Report No.: GTSE13120198501

FCC Report

(FHSS)

Applicant:	SHENZHE GOSPELL SMARTHOME ELECTRONIC CO., LTD
Address of Applicant:	5 Floor/Block 2, Vision(SZ) Park, Hi-Tech, Industrial Park, Shenzhen, 518057, China

Equipment Under Test (EUT)

Product Name:	Digital Wireless Camera System
Model No.:	GD7067
FCC ID:	TW5GD7067
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247:2012
Date of sample receipt:	December 23, 2013
Date of Test:	December 23-31, 2013
Date of report issued:	December 31, 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	*December 31, 2013*	*Original*

Prepared By: hank. yan ***Date:*** *December 31, 2013*

Project Engineer

Check By: Hans. Hu ***Date:*** *December 31, 2013*

Reviewer

3 Contents

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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
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)&TCB Exclusion List (7 July 2002)	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.

5 General Information

5.1 Client Information

Applicant:	SHENZHE GOSPELL SMARTHOME ELECTRONIC CO., LTD
Address of Applicant:	5 Floor/Block 2, Vision(SZ) Park, Hi-Tech, Industrial Park, Shenzhen, 518057, China
Manufacturer:	SHENZHE GOSPELL SMARTHOME ELECTRONIC CO., LTD
Address of Manufacturer:	5 Floor/Block 2, Vision(SZ) Park, Hi-Tech, Industrial Park, Shenzhen, 518057, China

5.2 General Description of EUT

Product Name:	Digital Wireless Camera System
Model No.:	GD7067
Operation Frequency:	2403MHz~2478MHz
Channel numbers:	26
Channel separation:	3MHz
Modulation type:	QPSK
Antenna Type:	Integral monopole antenna
Antenna gain:	1dBi (declare by Applicant)

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2403MHz	8	2424MHz	15	2445MHz	22	2466MHz
2	2406MHz	9	2427MHz	16	2448MHz	23	2469MHz
3	2409MHz	10	2430MHz	17	2451MHz	24	2472MHz
4	2412MHz	11	2433MHz	18	2454MHz	25	2475MHz
5	2415MHz	12	2436MHz	19	2457MHz	26	2478MHz
6	2418MHz	13	2439MHz	20	2460MHz		
7	2421MHz	14	2442MHz	21	2463MHz		

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	2403MHz
The middle channel	2442MHz
The Highest channel	2478MHz

5.3 Test mode

Transmitting mode	Keep the FHSS in continuously transmitting mode

5.4 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 Testing and 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.

5.5 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

5.6 Other Information Requested by the Customer

None.

5.7 Description of Support Units

None.

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, 2013	Dec. 5, 2014
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 2013	Sep. 07 2015
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:

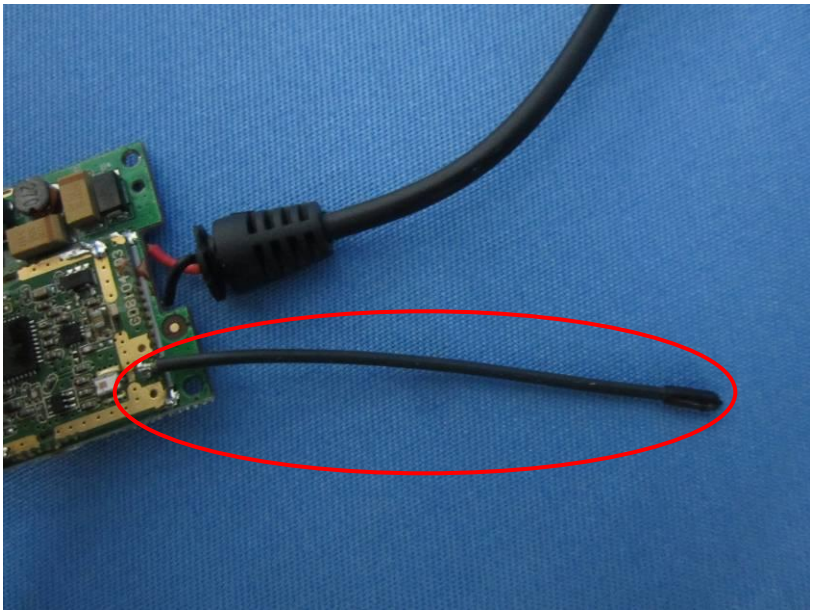
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit 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:

