz)
	1	2402	1004
	40	2441	1002
	79	2480	1002

Following the test diagram



Channel 40





6. DWELL TIME OF A HOPPING CHANNEL

6.1 Standard Applicable

According to 15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

6.2 Test Procedure

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.

Equipment mode: Spectrum analyzer

RBW: 1MHz VBW: 1MHz SPAN: Zero Span

- 2. Adjust the center frequency of spectrum analyzer on any frequency be measured.
- 3. Measure the Dwell Time by spectrum analyzer Marker function.
- 4. Repeat above procedures until all frequencies measured were complete.

6.3 Measuring Results

Mode	Channel (MHz)	SA Reading (µs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH5	2402	414	264.96	<400	Pass
DH5	2441	416	266.24	<400	Pass
DH5	2480	414	264.96	<400	Pass

A period time=79x0.4(s)=31.6(s)

CH₁

DH1 time slot= $414(\mu s)*(1600/(1*79))*31.6= 264.96$ (ms)

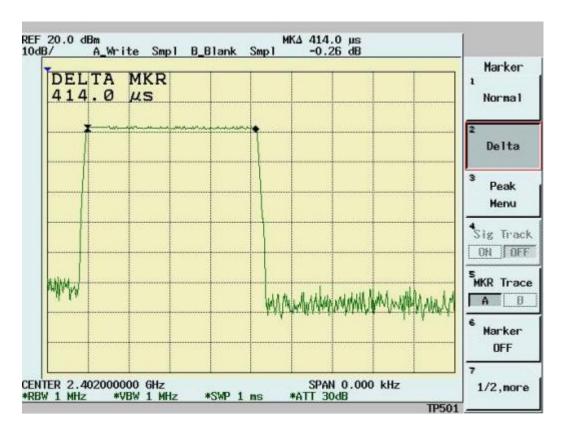
CH40

DH1 time slot= $416(\mu s)*(1600/(1*79))*31.6= 266.24$ (ms)

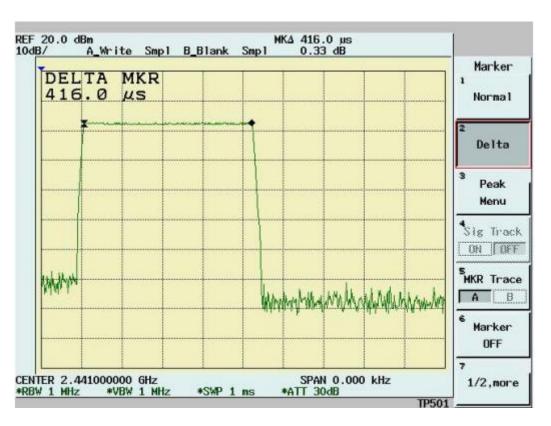
CH79

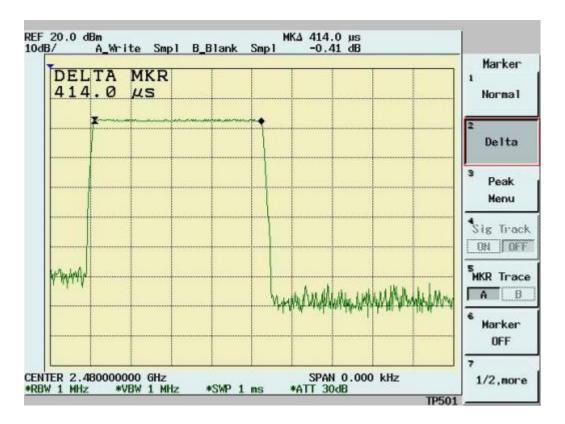
DH1 time slot= $414(\mu s)*(1600/(1*79))*31.6= 264.96$ (ms)

Please refer to the following test diagram Channel 1



Channel 40:





7. MAX PEAK POWER MEASUREMENT

7.1 Standards Applicable

According to 15.247(b)(1). For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400 –2483.5 MHz band: 0.125 watts.

7.2 Test Procedure

The Transmitter output of EUT was connected to the Spectrum analyzer.

The test performed in accordance with FCC document "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems", March 30, 2000.

