

FCC REPORT

Applicant: Hobbico, Inc.

Address of Applicant: 2904 Research Road Champaign, Illinois, USA

Equipment Under Test (EUT)

Product Name: Tactic TTX240 2.4GHz Transmitter

Model No.: TTX240, 224

FCC ID: IYFTTX240PA

Trade Mark: Tower Hobbies, TACTIC

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: 09 Dec., 2013

Date of Test: 10 Dec., to 25 Dec., 2013

Date of report issued: 26 Dec., 2013

Test Result: PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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2 Version

Version No.	Date	Description
00	26 Dec., 2013	Original

Prepared by: Shirley Li **Date:** 26 Dec., 2013
Report Clerk

Reviewed by: Wimer Zhang **Date:** 26 Dec., 2013
Project Engineer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	N/A
Conducted Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable for battery-powered equipment.

5 General Information

5.1 Client Information

Applicant:	Hobbico, Inc.
Address of Applicant:	2904 Research Road Champaign, Illinois, USA
Manufacturer:	Hobbico, Inc.
Address of Manufacturer:	2904 Research Road Champaign, Illinois, USA

5.2 General Description of E.U.T.

Product Name:	Tactic TTX240 2.4GHz Transmitter
Model No.:	TTX240,224
Operation Frequency:	2403MHz~2480MHz
Number of channel:	15
Modulation type:	GFSK
Modulation technology:	FHSS
Antenna Type:	External antenna
Antenna gain:	0dBi
Power supply:	4* 1.5 V "AA" Battery
Remark:	<p>Note: 1. EUT short description is used to simplify the identification of the EUT in this test report.</p> <p>2. The Model: TTX240,224 were identical inside, the electrical circuit design, layout, components used and internal wiring, The difference as below :</p> <p>TTX240 and 224 the different just being model name and Brand.</p>

Channel List			
Channel	Frequency	Channel	Frequency
0	2403MHz	8	2447MHz
1	2408MHz	9	2452MHz
2	2414MHz	10	2458MHz
3	2419MHz	11	2463MHz
4	2425MHz	12	2469MHz
5	2430MHz	13	2474MHz
6	2436MHz	14	2480MHz
7	2441MHz		
Remark: Channel 1, 7 & 14 selected for test.			

5.3 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with modulation.
<p>The sample was placed 0.8m above the ground plane of 3m chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working with a fresh battery, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	

5.4 Laboratory Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> ● FCC - Registration No.: 817957 Shenzhen Zhongjian Nanfang Testing 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 out files. Registration 817957, February 27, 2012. ● IC - Registration No.: 10106A-1 The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1. ● CNAS - Registration No.: CNAS L6048 Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.
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5.5 Laboratory Location

<p>Shenzhen Zhongjian Nanfang Testing Co., Ltd. Address: No.B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China Tel: +86-755-23118282 Fax: +86-755-23116366</p>
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5.6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	June 09 2013	June 08 2014
2	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CCIS0005	May 25 2013	May 24 2014
3	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	CCIS0006	May 25 2013	May 24 2014
4	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
5	Coaxial Cable	CCIS	N/A	CCIS0016	Apr. 01 2013	Mar. 31 2014
6	Coaxial Cable	CCIS	N/A	CCIS0017	Apr. 01 2013	Mar. 31 2014
7	Coaxial cable	CCIS	N/A	CCIS0018	Apr. 01 2013	Mar. 31 2014
8	Coaxial Cable	CCIS	N/A	CCIS0019	Apr. 01 2013	Mar. 31 2014
9	Coaxial Cable	CCIS	N/A	CCIS0087	Apr. 01 2013	Mar. 31 2014
10	Amplifier(10kHz-1.3GHz)	HP	8447D	CCIS0003	Apr. 01 2013	Mar. 31 2014
11	Amplifier(1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	June 09 2013	June 08 2014
12	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	Apr. 01 2013	Mar. 31 2014
13	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 30 2013	Mar. 29 2014
14	Printer	HP	HP LaserJet P1007	N/A	N/A	N/A
15	Positioning Controller	UC	UC3000	CCIS0015	N/A	N/A
16	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP	CCIS0023	May. 25 2013	May. 24 2014
17	EMI Test Receiver	Rohde & Schwarz	ESPI	CCIS0022	Apr 01 2013	Mar. 31 2014
18	Loop antenna	Laplace instrument	RF300	EMC0701	Aug. 12 2012	Aug. 11 2013
19	Universal radio communication tester	Rhode & Schwarz	CMU200	CCIS0069	May. 25 2013	May. 24 2014
20	Signal Analyzer	Rohde & Schwarz	FSIQ3	CCIS0088	May. 25 2013	May. 24 2014

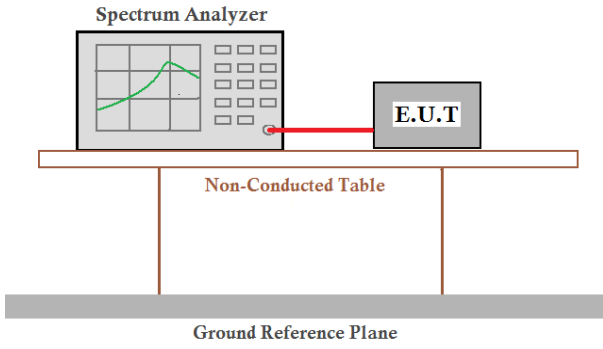
Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	June 09 2013	June 08 2014
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	May 25 2013	May 24 2014
3	LISN	CHASE	MN2050D	CCIS0074	Apr 01 2013	Mar. 31 2014
4	Coaxial Cable	CCIS	N/A	CCIS0086	Apr. 01 2013	Mar. 31 2014
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

6.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
<p><i>15.203 requirement:</i> <i>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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</i></p> <p><i>15.247(c) (1)(i) requirement:</i> <i>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</i></p>	
E.U.T Antenna:	
<p><i>The antenna is an external antenna which permanently attached, and the best case gain of the antenna is 0 dBi.</i></p>	
	

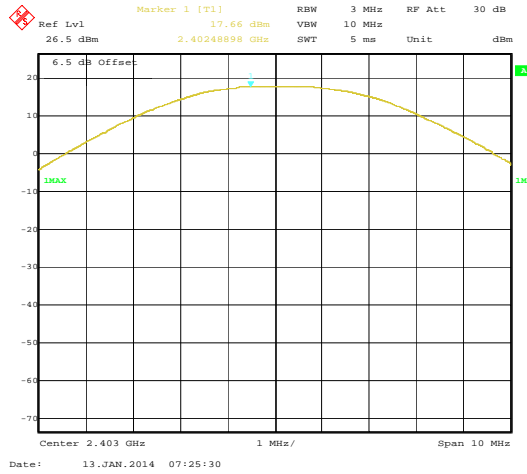
6.2 Conducted Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2003 and DA00-705
Receiver setup:	RBW=1MHz, VBW=3MHz, Detector=Peak (If 20dB BW ≤ 1 MHz) RBW=3MHz, VBW=10MHz, Detector=Peak (If 20dB BW > 1 MHz and < 3MHz)
Limit:	125 mW(21 dBm)
Test setup:	 <p>The diagram shows a Spectrum Analyzer and an E.U.T. (Equipment Under Test) connected by a red cable. They are positioned on a table labeled 'Non-Conducted Table'. Below the table is a 'Ground Reference Plane'.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode
Test results:	Pass