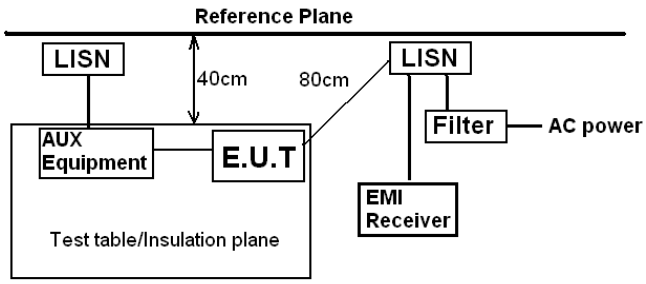
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional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

E.U.T Antenna:

*The antenna is Integral antenna, the best case gain of the antenna is 1*dBi



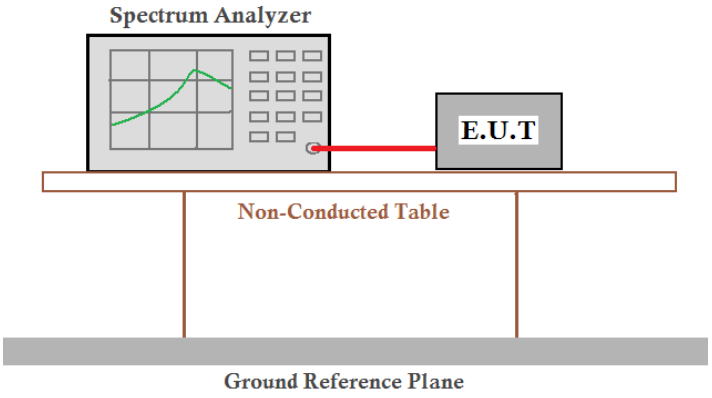
7.2 Conducted Emissions

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:	Mains supply by DC power
Test results:	N/A

Measurement data:

N/A

7.3 Conducted Peak Output Power

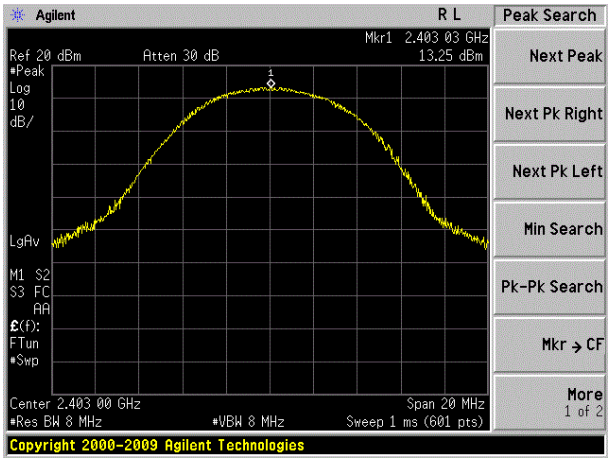
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2003
Limit:	0.125W
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

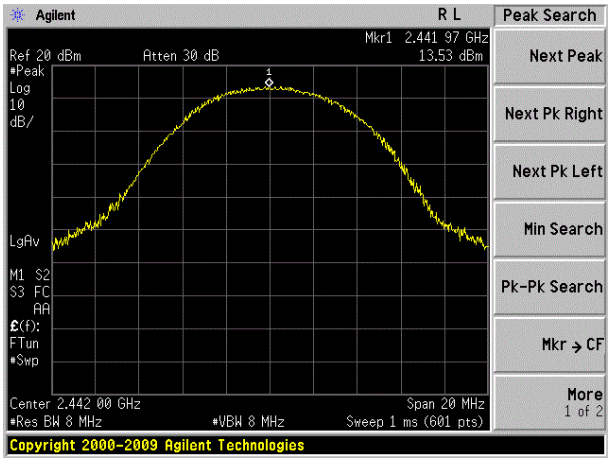
Mode	Test channel	Peak Output Power (dBm)	Peak Output Power (W)	Limit (W)	Result
QPSK	Lowest/2403MHz	13.25	0.021135	0.125	Pass
	Middle/2442MHz	13.53	0.022542	0.125	Pass
	Highest/2478MHz	13.40	0.021878	0.125	Pass

Test plot as follows:

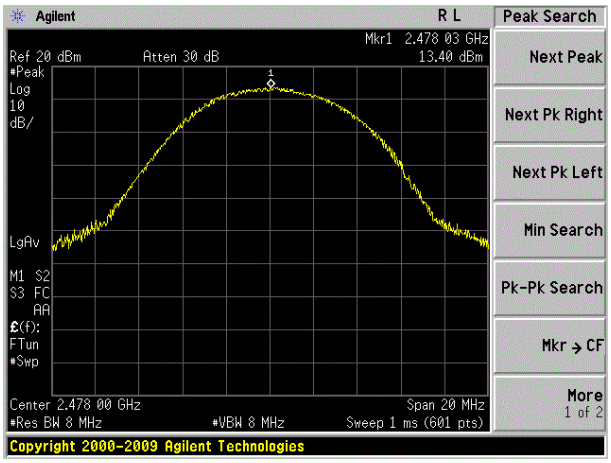
Test mode:	QPSK mode



Lowest channel

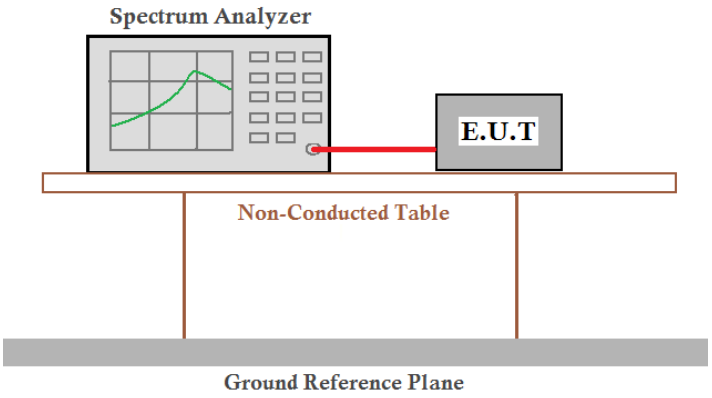


Middle channel



Highest channel

7.4 20dB Emission Bandwidth

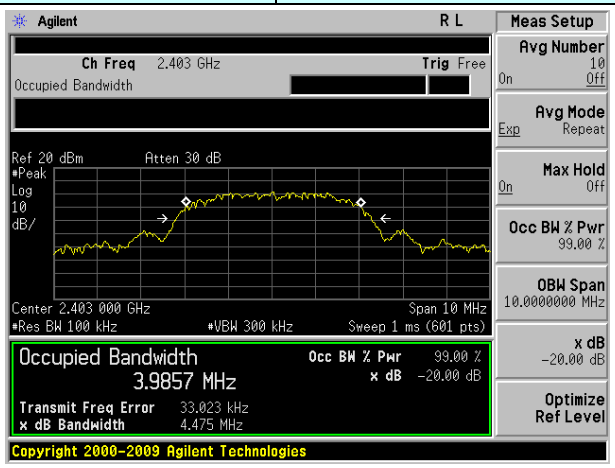
Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.4:2003
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

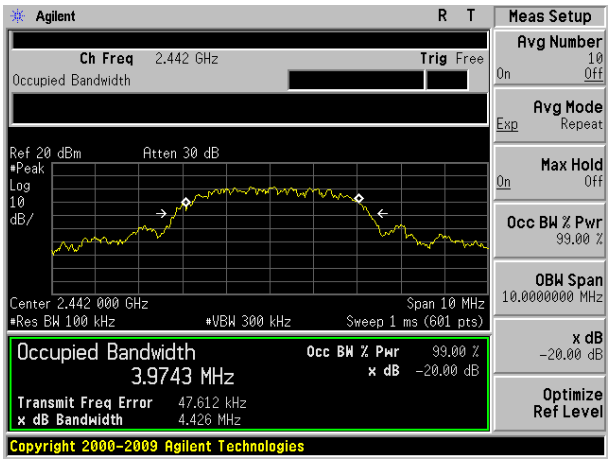
Mode	Test channel	20dB Emission Bandwidth (MHz)	Result
QPSK	Lowest	4.475	Pass
	Middle	4.426	
	Highest	4.440	

Test plot as follows:

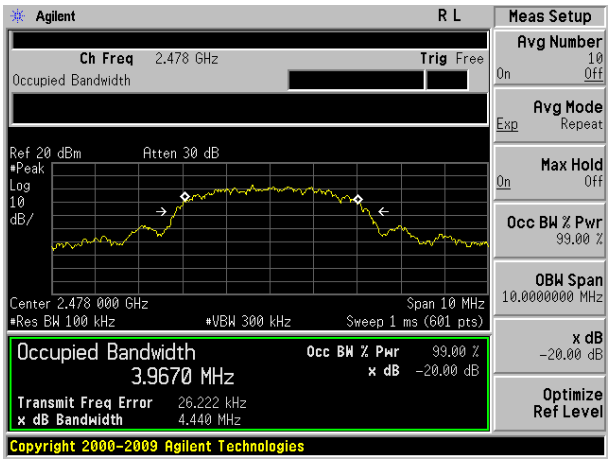
Test mode:	QPSK mode



Lowest channel

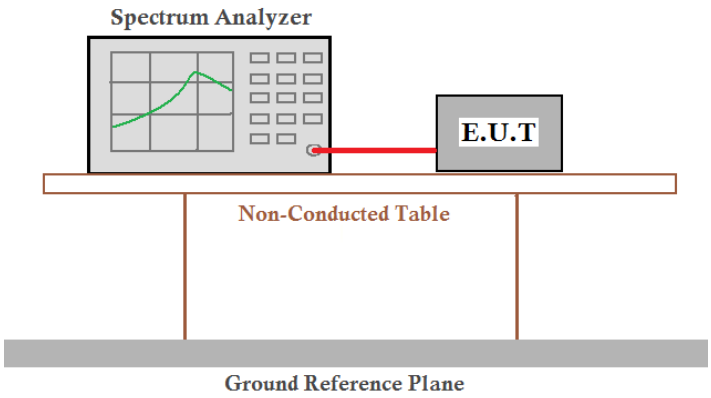


Middle channel



Highest channel

7.5 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

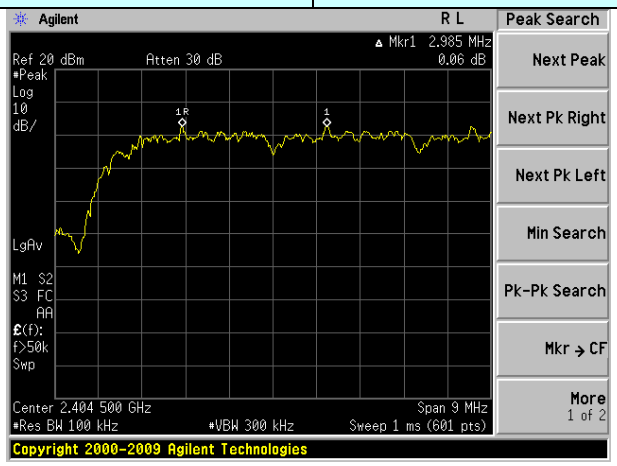
Measurement Data

Mode	Test channel	Carrier Frequencies Separation (kHz)	>Limit (kHz)	Result
QPSK	Lowest	2985	2983	Pass
	Middle	3015	2983	Pass
	Highest	3000	2983	Pass

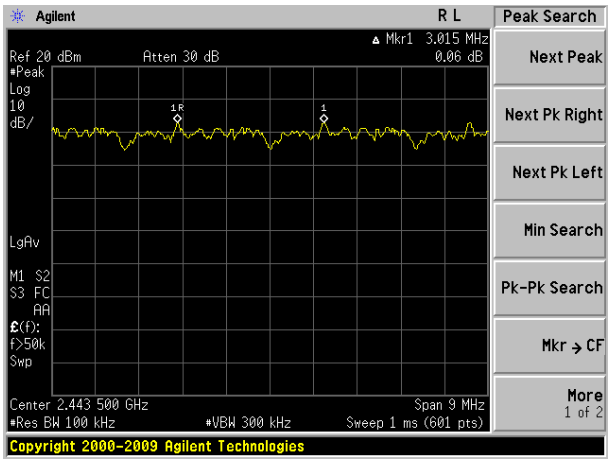
Note: limit =2/3 of 20 dB bandwidth

Test plot as follows:

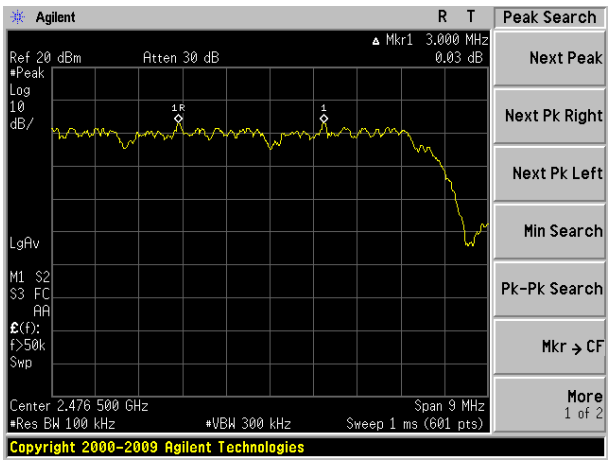
Modulation mode:	QPSK



Lowest channel

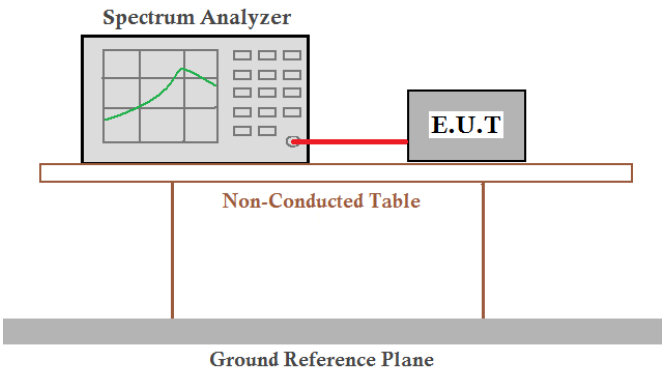


Middle channel



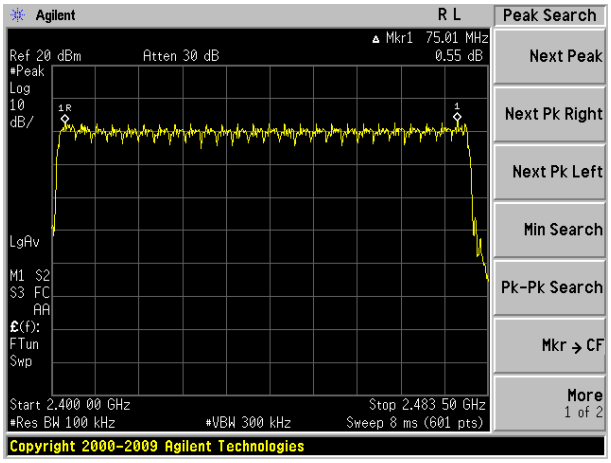
Highest channel

7.6 Hopping Channel Number

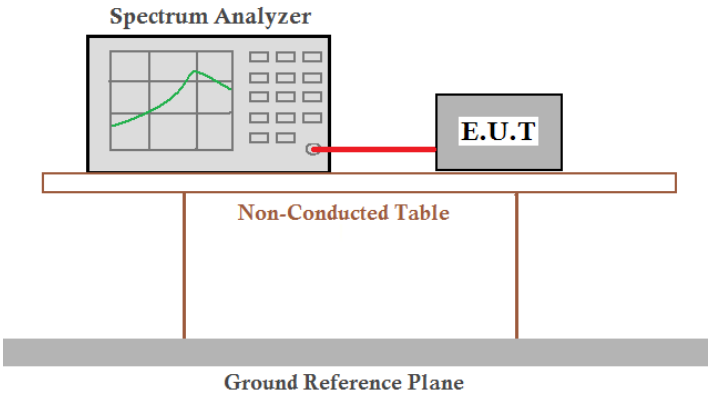
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data:

Mode	Hopping channel numbers	Limit	Result
QPSK	26	15	Pass



7.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
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	Dwell time(ms)	Limit(ms)	Result
2403MHz	45.56	400	Pass
2442MHz	46.80	400	Pass
2478MHz	46.80	400	Pass

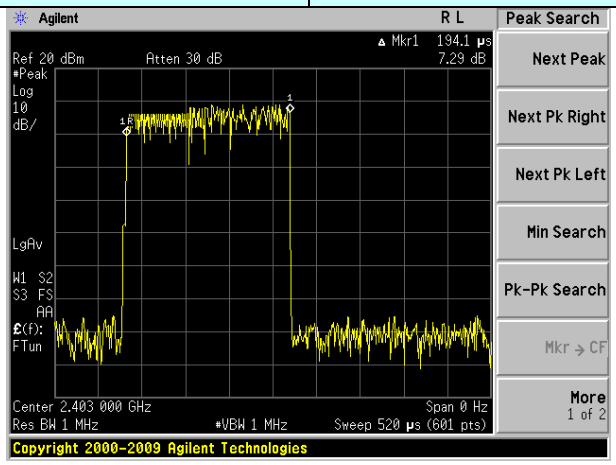
The test period: T= 0.4 Second/Channel x 26 Channel = 10.4 s

Test channel: 2403MHz/2442MHz/278MHz as blow

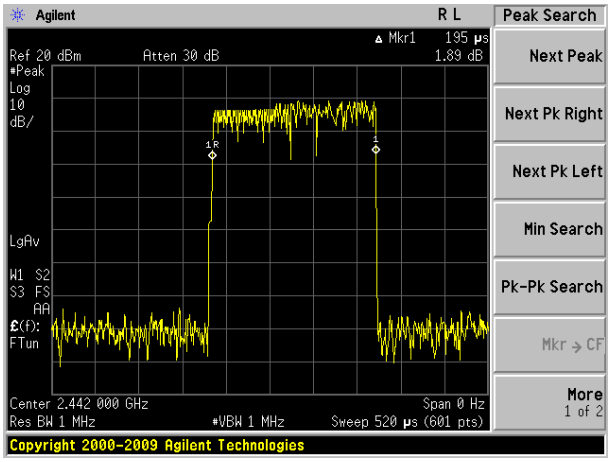
Dwell time= Pulse time (ms)*(1200/2/26)*26*0.4