Equipment mode Spectrum analyzer

Detector function Peak

RBW > the 20 dB bandwidth of the emission being measured

VBW ≥ RBW

SPAN approximately 5 times the 20 dB bandwidth

Center frequency fundamental frequency tested

Sweep time auto

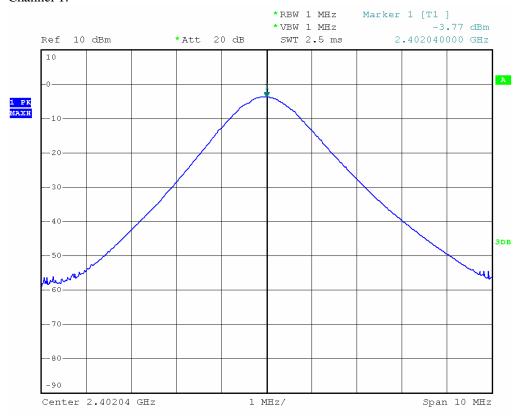
7.3 Test data

Refer the following table of testing data

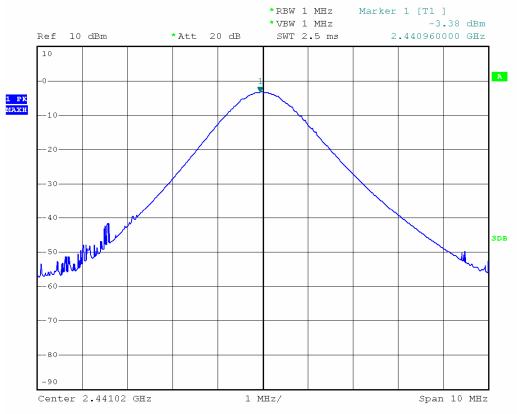
Channel	Frequency (MHz)	SA Reading (dBm)	Loss (dB)	Peak Power (dBm)	Peak Power (mW)	Limit (dBm)	Pass/Fail
1	2402	-3.77	1.10	-2.67	0.5408	30	Pass
40	2441	-3.38	1.10	-2.28	0.5916	30	Pass
79	2480	-3.98	1.10	-2.88	0.5152	30	Pass

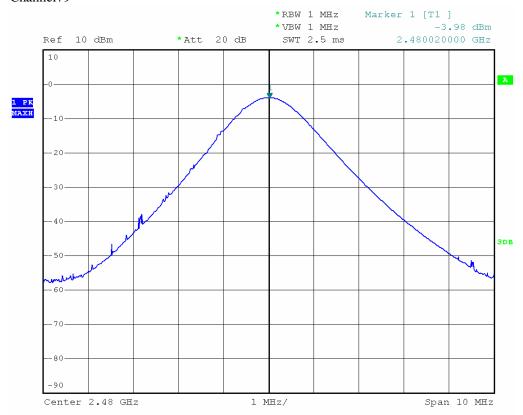
Following the test diagram:

Channel 1:



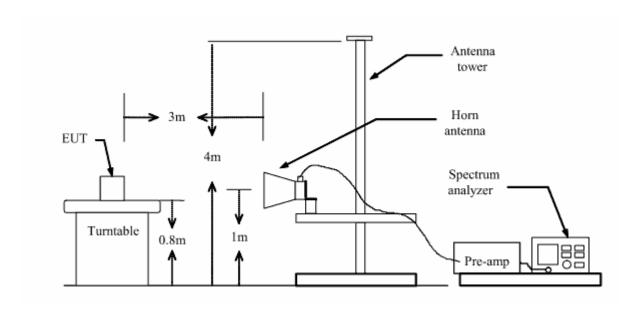
Channel 40:





8. SPURIOUS RADIATEDEMISSION MEASUREMENT

8.1 Block Diagram of Test Setup



8.2 Measuring Standard

According to FCC 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P) dB$.

8.3 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz–25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission.

While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to EMI Receiver/Spectrum Analyzer Configuration.

For the test of 2nd to 10th harmonics frequencies, the equipment setup was also referred to EMI Receiver/Spectrum Analyzer Configuration. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

8.4 Test data

Refer the following table of testing data

For 9kHz-1GHz Field Radiated Emission (DH1 Transmitting Mode, Worst frequency point record)

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
	Low Channel (1G to 25GHz)									
4804.0	AV	43.2	57	Н	34.1	5.2	33.0	49.5	54	-4.5
4804.0	AV	40.4	35	V	34.1	5.2	33.0	46.7	54	-7.3
7206.0	AV	32.1	60	Н	37.4	6.1	33.5	42.1	54	-11.9
7206.0	AV	28.9	79	V	37.4	6.1	33.5	38.9	54	-15.1
2402.0	AV	84.6	45	Н	29.1	3.7	34.0	83.4		(Fund.)
2402.0	AV	82.0	359	V	29.1	3.7	34.0	80.8		(Fund.)
4804.0	PK	46.4	65	Н	37.4	6.1	33.5	56.4	74	-17.6
4804.0	PK	45.3	98	V	34.1	5.2	33.0	51.6	74	-22.4
7206.0	PK	41.6	256	Н	34.1	5.2	33.0	47.9	74	-26.1
7206.0	PK	33.5	185	V	37.4	6.1	33.5	43.5	74	-30.5
2402.0	PK	89.0	78	Н	29.1	3.7	34.0	87.8		(Fund.)
2402.0	PK	85.4	44	V	29.1	3.7	34.0	84.2		(Fund.)
			M	ddle (Channel	(1G to 2	25GHz)			
4882.0	AV	46.0	21	Н	34.1	5.2	33.0	52.3	54	-1.7
4882.0	AV	43.4	34	V	34.1	5.2	33.0	49.7	54	-4.3
7323.0	AV	36.4	342	Н	37.4	6.1	33.5	46.4	54	-7.6
7323.0	AV	32.8	30	V	37.4	6.1	33.5	42.8	54	-11.2
2441.0	AV	86.7	98	Н	29.1	3.7	34.0	85.5		(Fund.)
2441.0	AV	84.3	72	V	29.1	3.7	34.0	83.1		(Fund.)
4882.0	PK	48.2	237	Н	37.4	6.1	33.5	58.2	74	-15.8
4882.0	PK	45.7	354	V	37.4	6.1	33.5	55.7	74	-18.3
7323.0	PK	43.1	264	Н	34.1	5.2	33.0	49.4	74	-24.6
7323.0	PK	39.9	187	V	34.1	5.2	33.0	46.2	74	-27.8
2441.0	PK	89.4	55	Н	29.1	3.7	34.0	88.2		(Fund.)
2441.0	PK	86.9	49	V	29.1	3.7	34.0	85.7		(Fund.)