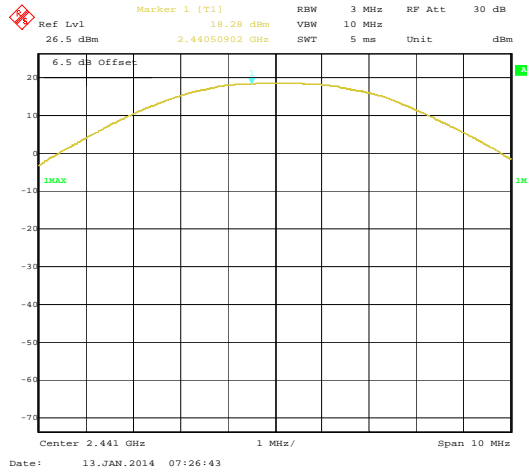
Measurement Data

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	17.66	21.00	Pass
Middle	18.28	21.00	Pass
Highest	18.55	21.00	Pass

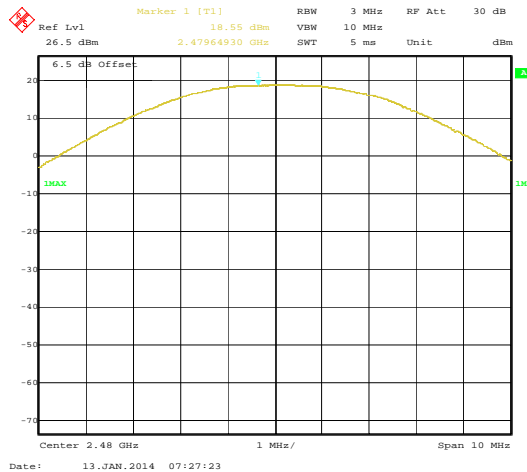
Test plot as follows:



Lowest channel

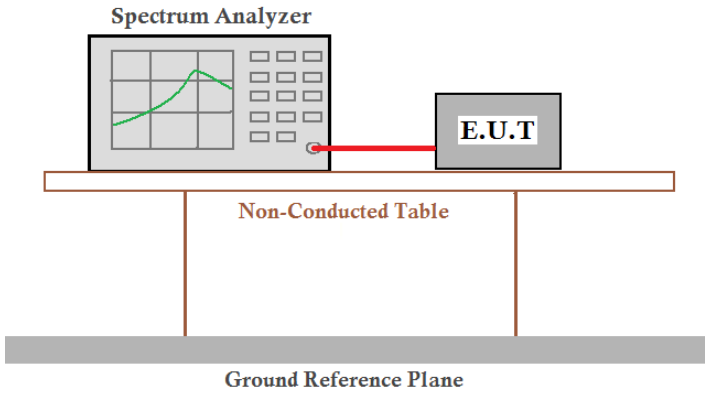


Middle channel



Highest channel

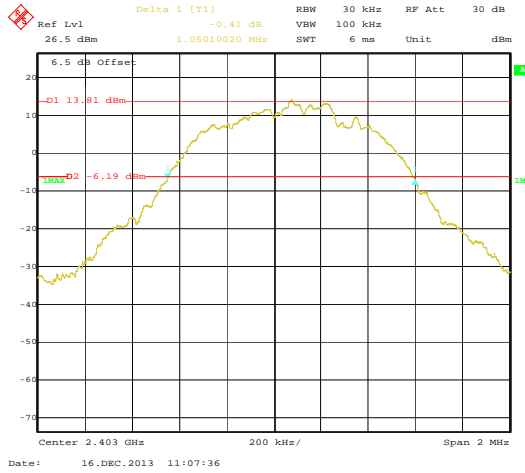
6.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003 and DA00-705
Receiver setup:	RBW=30 kHz, VBW=100 kHz, detector=Peak
Limit:	NA
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode
Test results:	Pass

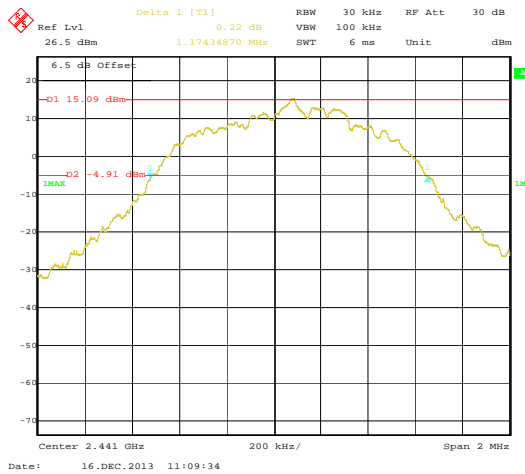
Measurement Data

Test channel	20dB Occupy Bandwidth (kHz)
Lowest	1050
Middle	1174
Highest	1126

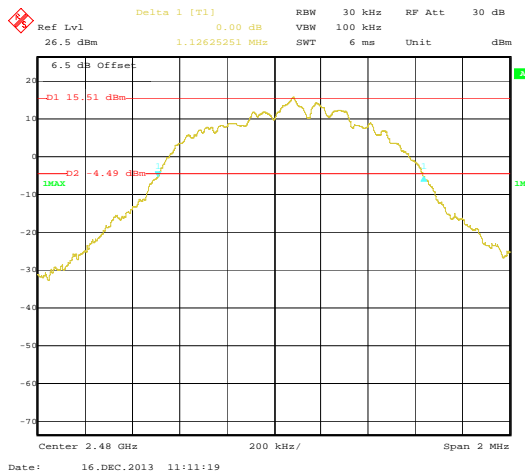
Test plot as follows:



Lowest channel

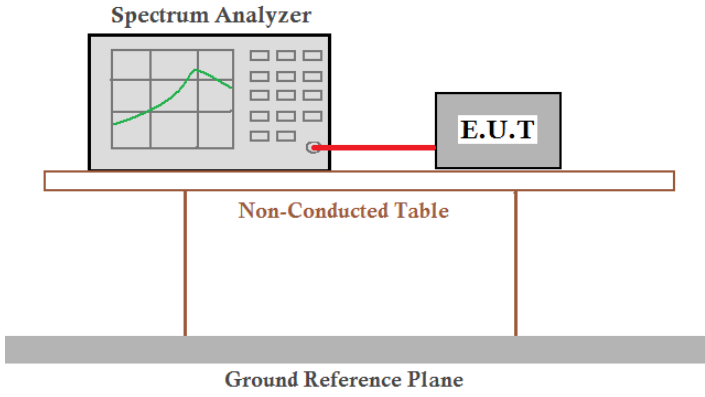


Middle channel



Highest channel

6.4 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is positioned above a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Hopping mode
Test results:	Pass

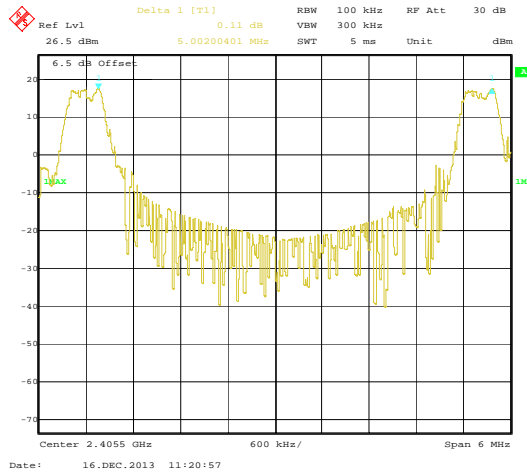
Measurement Data

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	5002	782.667	Pass
Middle	6018	782.667	Pass
Highest	6018	782.667	Pass

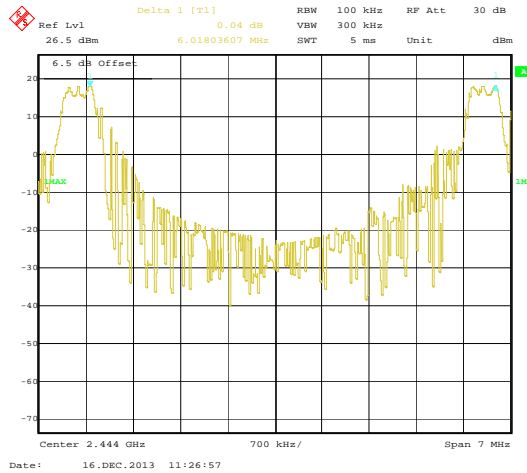
Note: According to section 6.4

20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
1174	782.667

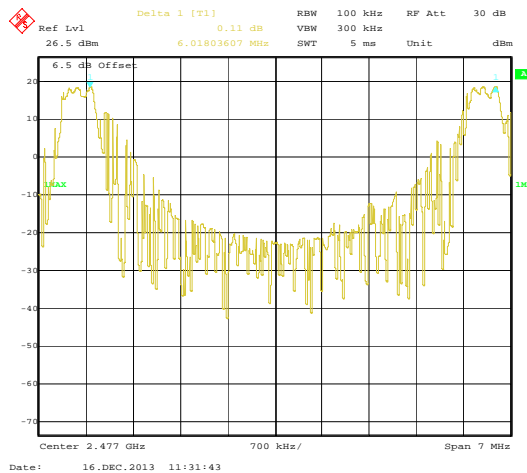
Test plot as follows:



Lowest channel

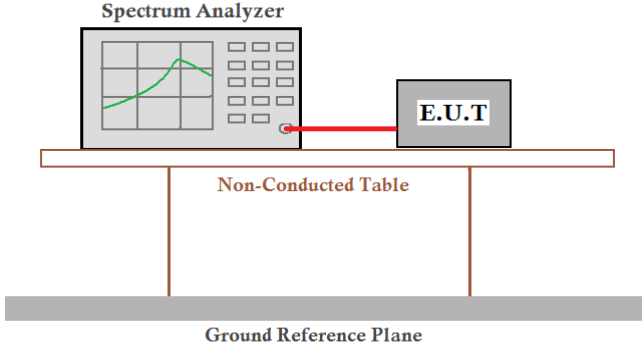


Middle channel



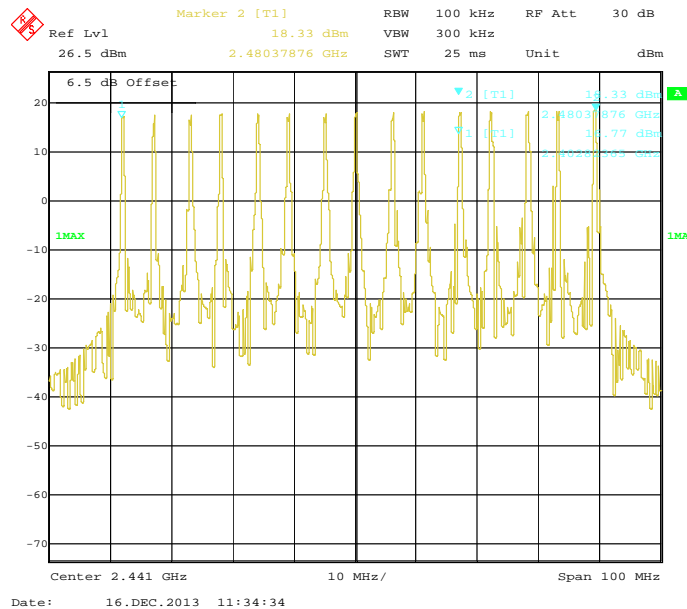
Highest channel

6.5 Hopping Channel Number

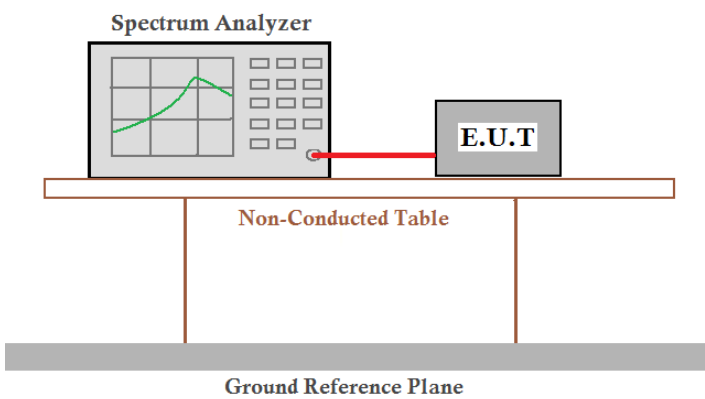
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data:

Hopping channel numbers	Limit	Result
15	≥15	Pass



6.6 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003 and KDB DA00-705
Receiver setup:	RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Hopping mode
Test results:	Pass

