FCC REPORT

Applicant:	Salus Limited.
Address of Applicant:	9/F, Tower One, Lippo Centre, 89 Queensway, Hong Kong
Equipment Under Test (EUT)	
Product Name:	OPTIMA US ZIGBEE THERMOSTAT
Model No.:	ST880ZB, SAU10T1
FCC ID:	2AAP7ST880ZB
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247:2012
Date of sample receipt:	July 10, 2013
Date of Test:	July 10-19, 2013
Date of report issued:	July 19, 2013
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*July 19, 2013*	*Original*

Prepared By:  ***Date:*** *July 19, 2013*

Project Engineer

Check By:  ***Date:*** *July 19, 2013*

Reviewer

3 Contents

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	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
Channel Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

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

5 General Information

5.1 Client Information

Applicant:	Salus Limited.
Address of Applicant:	9/F, Tower One, Lippo Centre, 89 Queensway, Hong Kong
Manufacturer:	Salus Limited.
Address of Manufacturer:	9/F, Tower One, Lippo Centre, 89 Queensway, Hong Kong
Factory:	Computime Electronics (shenzhen) Company Limited
Address of Factory:	Yuekenguangyu Industrial Park,Kangqiao Road 88#, Danzhutou Community, Nanwan Street Office Longgang District, Shenzhen, China

5.2 General Description of EUT

Product Name:	OPTIMA US ZIGBEE THERMOSTAT
Model No.:	ST880ZB, SAU10T1
Test model No.:	ST880ZB
Remark:	ST880ZB and SAU10T1 are identical in the same interior structure, electrical circuits, components and appearance. The only difference is the model name for the marketing requirement.
Operation Frequency:	2405MHz~2480MHz
Channel numbers:	16
Channel separation:	5MHz
Modulation type:	O-QPSK
Antenna Type:	PCB Antenna
Antenna gain:	0dBi
Power supply:	AC 24V Or DC 3.0V (2*1.5V “AA” Size Battery)

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	5	2425MHz	9	2445MHz	13	2465MHz
2	2410MHz	6	2430MHz	10	2450MHz	14	2470MHz
3	2415MHz	7	2435MHz	11	2455MHz	15	2475MHz
4	2420MHz	8	2440MHz	12	2460MHz	16	2480 MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2405MHz
The middle channel	2440MHz
The Highest channel	2480MHz

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.4 Description of Support Units

Manufacturer	Description	Model	Serial Number
ET	AC/AC Linear Transformer	ETE40310F	N/A

5.5 Test Facility

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

● **CNAS —Registration No.: CNAS L5775**

CNAS has accredited Global United Technology Services Co., Ltd. to ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testingand Calibration Laboratories) for the competence in the field of testing.

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 28, 2013.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.

5.6 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China
Tel: 0755-27798480
Fax: 0755-27798960

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	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 29 2013	Mar. 28 2014
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	Dec. 6 2012	Dec. 5 2013
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 02 2013	Jul. 01 2014
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 24 2013	Feb. 23 2014
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2013	June 27 2014
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 29 2013	Mar. 28 2014
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	Mar. 30 2013	Mar. 29 2014
10	Coaxial Cable	GTS	N/A	GTS211	Mar. 30 2013	Mar. 29 2014
11	Coaxial cable	GTS	N/A	GTS210	Mar. 30 2013	Mar. 29 2014
12	Coaxial Cable	GTS	N/A	GTS212	Mar. 30 2013	Mar. 29 2014
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 02 2013	Jul. 01 2014
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 02 2013	Jul. 01 2014
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2013	June 27 2014
16	Band filter	Amindeon	82346	GTS219	Mar. 30 2013	Mar. 29 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	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	Sep. 08 2011	Sep. 07 2013
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jul. 02 2013	Jul. 01 2014
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 02 2013	Jul. 01 2014
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 02 2013	Jul. 01 2014
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 02 2013	Jul. 01 2014
6	Coaxial Cable	GTS	N/A	GTS227	Jul. 02 2013	Jul. 01 2014
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	ChangChun	DYM3	GTS257	July 09 2013	July 08 2014

7 Test results and Measurement Data

7.1 Antenna requirement:

Standard requirement:	FCC Part15 C Section 15.203 /247(c)

15.203 requirement:

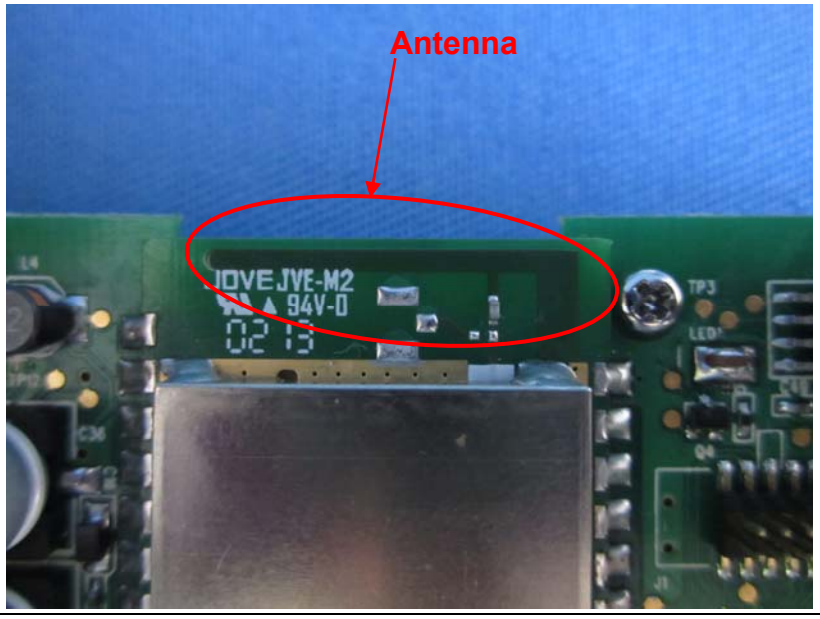
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(c) (1)(i) requirement:

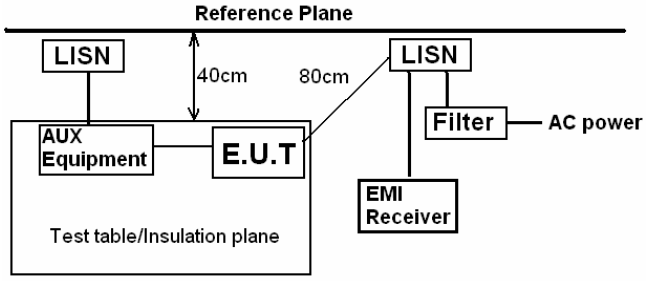
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The antenna is PCB Antenna, the best case gain of the antenna is 0dBi