Test plot as follows:

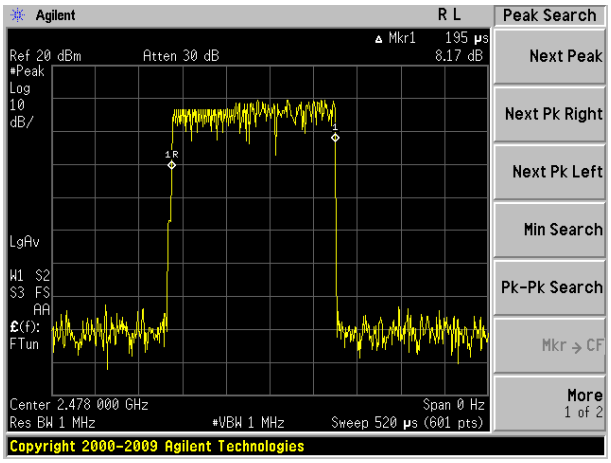
Test channel:	2402MHz/2442MHz/2478MHz



Lowest Channel



Middle Channel



Highest Channel

7.8 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part15 C Section 15.247 (a)(1) requirement:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 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.

EUT Pseudorandom Frequency Hopping Sequence

The embedded FHSS engine uses 26 hopping frequencies. Each channel frequency is selected from a pseudorandom ordered list of hopping frequencies, from 2403MHz to 2478MHz with separating in 4.5MHz apart from each of the channels. A single data frame is transmitted on each frequency location before skipping to the next hopping frequency in the list.

The system will generate a pseudorandom ordered list base on:

1/ A 26 bit Random ID (26 bit)

2/ A Sequence No. (16 bit)

3/ A 26 bit polynomial Randomization

System Receiver Input Bandwidth

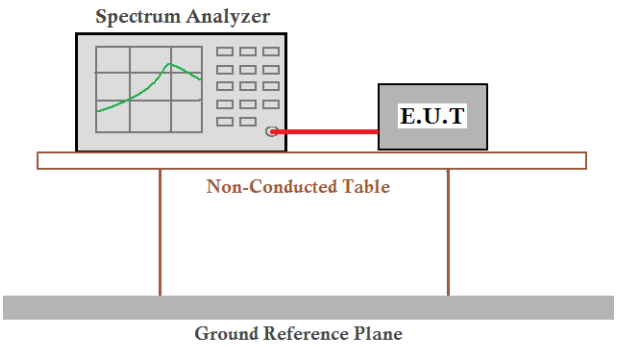
The receiver bandwidth is equal to the receiver bandwidth in the 26 hopping channel mode, which is 3MHz. The receiver bandwidth was verified during RF hopping to the relative channel.

Receiver Hopping Capability

The associated receiver has the ability to shift frequencies in synchronization with the transmitted signals, with they start connect with a same channel and then hop to next channel with a same formula among each other.

7.9 Band Edge

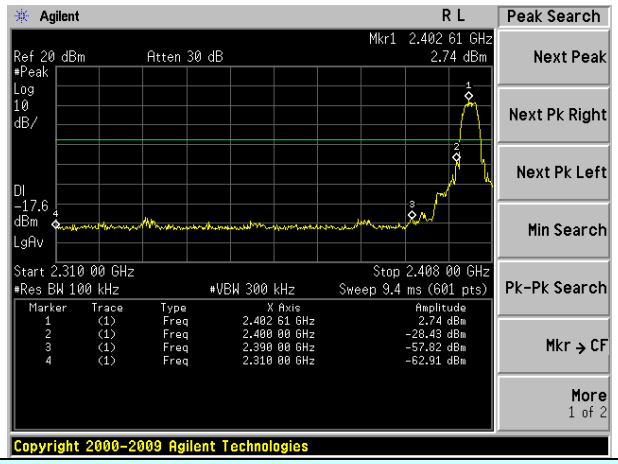
7.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100kHz, VBW=300kHz, 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:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

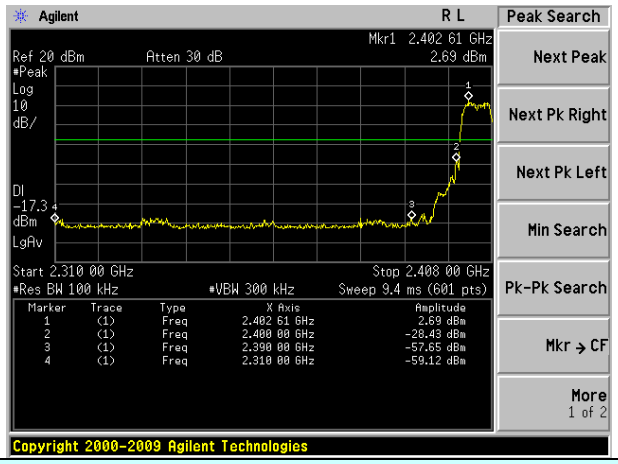
Test plot as follows:

Test channel:	Lowest channel

No hopping

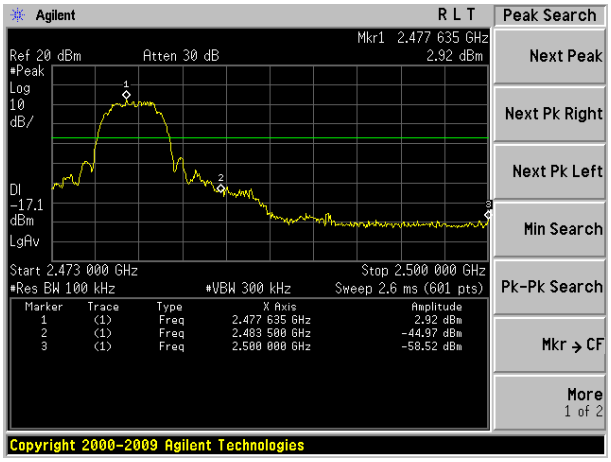


Hopping

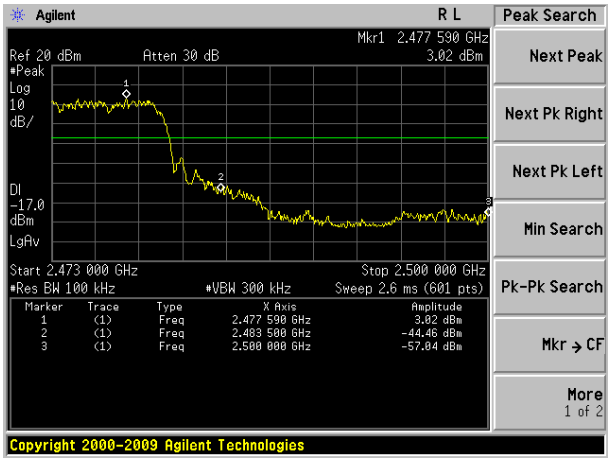


Test channel:	Highest channel

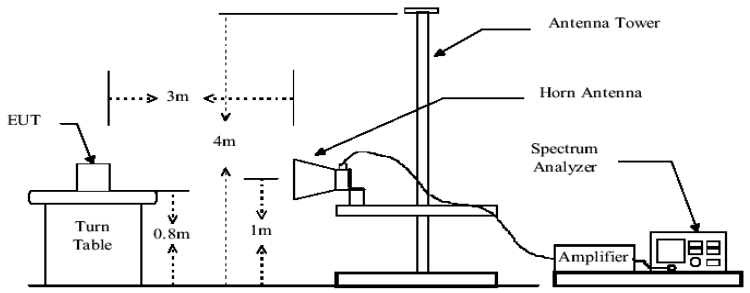
No hopping



Hopping



7.9.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2003</td></tr>
<tr><td>Test Frequency Range:</td><td>All restriction band have been tested, and 2.3GHz to 2.5GHz band is the worse case</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.00</td><td>Average Value</td></tr>
<tr><td>74.00</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test Procedure:</td><td>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.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 6.0 for details</td></tr>
<tr><td>Test mode:</td><td>Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td>Pass</td></tr>
</table>

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.

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
2310.00	49.05	27.04	5.30	38.91	42.48	74	-31.52	Vertical
2390.00	55.66	27.30	5.38	38.99	49.35	74	-24.65	Vertical
2310.00	46.61	27.04	5.30	38.91	40.04	74	-33.96	Horizontal
2390.00	53.82	27.30	5.38	38.99	47.51	74	-26.49	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
2310.00	37.71	27.04	5.30	38.91	31.14	54	-22.86	Vertical
2390.00	43.22	27.30	5.38	38.99	36.91	54	-17.09	Vertical
2310.00	34.62	27.04	5.30	38.91	28.05	54	-25.95	Horizontal
2390.00	41.43	27.30	5.38	38.99	35.12	54	-18.88	Horizontal

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
2483.50	54.19	27.56	5.47	39.07	48.15	74	-25.85	Vertical
2500.00	49.59	27.61	5.49	39.09	43.6	74	-30.4	Vertical
2483.50	51.61	27.56	5.47	39.07	45.57	74	-28.43	Horizontal
2500.00	46.89	27.61	5.49	39.09	40.9	74	-33.1	Horizontal