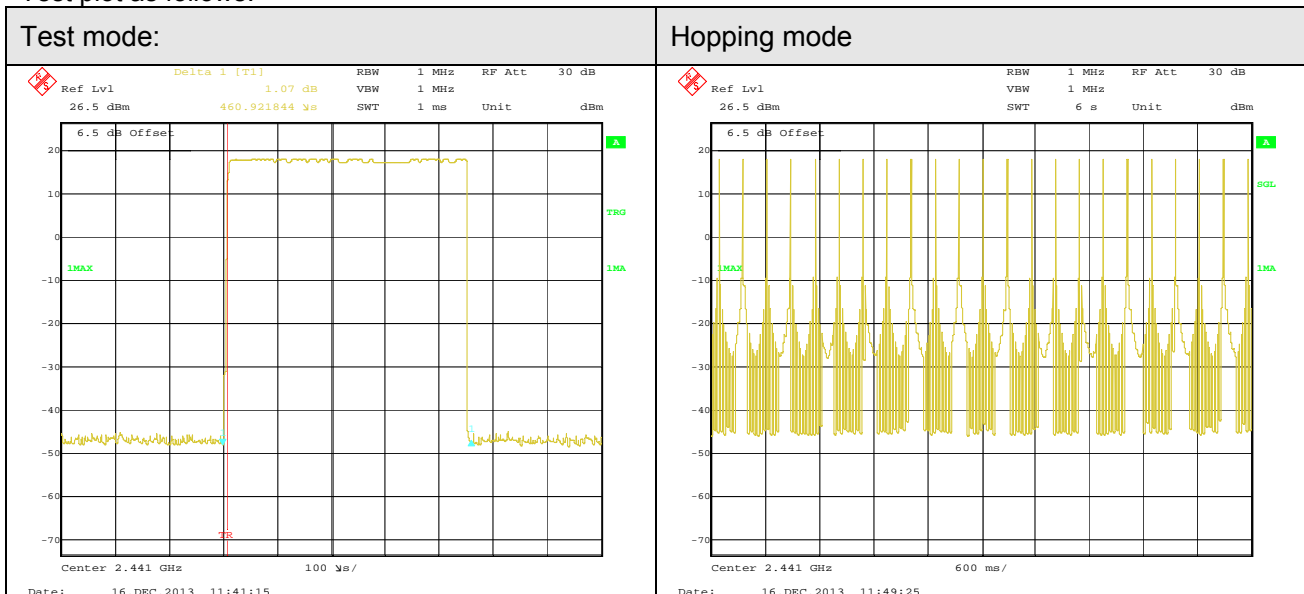
Measurement Data:

Dwell time per hop (Second)	Hopping numbers	Dwell time in one period (Second)	Limit (Second)	Result
0.000461	23	0.010603	0.4	Pass

Remark:

The test period: $T = 0.4 \text{ Second/Channel} \times 15 \text{ Channel} = 6 \text{ s}$

Test plot as follows:

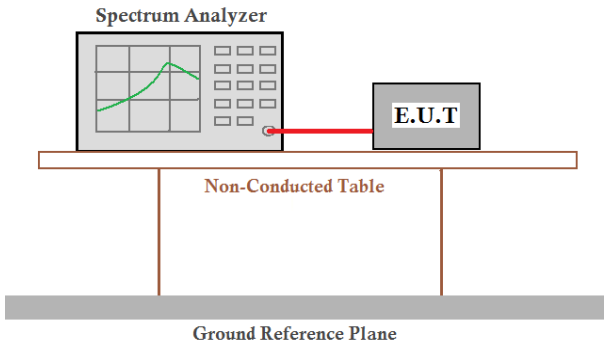


6.7 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1) requirement:
<p><i>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.</i></p> <p><i>Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom 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.</i></p>	
<p>EUT Pseudorandom Frequency Hopping Sequence</p>	
<p><i>The system would hop to the channel follow the frequencies table that was defined in the system and the system hop once per 18 ms. Each frequency will be used equally on the average by each transmitter.</i></p> <p><i>The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.</i></p>	

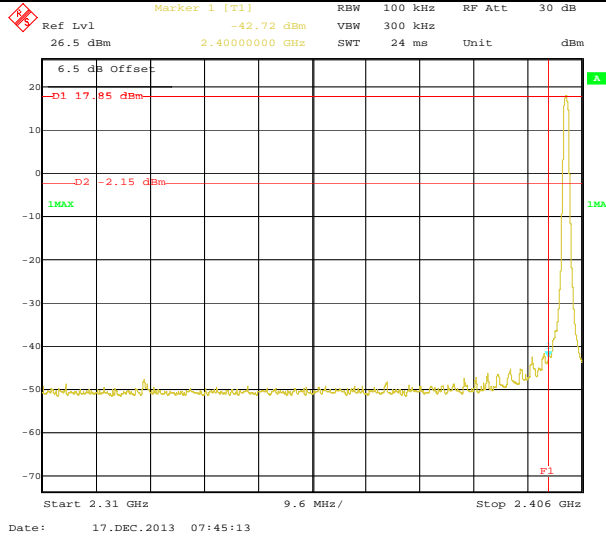
6.8 Band Edge

6.8.1 Conducted Emission Method

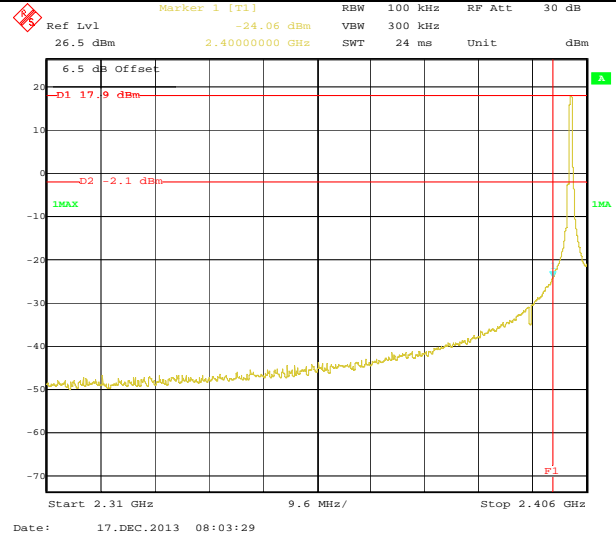
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that 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.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode and hopping mode
Test results:	Pass

Test plot as follows:

Test channel:	Lowest channel
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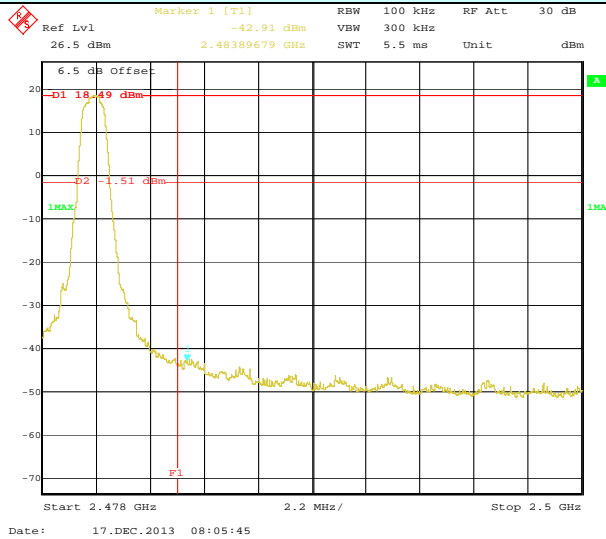


No-hopping mode

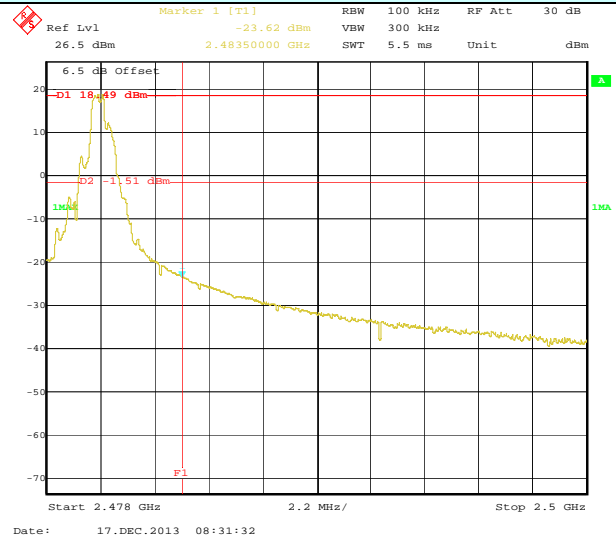


Hopping mode

Test channel:	Highest channel
---------------	-----------------



No-hopping mode

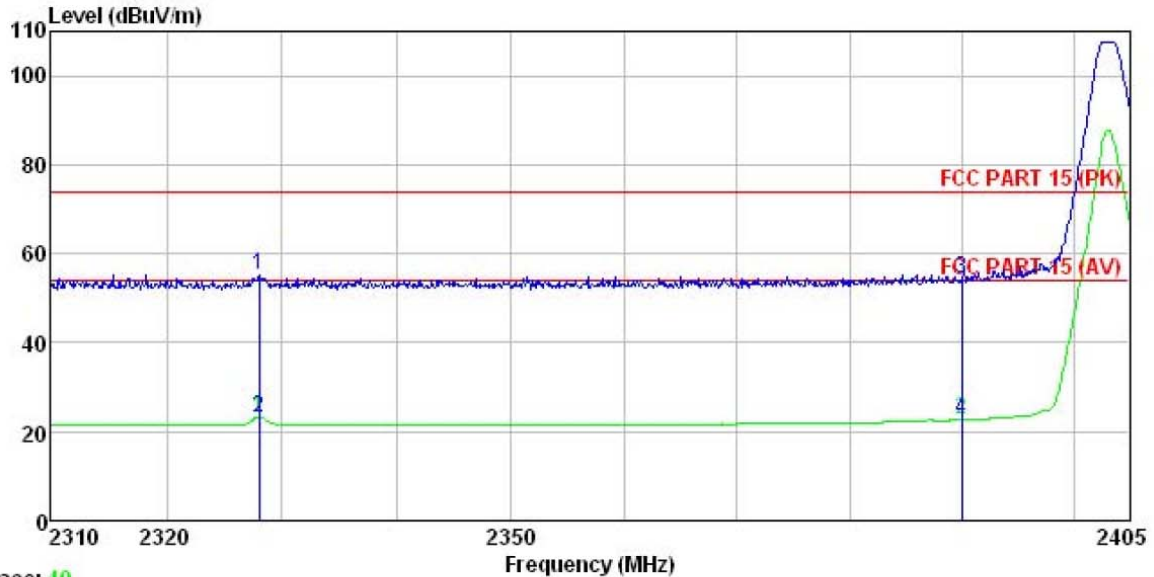


Hopping mode

6.8.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	2.3GHz to 2.5GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	Above 1GHz		54.00		Average Value
			74.00		Peak Value
Test setup:					
Test Procedure:	<ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna 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. 4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 				
Test Instruments:	Refer to section 5.7 for details				
Test mode:	Non-hopping mode				
Test results:	Passed				

GFSK mode
 Test channel: Lowest
 Horizontal:

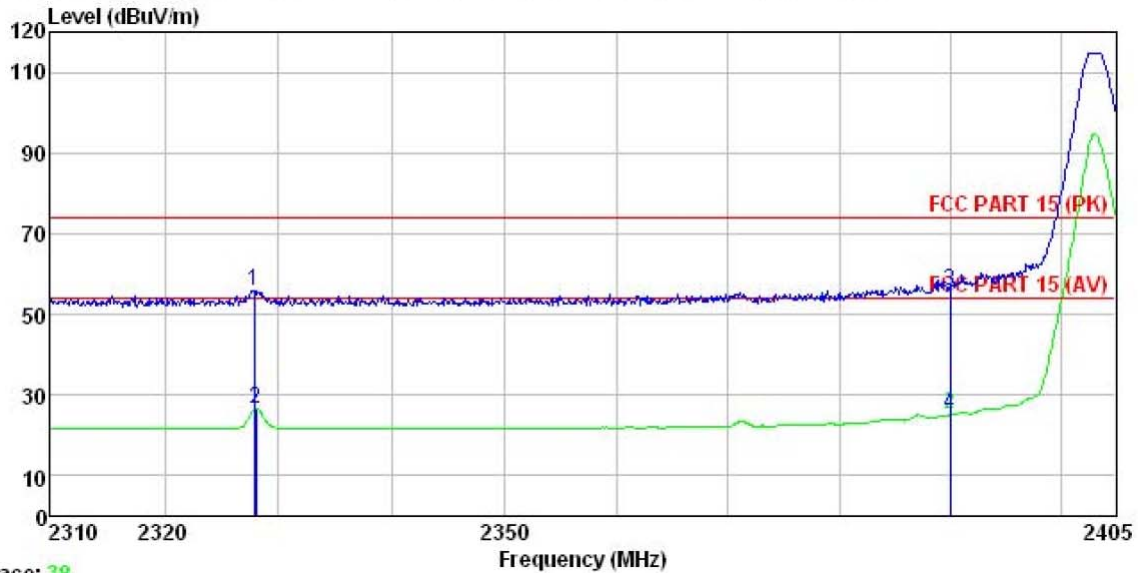


Trace: 40

Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 Job No. : 547RF
 EUT : 2.4G Transmitter
 Model : TTX240
 Test mode : TX (low channel) mode
 Power Rating : DC 6V
 Environment : Temp:25°C Humi:55% Atmos:101Kpa
 Test Engineer: Winner
 Remark :