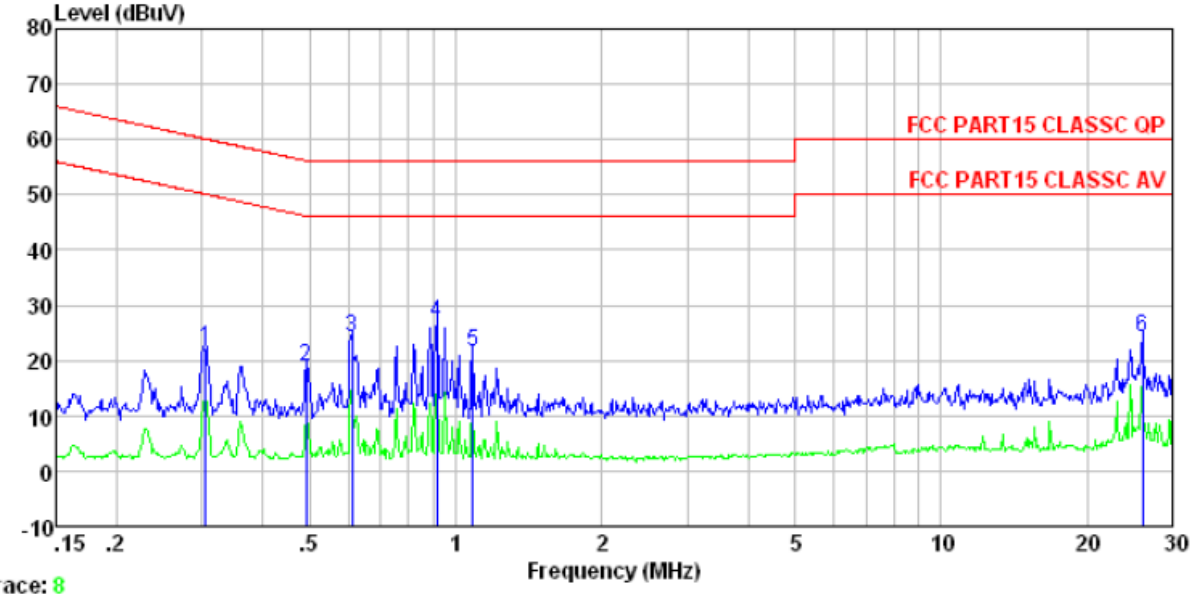


7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.4:2003
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data

Line:

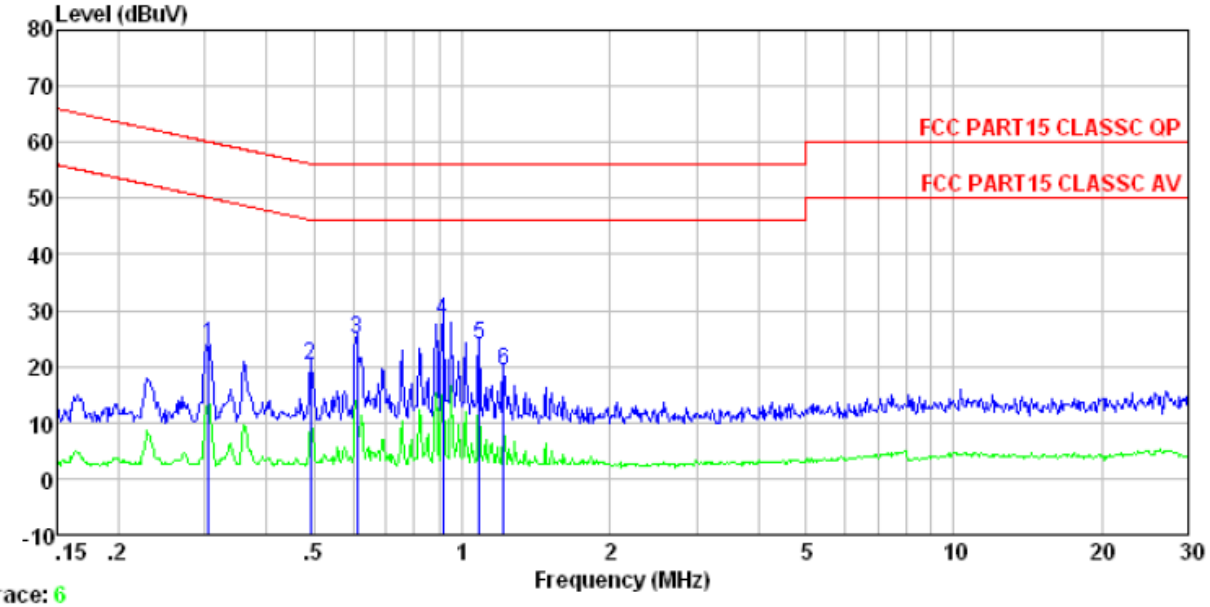


Trace: 8

Condition : FCC PART15 CLASSC QP LISN-2012 LINE
Job No. : 1060RF
Test mode : Transmitting mode
Test Engineer: Ying

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.305	22.44	-0.22	0.10	22.32	60.10	-37.78	QP
2	0.491	19.11	-0.21	0.10	19.00	56.14	-37.14	QP
3	0.611	24.19	-0.20	0.10	24.09	56.00	-31.91	QP
4	0.914	26.84	-0.21	0.10	26.73	56.00	-29.27	QP
5	1.082	21.54	-0.21	0.10	21.43	56.00	-34.57	QP
6	26.001	24.87	-0.86	0.21	24.22	60.00	-35.78	QP

Neutral:



Trace: 6

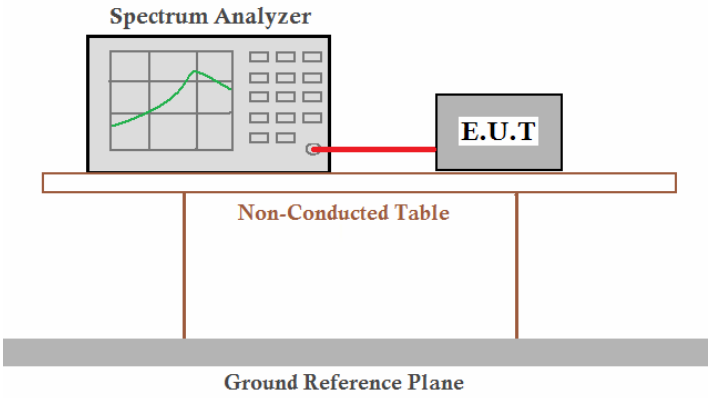
Condition : FCC PART15 CLASSC QP LISN-2012 NEUTRAL
Job No. : 1060RF
Test mode : Transmitting mode
Test Engineer: Ying

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.305	23.76	-0.09	0.10	23.77	60.10	-36.33	QP
2	0.491	20.22	-0.08	0.10	20.24	56.14	-35.90	QP
3	0.611	24.76	-0.08	0.10	24.78	56.00	-31.22	QP
4	0.914	28.22	-0.09	0.10	28.23	56.00	-27.77	QP
5	1.082	23.71	-0.09	0.10	23.72	56.00	-32.28	QP
6	1.216	19.08	-0.09	0.10	19.09	56.00	-36.91	QP