High Channel (1G to 25GHz)											
4960.0	AV	38.2	17	Н	37.4	6.1	33.5	48.2	54	-5.8	
4960.0	AV	35.7	13	V	37.4	6.1	33.5	45.7	54	-8.3	
7440.0	AV	33.8	355	Н	34.1	5.2	33.0	40.1	54	-13.9	
7440.0	AV	31.2	66	V	34.1	5.2	33.0	37.5	54	-16.5	
2480.0	AV	82.8	63	Н	29.1	3.7	34.0	81.6		(Fund.)	
2480.0	AV	79.5	85	V	29.1	3.7	34.0	78.3		(Fund.)	
4960.0	PK	49.2	50	Н	34.1	5.2	33.0	55.5	74	-18.5	
4960.0	PK	45.5	59	V	34.1	5.2	33.0	51.8	74	-22.2	
7440.0	PK	36.3	269	Н	37.4	6.1	33.5	46.3	74	-27.7	
7440.0	PK	33.4	64	V	37.4	6.1	33.5	43.4	74	-30.6	
2480.0	PK	87.1	85	Н	29.1	3.7	34.0	85.9		(Fund.)	
2480.0	PK	83.5	55	V	29.1	3.7	34.0	82.3		(Fund.)	

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

9. BAND EDGE TEST

9.1 Test Standard

According to §15.247 (d) 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 power limits.

9.2 Test Procedure

Conducted

1. The transmitter output of EUT was connected to the spectrum analyzer.

Equipment mode: Spectrum analyzer

Detector function: Peak mode

SPAN: 100MHz RBW: 100KHz VBW: 100KHz

Center frequency: 2.375GHz, 2.5GHz.

- 2.Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
- 3. Find the next peak frequency outside the operation frequency band Radiated
- 1. Antenna and Turntable test procedure same as Radiated Emission Measurement.

Equipment mode: Spectrum analyzer

Detector function: Peak mode

SPAN: 100MHz RBW: 100KHz VBW: 100KHz

Center frequency: 2.375GHz, 2.5GHz.

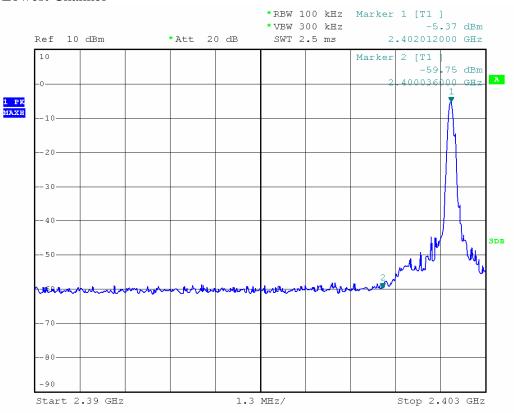
- 2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
- 3. Find the next peak frequency outside the operation frequency

9.3 Test Results

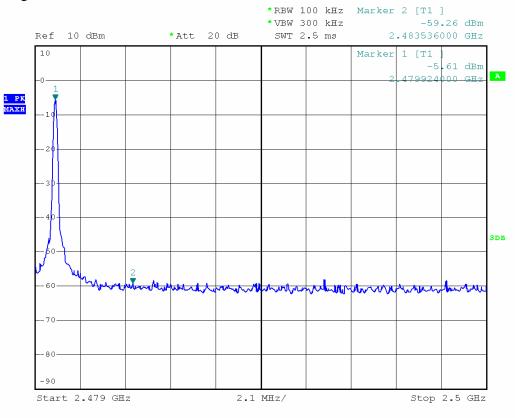
Please refer to the following table and diagram page

Channel	Frequecny	SA Reading	Carrier	Pass/Fail	
	(MHz)	(dBm)	outside		
			Band >20dB		
1	2402	-5.37			
/	2400	-59.75	54.38	Pass	
79	2497.9	-5.61			
/	2483.5	-59.26	53.65	Pass	

Lowest Channel



Highest Channel



-----The End Report -----