	Freq	ReadLevel	AntennaFactor	CableLoss	PreampFactor	Level	Limit	Over	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2328.038	21.80	27.89	5.35	0.00	55.04	74.00	-18.96	Peak
2	2328.038	9.54	27.89	5.35	0.00	23.29	54.00	-30.71	Average
3	2390.000	21.25	27.58	5.67	0.00	54.50	74.00	-19.50	Peak
4	2390.000	8.85	27.58	5.67	0.00	22.61	54.00	-31.39	Average

Vertical:



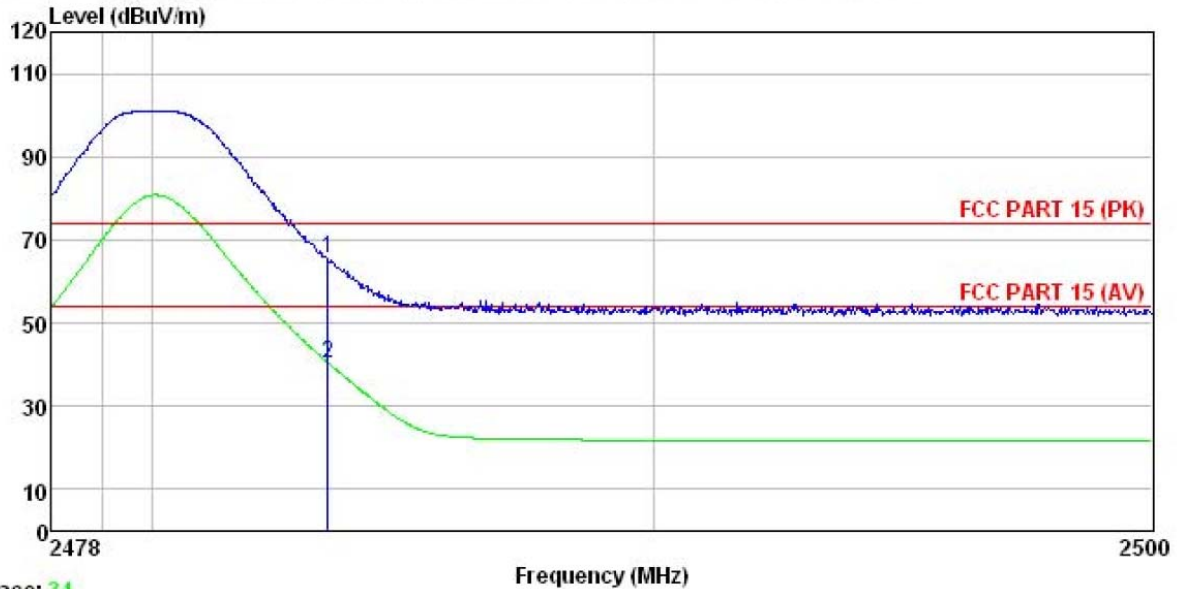
Trace: 38

Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 Job No. : 547RF
 EUT : 2.4G Transmitter
 Model : TTX240
 Test mode : TX (low channel) mode
 Power Rating : DC 6W
 Environment : Temp:25°C Humi:55% Atmos:101Kpa
 Test Engineer: Winner
 Remark :

	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit Remark
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2327.850	22.73	27.89	5.35	0.00	55.97	74.00 -18.03 Peak
2	2328.038	12.88	27.89	5.35	0.00	26.63	54.00 -27.37 Average
3	2390.000	22.75	27.58	5.67	0.00	56.00	74.00 -18.00 Peak
4	2390.000	11.28	27.58	5.67	0.00	25.04	54.00 -28.96 Average

Test channel: Highest

Horizontal:

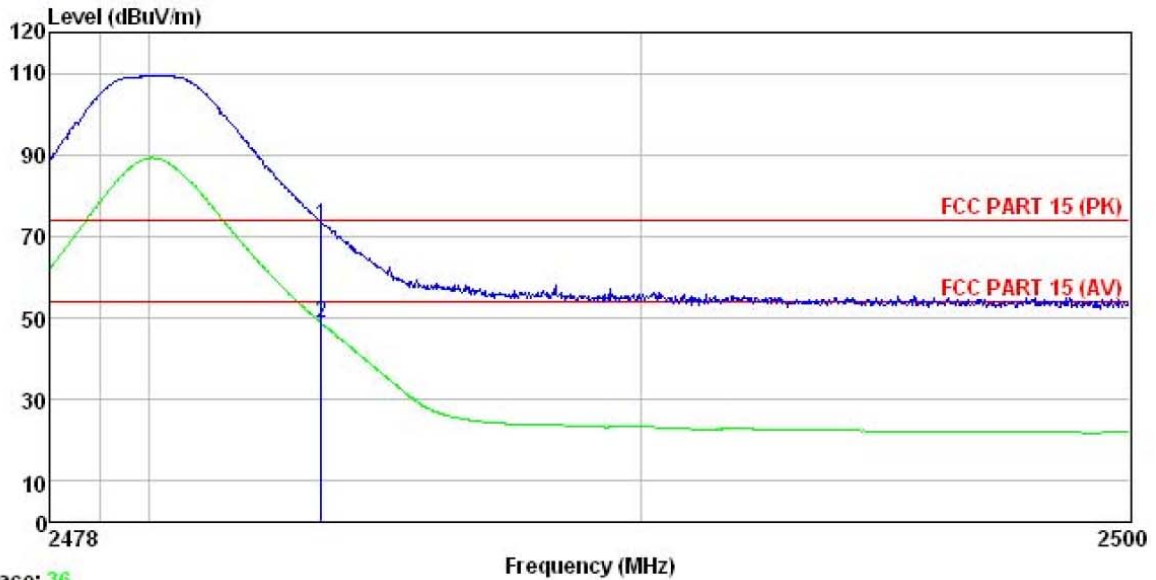


Trace: 34

Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
 Job No. : 547RF
 EUT : 2.4G Transmitter
 Model : TTX240
 Test mode : TX (high channel) mode
 Power Rating : DC 6V
 Environment : Temp:25°C Humi:55% Atmos:101Kpa
 Test Engineer: Winner
 Remark :

	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2483.500	32.24	27.52	5.70	0.00	65.46	74.00 -8.54 Peak
2	2483.500	26.73	27.52	5.70	0.00	40.46	54.00 -13.54 Average

Vertical:

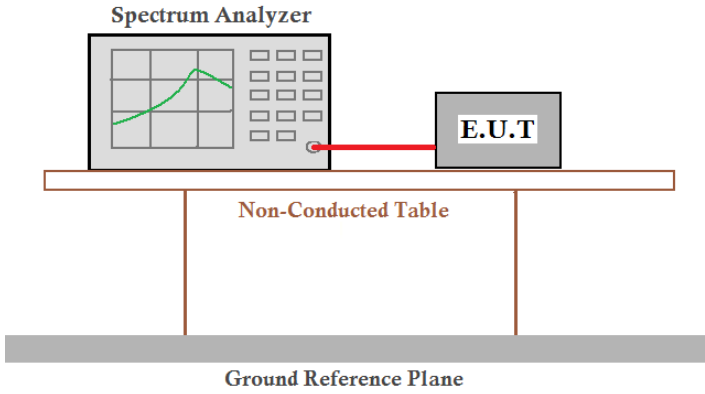


Trace: 36
 Site : 3m chamber
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
 Job No. : 547RF
 EUT : 2.4G Transmitter
 Model : TTX240
 Test mode : TX (high channel) mode
 Power Rating : DC 6W
 Environment : Temp:25°C Humi:55% Atmos:101Kpa
 Test Engineer: Winner
 Remark :

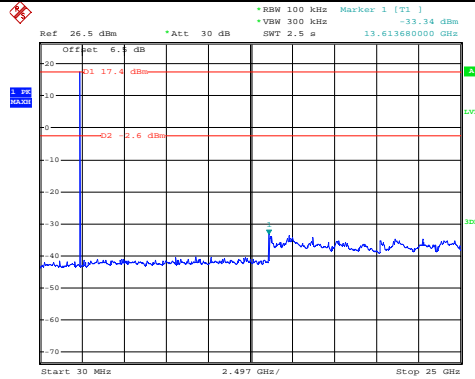
	Freq	ReadLevel	AntennaFactor	CableLoss	PreampFactor	Level	Limit	OverLimit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	39.56	27.52	5.70	0.00	72.78	74.00	-1.22	Peak
2	2483.500	34.99	27.52	5.70	0.00	48.72	54.00	-5.28	Average

6.9 Spurious Emission

6.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and DA00-705
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode
Test results:	Pass

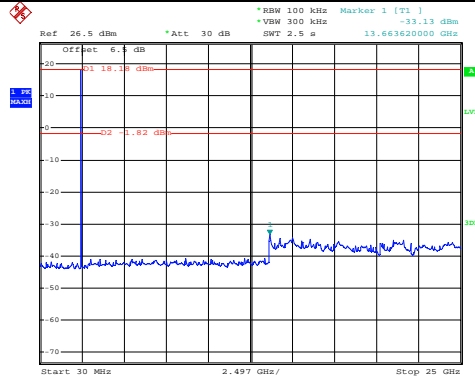
Lowest channel



Date: 17.DEC.2013 10:53:23

30MHz~25GHz

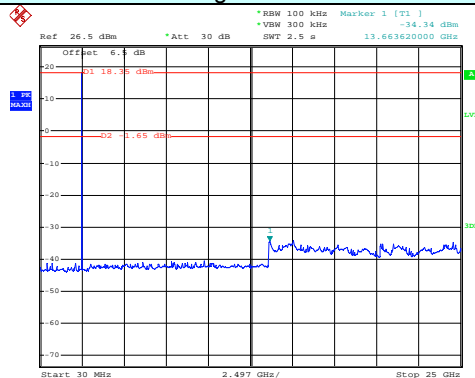
Middle channel



Date: 17.DEC.2013 10:54:39

30MHz~25GHz

Highest channel



Date: 17.DEC.2013 10:55:49

30MHz~25GHz

6.9.2 Radiated Emission Method

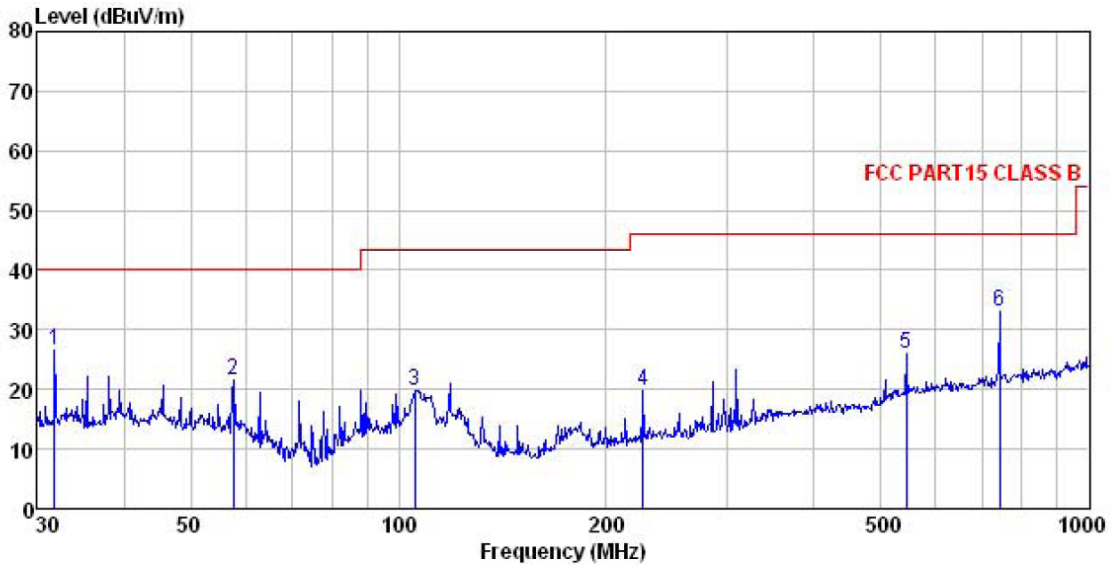
Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	9 kHz to 25 GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
Limit:	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
74.0		Peak Value			
Test setup:	Below 1GHz				
Test setup:	Above 1GHz				

<p>Test Procedure:</p>	<ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna 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. 4. 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 rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
<p>Test Instruments:</p>	<p>Refer to section 5.7 for details</p>
<p>Test mode:</p>	<p>Non-hopping mode</p>
<p>Test results:</p>	<p>Pass</p>

Measurement data:

Below 1GHz

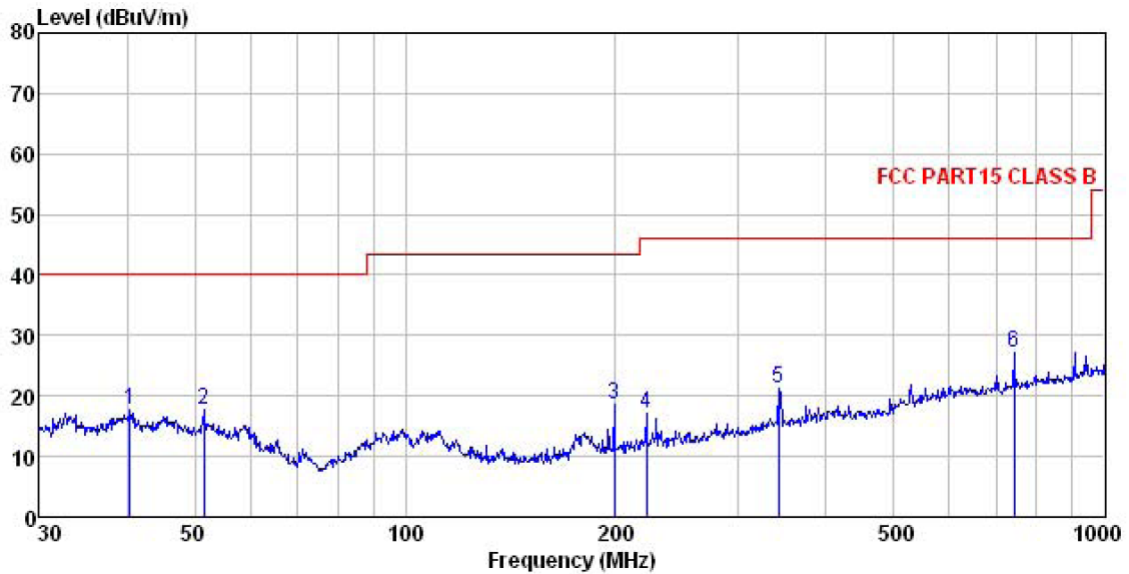
Vertical:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) VERTICAL
 Job No. : 547RF
 EUT : 2.4G Transmitter
 Model : ITX240
 Test mode : TX mode
 Power Rating : DC 6V
 Environment : Temp:25°C Humi:55% Atmos:101Kpa
 Test Engineer: Winner
 Remark :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	31.731	39.96	12.32	0.85	26.46	26.67	40.00	-13.33	QP
2	57.594	36.45	12.87	1.37	28.99	21.70	40.00	-18.30	QP
3	105.642	35.17	12.63	2.00	29.97	19.83	43.50	-23.67	QP
4	226.099	35.32	11.46	2.84	29.70	19.92	46.00	-26.08	QP
5	543.274	35.35	17.46	3.85	30.54	26.12	46.00	-19.88	QP
6	742.259	39.86	19.34	4.33	30.51	33.02	46.00	-12.98	QP

Horizontal:



Site : 3m chamber
 Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) HORIZONTAL
 Job No. : 547RF
 EUT : 2.4G Transmitter
 Model : TTX240
 Test mode : TX mode
 Power Rating : DC 6V
 Environment : Temp:25°C Humi:55% Atmos:101Kpa
 Test Engineer: Winner
 Remark :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	40.417	30.31	13.58	1.22	27.30	17.81	40.00	-22.19	QP
2	51.481	31.55	13.19	1.27	28.44	17.57	40.00	-22.43	QP
3	199.286	34.91	10.57	2.86	29.81	18.53	43.50	-24.97	QP
4	221.392	32.78	11.25	2.84	29.71	17.16	46.00	-28.84	QP
5	341.979	33.76	14.15	3.07	29.64	21.34	46.00	-24.66	QP
6	742.259	34.11	19.34	4.33	30.51	27.27	46.00	-18.73	QP

Above 1GHz:

Test channel:			Lowest		Level:		Peak	
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)	Polarization
4804	53.60	31.53	8.90	40.24	53.79	74.00	-20.21	Vertical
7206	---	---	---	---	---	---	---	Vertical
9608	---	---	---	---	---	---	---	Vertical
4804	52.23	31.53	8.90	40.24	52.42	74.00	-21.58	Horizontal
7206	---	---	---	---	---	---	---	Horizontal
9608	---	---	---	---	---	---	---	Horizontal

Test channel:			Lowest		Level:		Average	
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)	Polarization
4804.00	30.54	31.53	8.90	40.24	30.73	54	-23.27	Vertical
7206.00	---	---	---	---	---	---	---	Vertical
9608.00	---	---	---	---	---	---	---	Vertical
4804.00	29.10	31.53	8.90	40.24	29.29	54	-24.71	Horizontal
7206.00	---	---	---	---	---	---	---	Horizontal
9608.00	---	---	---	---	---	---	---	Horizontal

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Test channel:			Middle		Level:		Peak	
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)	Polarization
4882.00	55.03	31.58	8.98	40.15	55.44	74.00	-18.56	Vertical
7323.00	---	---	---	---	---	---	---	Vertical
9764.00	---	---	---	---	---	---	---	Vertical
4882.00	55.64	31.58	8.98	40.15	56.05	74.00	-17.95	Horizontal
7323.00	---	---	---	---	---	---	---	Horizontal
9764.00	---	---	---	---	---	---	---	Horizontal

Test channel:			Middle		Level:		Average	
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)	Polarization
4882.00	32.02	31.58	8.98	40.15	32.43	54.00	-21.57	Vertical
7323.00	---	---	---	---	---	---	---	Vertical
9764.00	---	---	---	---	---	---	---	Vertical
4882.00	32.73	31.58	8.98	40.15	33.14	54.00	-20.86	Horizontal
7323.00	---	---	---	---	---	---	---	Horizontal
9764.00	---	---	---	---	---	---	---	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Test channel:			Highest		Level:		Peak	
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)	Polarization
4960.00	57.18	31.69	9.08	40.03	57.92	74.00	-16.08	Vertical
7440.00	53.81	36.60	10.80	41.05	60.16	74.00	-13.84	Vertical
9920.00	---	---	---	---	---	---	---	Vertical
4960.00	57.40	31.69	9.08	40.03	58.14	74.00	-15.86	Horizontal
7440.00	51.73	36.60	10.80	41.05	58.08	74.00	-15.92	Horizontal
9920.00	---	---	---	---	---	---	---	Horizontal

Test channel:			Highest		Level:		Average	
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)	Polarization
4960.00	34.95	31.69	9.08	40.03	35.69	54.00	-18.31	Vertical
7440.00	30.23	36.60	10.80	41.05	36.58	54.00	-17.42	Vertical
9920.00	---	---	---	---	---	---	---	Vertical
4960.00	34.77	31.69	9.08	40.03	35.51	54.00	-18.49	Horizontal
7440.00	29.12	36.60	10.80	41.05	35.47	54.00	-18.53	Horizontal
9920.00	---	---	---	---	---	---	---	Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.