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

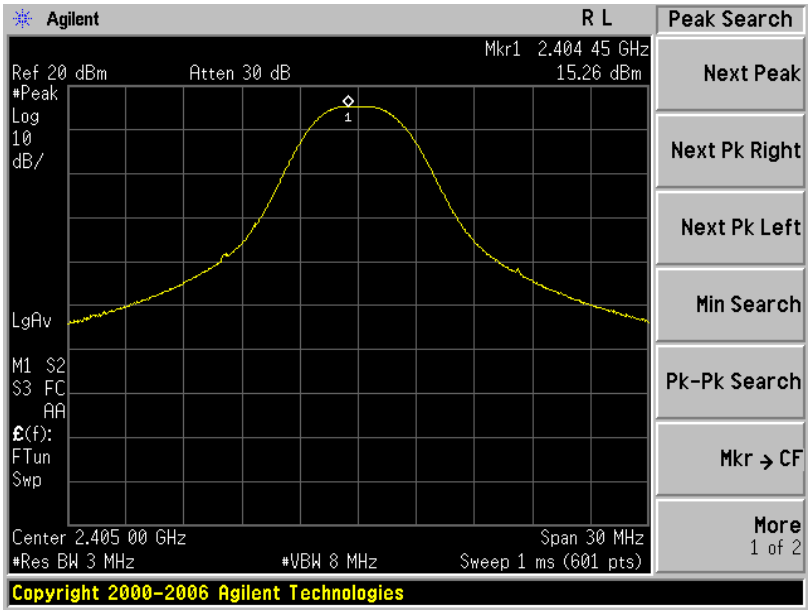
7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 DTS Meas Guidance V03
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

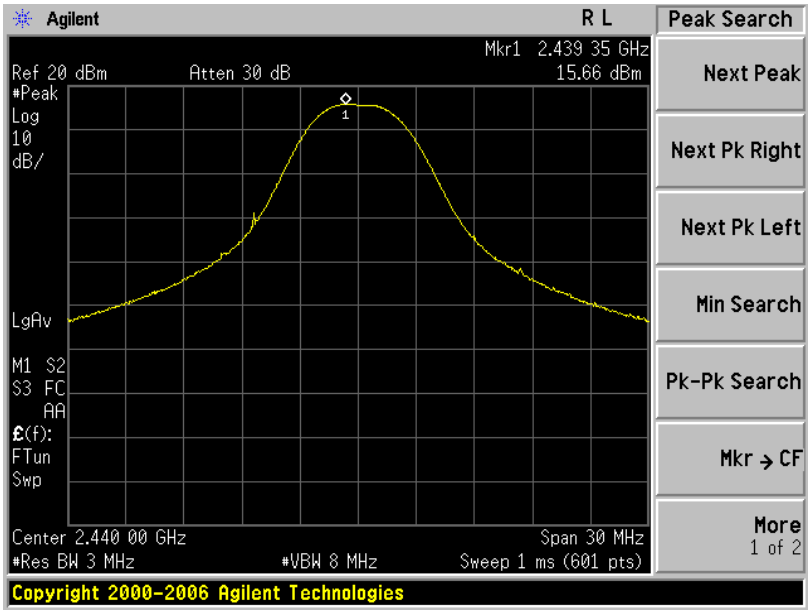
Measurement Data

Frequency (MHz)	Peak Output Power (dBm)	Limit(dBm)	Result
2405	15.26	30	PASS
2440	15.66		
2475	15.34		
2480	-7.35		

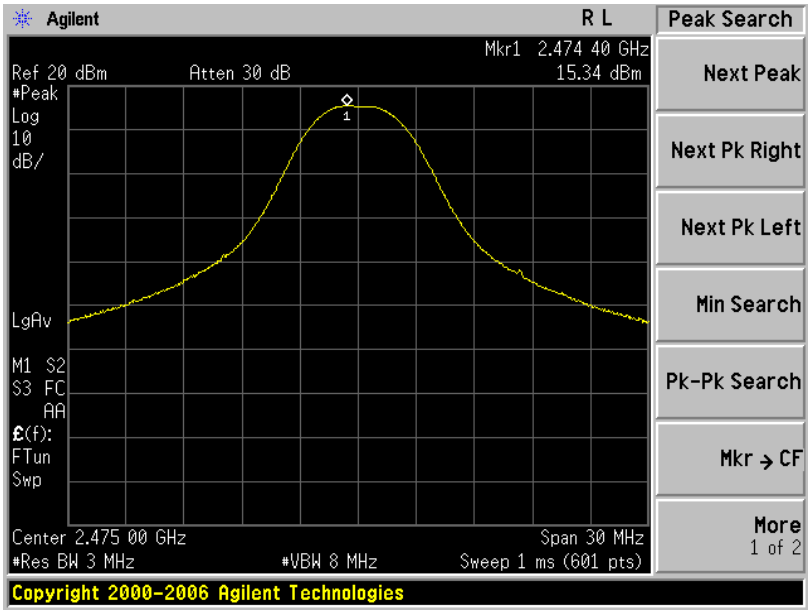
Test plot as follows:



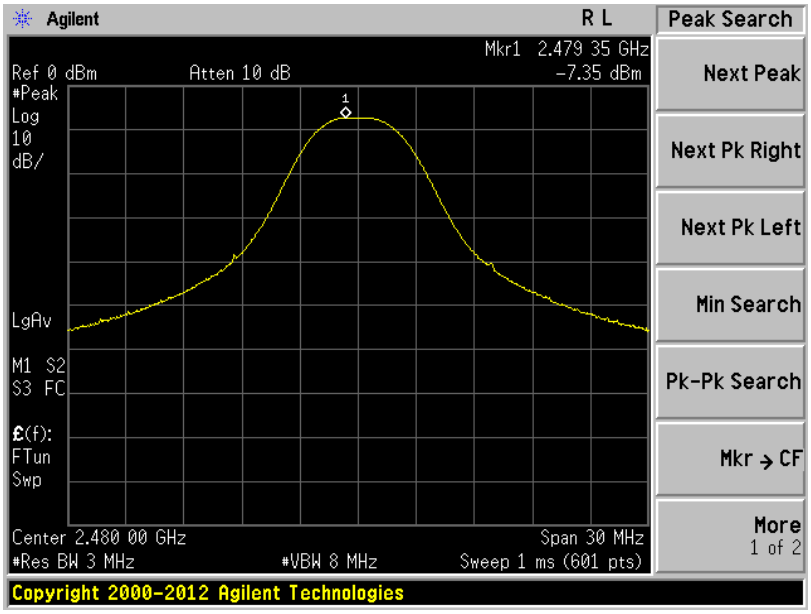
2405MHz



2440MHz

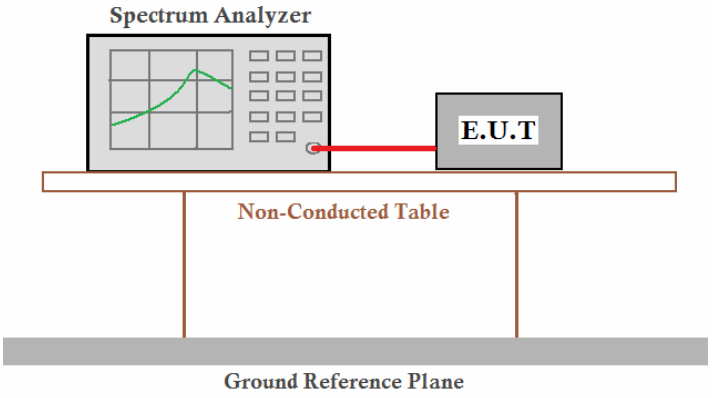


2475MHz



2480MHz

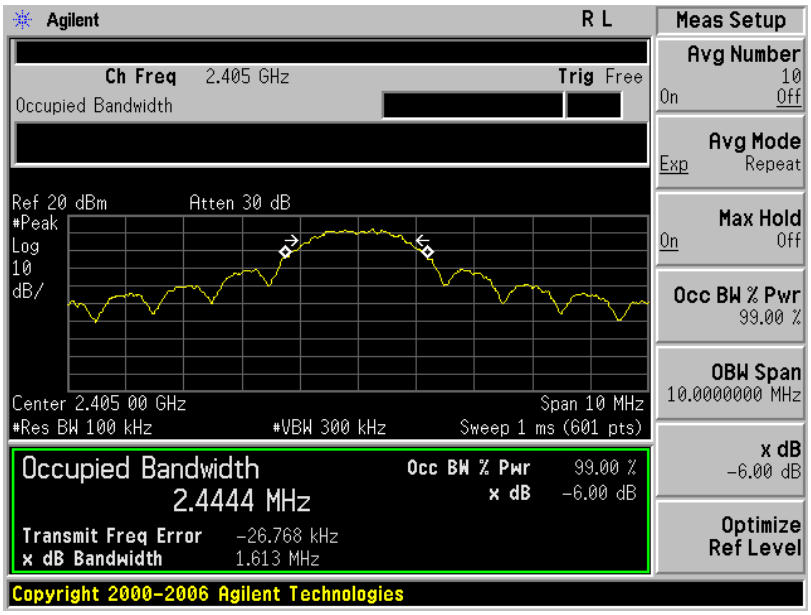
7.4 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 DTS Meas Guidance V03
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

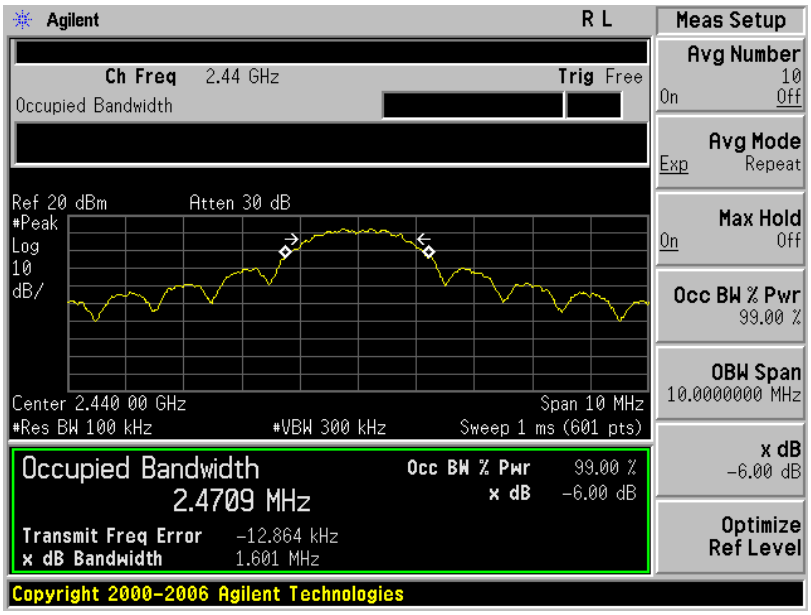
Measurement Data

Frequency (MHz)	Channel Bandwidth (MHz)	Limit(KHz)	Result
2405	1.613	>500	Pass
2440	1.601		
2475	1.624		
2480	1.644		

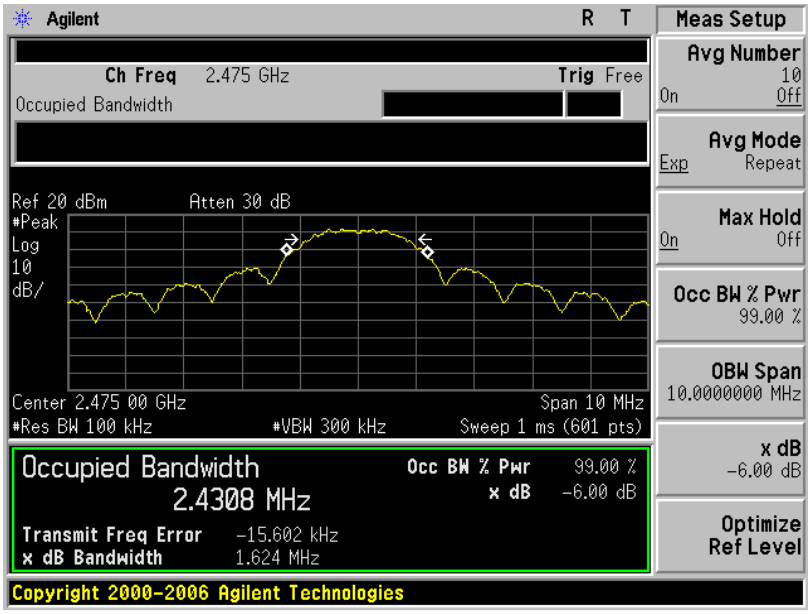
Test plot as follows:



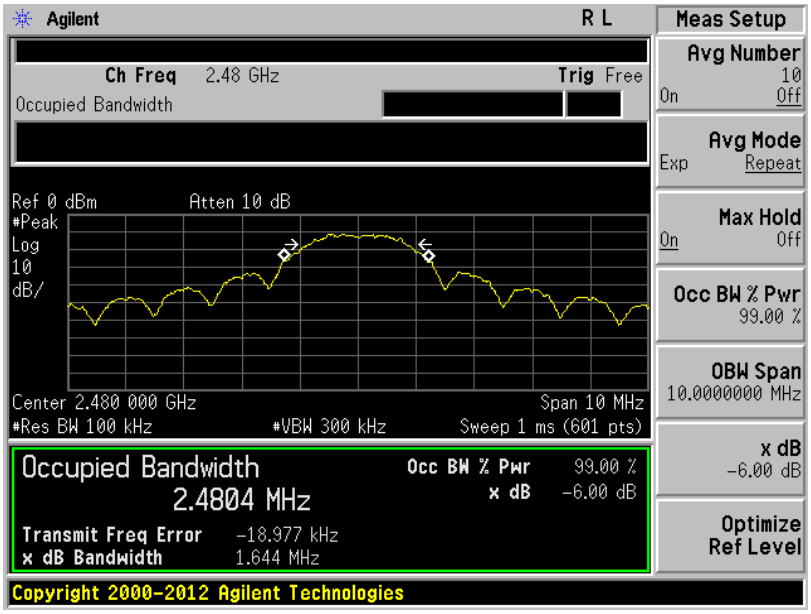
2405MHz



2440MHz

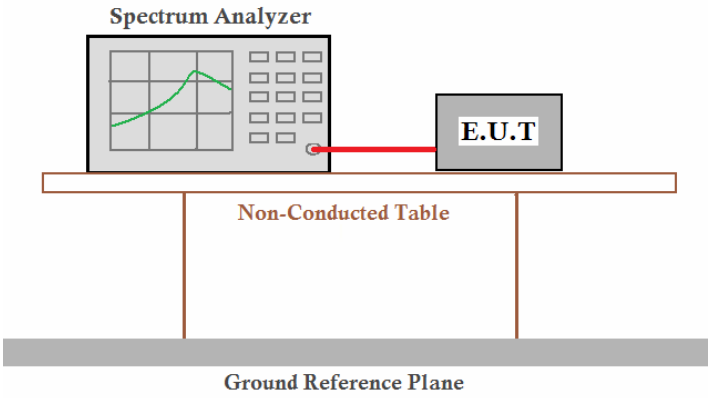


2475MHz



2480MHz

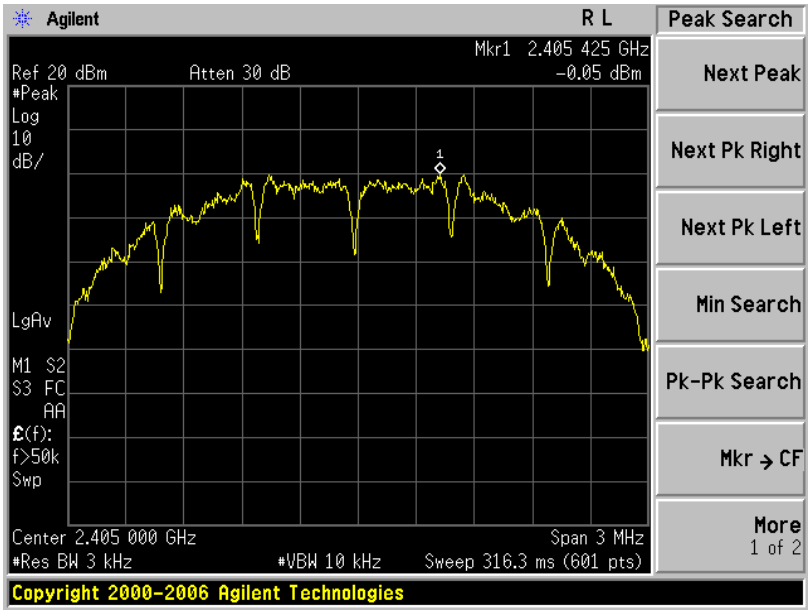
7.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 DTS Meas Guidance V03
Limit:	8dBm/3kHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

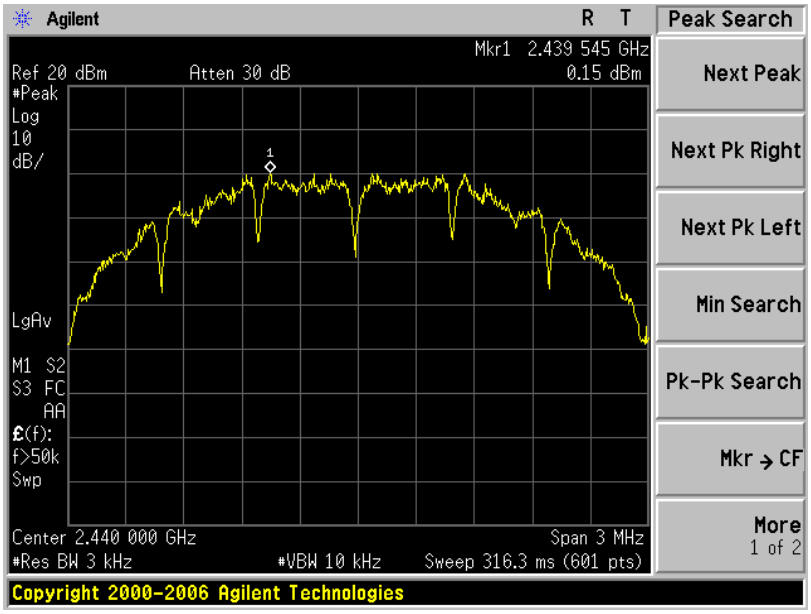
Measurement Data

Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm/3kHz)	Result
2405	-0.05	8.00	Pass
2440	0.15		
2475	-0.50		
2480	-10.80		

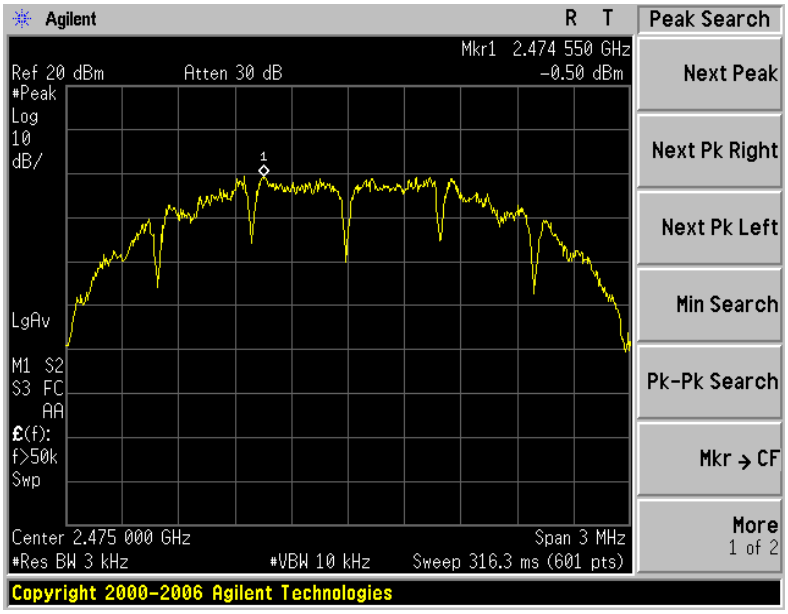
Test plot as follows:



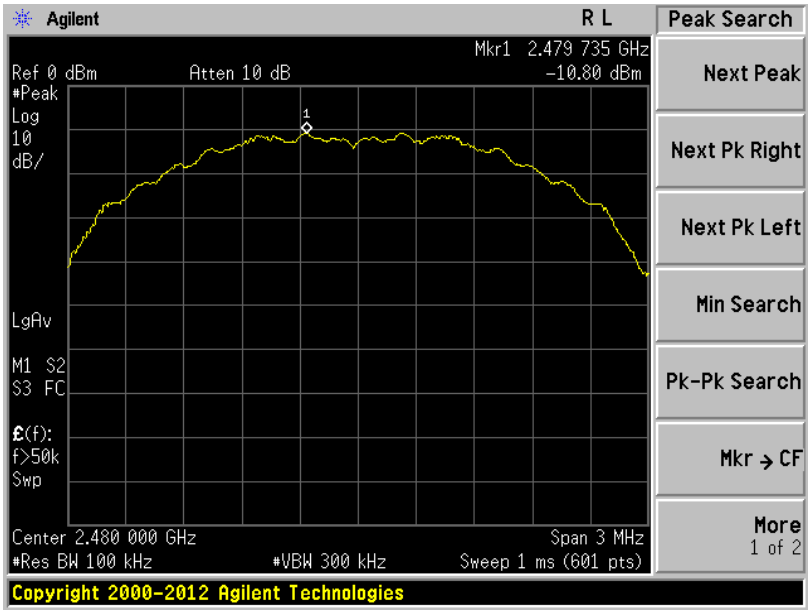
2405MHz



2440MHz



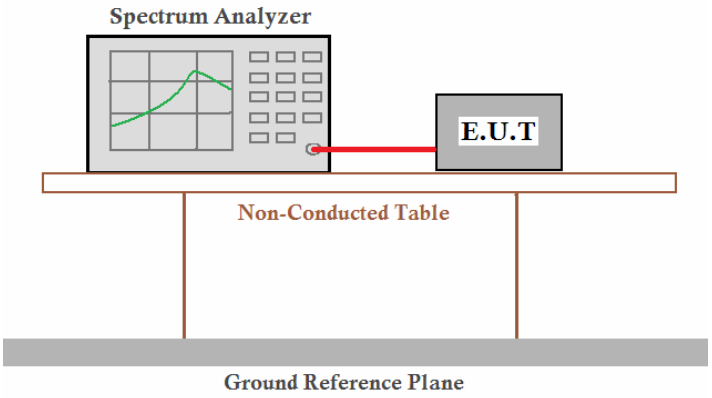
2475MHz



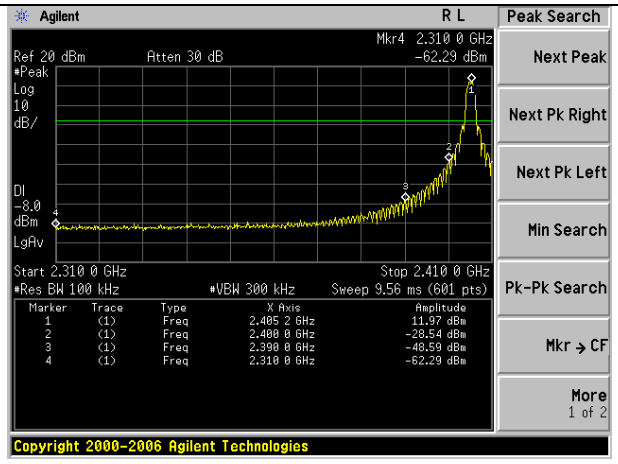
2480MHz

7.6 Band edges

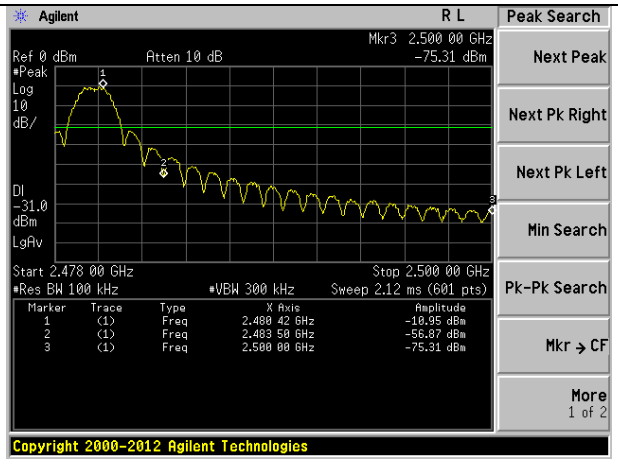
7.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 DTS Meas Guidance V03
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:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Test plot as follows:



Lowest channel



Highest channel

7.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.4: 2003
Test Frequency Range:	All of the restrict bands were tested, only the worst band's (2310MHz to 2500MHz) data was showed.
Test site:	Measurement Distance: 3m

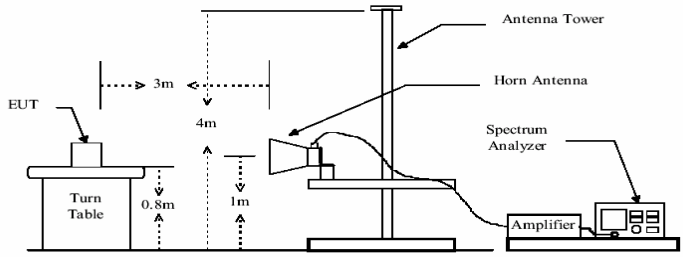
Receiver setup:

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	AV	1MHz	10Hz	Average

Limit:

Frequency	Limit (dBuV/m @3m)	Value
Above 1GHz	54.00	Average
	74.00	Peak

Test setup:



Test Procedure:

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.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Test channel:	2405MHz

Peak value:

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
2390.00	43.10	27.59	5.38	30.18	45.89	74.00	-28.11	Horizontal
2400.00	60.68	27.58	5.39	30.18	63.47	74.00	-10.53	Horizontal
2390.00	44.60	27.59	5.38	30.18	47.39	74.00	-26.61	Vertical
2400.00	63.66	27.58	5.39	30.18	66.45	74.00	-7.55	Vertical

Average value:

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
2390.00	33.93	27.59	5.38	30.18	36.72	54.00	-17.28	Horizontal
2400.00	45.59	27.58	5.39	30.18	48.38	54.00	-5.62	Horizontal
2390.00	34.52	27.59	5.38	30.18	37.31	54.00	-16.69	Vertical
2400.00	47.97	27.58	5.39	30.18	50.76	54.00	-3.24	Vertical

Test channel:	2475MHz

Peak value:

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
2483.50	53.35	27.53	5.47	29.93	56.42	74.00	-17.58	Horizontal
2500.00	50.81	27.55	5.49	29.93	53.92	74.00	-20.08	Horizontal
2483.50	54.26	27.53	5.47	29.93	57.33	74.00	-16.67	Vertical
2500.00	51.30	27.55	5.49	29.93	54.41	74.00	-19.59	Vertical

Average value:

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
2483.50	43.23	27.53	5.47	29.93	46.30	54.00	-7.70	Horizontal
2500.00	38.67	27.55	5.49	29.93	41.78	54.00	-12.22	Horizontal
2483.50	43.14	27.53	5.47	29.93	46.21	54.00	-7.79	Vertical
2500.00	39.85	27.55	5.49	29.93	42.96	54.00	-11.04	Vertical

Test channel:	2480MHz

Peak value:

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
2483.50	47.01	27.53	5.47	29.93	50.08	74.00	-23.92	Horizontal
2500.00	45.55	27.55	5.49	29.93	48.66	74.00	-25.34	Horizontal
2483.50	46.98	27.53	5.47	29.93	50.05	74.00	-23.95	Vertical
2500.00	45.50	27.55	5.49	29.93	48.61	74.00	-25.39	Vertical

Average value:

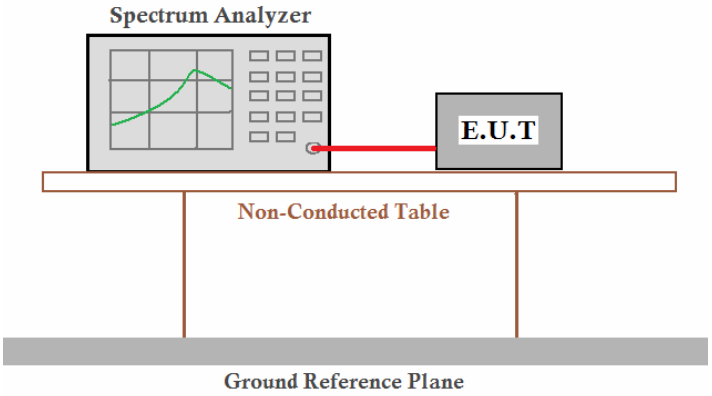
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	38.78	27.53	5.47	29.93	41.85	54.00	-12.15	Horizontal
2500.00	35.03	27.55	5.49	29.93	38.14	54.00	-15.86	Horizontal
2483.50	38.22	27.53	5.47	29.93	41.29	54.00	-12.71	Vertical
2500.00	35.74	27.55	5.49	29.93	38.85	54.00	-15.15	Vertical

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.*

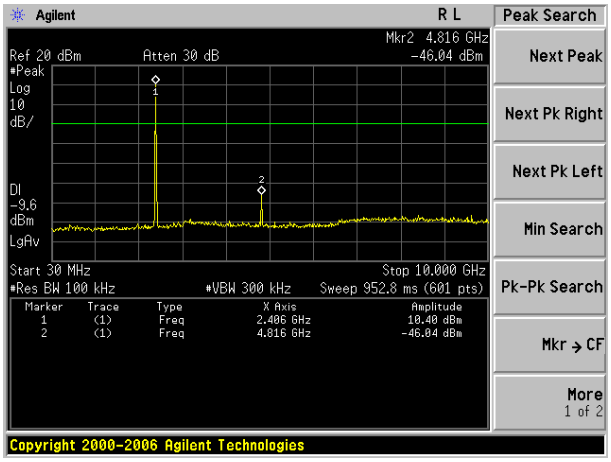
7.7 Spurious Emission

7.7.1 Conducted Emission Method

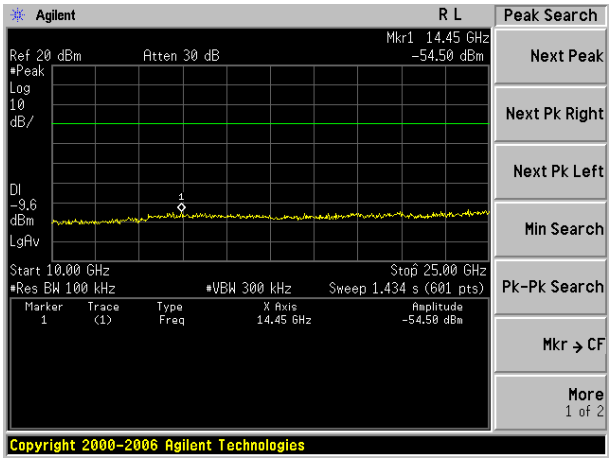
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 DTS Meas Guidance V03
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional 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:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Test plot as follows:

Lowest channel

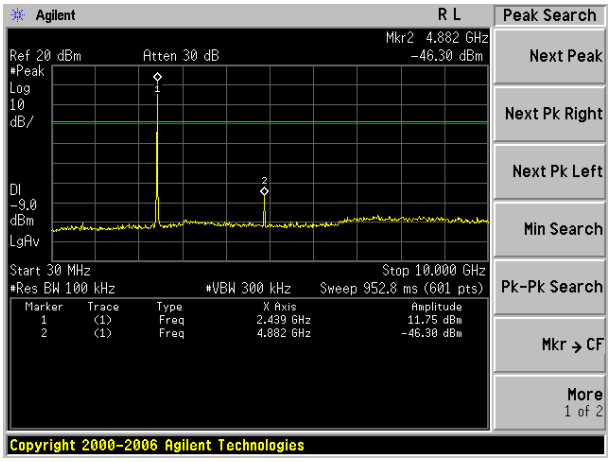


30MHz~10GHz

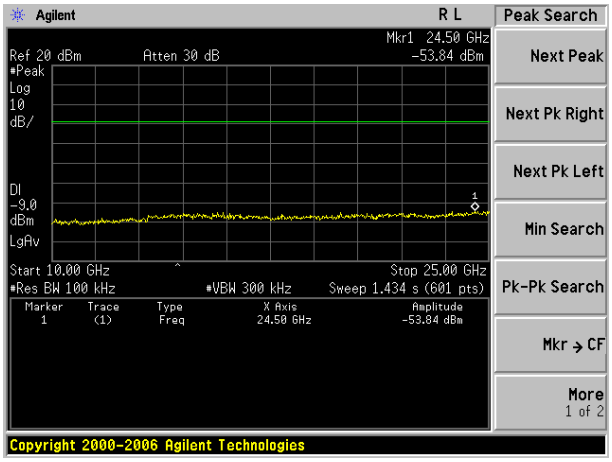


10GHz~25GHz

Middle channel

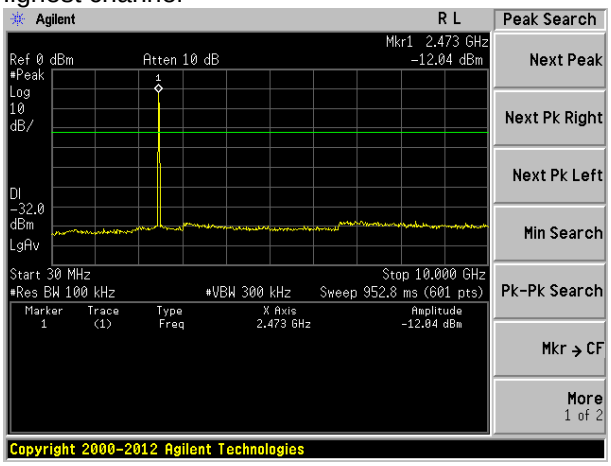


30MHz~10GHz

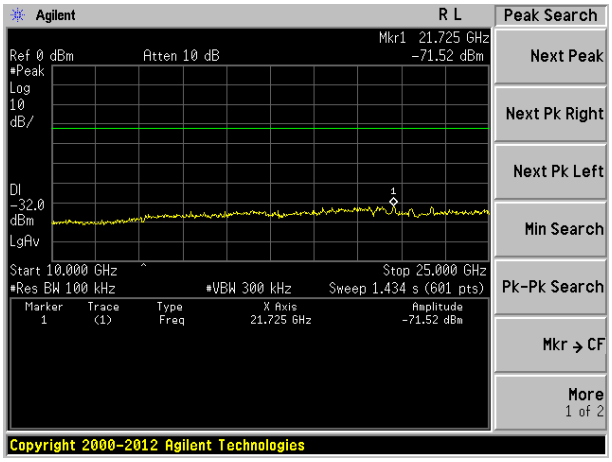


10GHz~25GHz

Highest channel



30MHz~10GHz



10GHz~25GHz

7.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.4: 2003
Test Frequency Range:	30MHz to 25GHz
Test site:	Measurement Distance: 3m

Receiver setup:

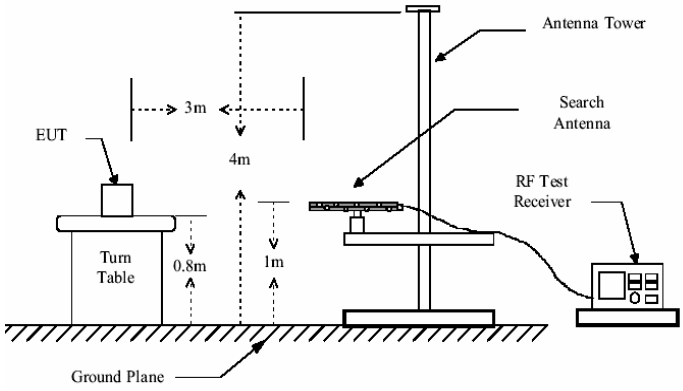
Frequency	Detector	RBW	VBW	Value
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	AV	1MHz	10Hz	Average

Limit:

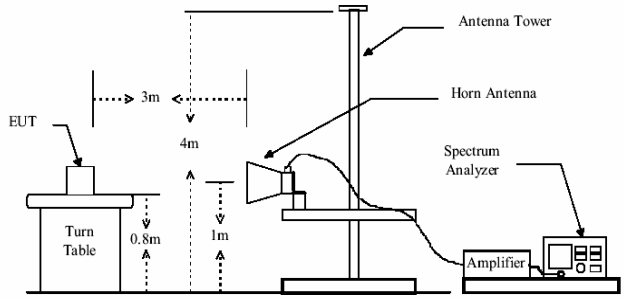
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

Test setup:

Below 1GHz



Above 1GHz



Test Procedure: 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. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the Y axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Measurement Data

■ **Below 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)	polarization
43.20	36.93	15.56	0.70	32.02	21.17	40.00	-18.83	Vertical
67.68	40.61	11.61	0.92	31.89	21.25	40.00	-18.75	Vertical
97.46	37.68	15.00	1.17	31.75	22.10	43.50	-21.40	Vertical
155.91	42.04	10.51	1.60	32.00	22.15	43.50	-21.35	Vertical
291.04	38.72	14.89	2.32	32.18	23.75	46.00	-22.25	Vertical
417.64	37.48	17.43	2.93	31.83	26.01	46.00	-19.99	Vertical
41.13	36.87	15.57	0.67	32.05	21.06	40.00	-18.94	Horizontal
103.44	36.18	14.82	1.22	31.78	20.44	43.50	-23.06	Horizontal
190.41	37.83	12.56	1.79	32.11	20.07	43.50	-23.43	Horizontal
311.09	37.92	15.22	2.42	32.14	23.42	46.00	-22.58	Horizontal
457.51	37.21	17.59	3.12	31.70	26.22	46.00	-19.78	Horizontal
620.71	36.28	20.53	3.80	31.07	29.54	46.00	-16.46	Horizontal

■ **Above 1GHz**

Test channel:	Lowest

Peak value:

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
4810.00	39.60	31.79	8.60	24.17	55.82	74.00	-18.18	Vertical
7215.00	39.94	36.18	11.65	26.39	61.38	74.00	-12.62	Vertical
9620.00	38.93	38.09	14.15	25.45	65.72	74.00	-8.28	Vertical
12025.00	*					74.00		Vertical
14430.00	*					74.00		Vertical
16835.00	*					74.00		Vertical
4810.00	34.71	31.79	8.60	24.17	50.93	74.00	-23.07	Horizontal
7215.00	36.78	36.18	11.65	26.39	58.22	74.00	-15.78	Horizontal
9620.00	34.58	38.09	14.15	25.45	61.37	74.00	-12.63	Horizontal
12025.00	*					74.00		Horizontal
14430.00	*					74.00		Horizontal
16835.00	*					74.00		Horizontal

Average value:

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
4810.00	27.79	31.79	8.60	24.17	44.01	54.00	-9.99	Vertical
7215.00	24.16	36.18	11.65	26.39	45.60	54.00	-8.40	Vertical
9620.00	20.47	38.09	14.15	25.45	47.26	54.00	-6.74	Vertical
12025.00	*					54.00		Vertical
14430.00	*					54.00		Vertical
16835.00	*					54.00		Vertical
4810.00	23.22	31.79	8.60	24.17	39.44	54.00	-14.56	Horizontal
7215.00	20.75	36.18	11.65	26.39	42.19	54.00	-11.81	Horizontal
9620.00	17.22	38.09	14.15	25.45	44.01	54.00	-9.99	Horizontal
12025.00	*					54.00		Horizontal
14430.00	*					54.00		Horizontal
16835.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*

Test channel:	Middle

Peak value:

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
4880.00	40.05	31.85	8.66	24.10	56.46	74.00	-17.54	Vertical
7320.00	41.12	36.37	11.72	26.71	62.50	74.00	-11.50	Vertical
9760.00	38.35	38.35	14.25	25.36	65.59	74.00	-8.41	Vertical
12200.00	*					74.00		Vertical
14640.00	*					74.00		Vertical
17080.00	*					74.00		Vertical
4880.00	35.35	31.85	8.66	24.10	51.76	74.00	-22.24	Horizontal
7320.00	35.88	36.37	11.72	26.71	57.26	74.00	-16.74	Horizontal
9760.00	33.60	38.35	14.25	25.36	60.84	74.00	-13.16	Horizontal
12200.00	*					74.00		Horizontal
14640.00	*					74.00		Horizontal
17080.00	*					74.00		Horizontal

Average value:

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
4880.00	28.24	31.85	8.66	24.10	44.65	54.00	-9.35	Vertical
7320.00	24.23	36.37	11.72	26.71	45.61	54.00	-8.39	Vertical
9760.00	19.55	38.35	14.25	25.36	46.79	54.00	-7.21	Vertical
12200.00	*					54.00		Vertical
14640.00	*					54.00		Vertical
17080.00	*					54.00		Vertical
4880.00	23.86	31.85	8.66	24.10	40.27	54.00	-13.73	Horizontal
7320.00	20.82	36.37	11.72	26.71	42.20	54.00	-11.80	Horizontal
9760.00	17.01	38.35	14.25	25.36	44.25	54.00	-9.75	Horizontal
12200.00	*					54.00		Horizontal
14640.00	*					54.00		Horizontal
17080.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*

Test channel:	Highest

Peak value:

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	35.44	31.93	8.73	24.03	52.07	74.00	-21.93	Vertical
7440.00	36.58	36.59	11.79	27.03	57.93	74.00	-16.07	Vertical
9920.00	33.05	38.81	14.38	25.26	60.98	74.00	-13.02	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
17360.00	*					74.00		Vertical
4960.00	31.80	31.93	8.73	24.03	48.43	74.00	-25.57	Horizontal
7440.00	32.86	36.59	11.79	27.03	54.21	74.00	-19.79	Horizontal
9920.00	30.57	38.81	14.38	25.26	58.50	74.00	-15.50	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal
17360.00	*					74.00		Horizontal

Average value:

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	24.16	31.93	8.73	24.03	40.79	54.00	-13.21	Vertical
7440.00	21.74	36.59	11.79	27.03	43.09	54.00	-10.91	Vertical
9920.00	14.65	38.81	14.38	25.26	42.58	54.00	-11.42	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
17360.00	*					54.00		Vertical
4960.00	20.68	31.93	8.73	24.03	37.31	54.00	-16.69	Horizontal
7440.00	18.47	36.59	11.79	27.03	39.82	54.00	-14.18	Horizontal
9920.00	14.85	38.81	14.38	25.26	42.78	54.00	-11.22	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal
17360.00	*					54.00		Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*