Average value:

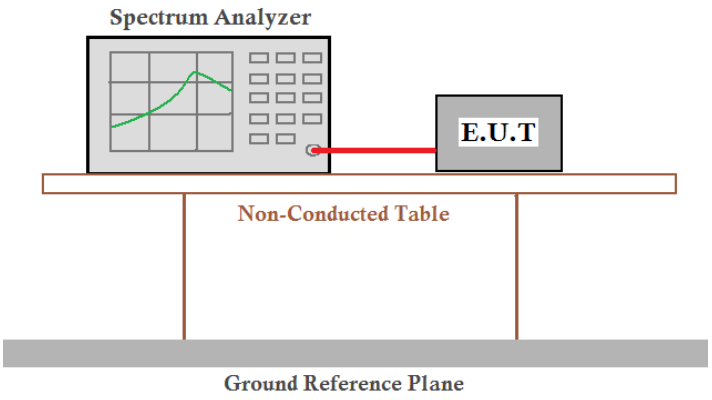
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	41.40	27.56	5.47	39.07	35.36	54	-18.64	Vertical
2500.00	36.85	27.61	5.49	39.09	30.86	54	-23.14	Vertical
2483.50	38.85	27.56	5.47	39.07	32.81	54	-21.19	Horizontal
2500.00	34.17	27.61	5.49	39.09	28.18	54	-25.82	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.*

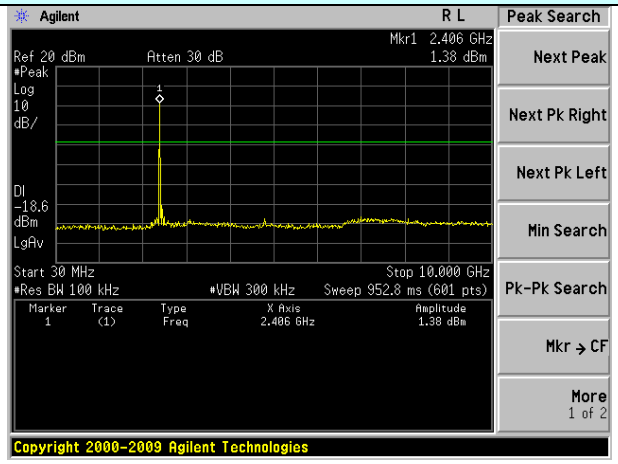
7.10 Spurious Emission

7.10.1 Conducted Emission Method

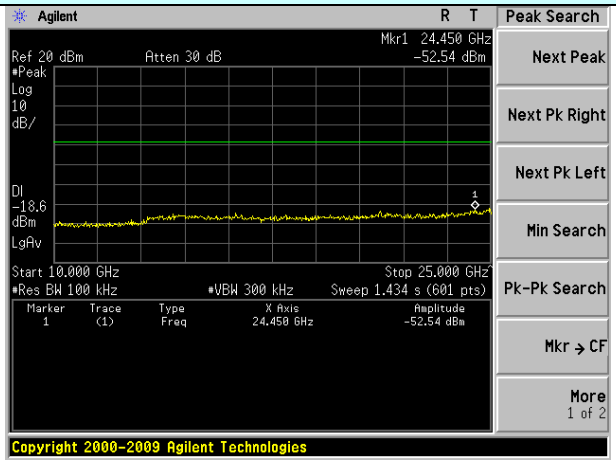
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 Meas Guidance
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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

Remark:
During the test, pre-scan the 16 QAM, QPSK modulation, and found the QPSK modulation which it is worse case.

Test channel:	Lowest channel

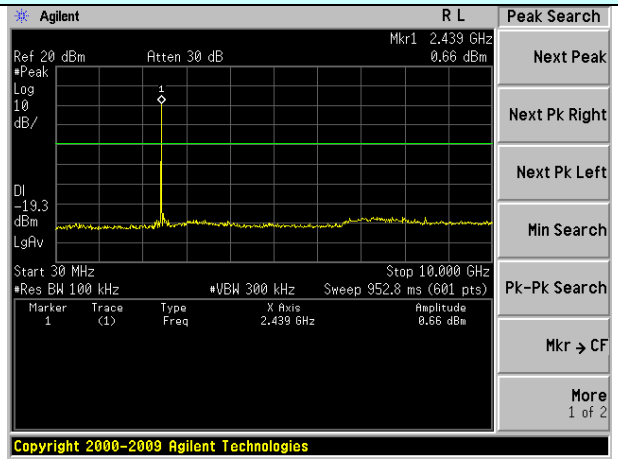


30MHz~10GHz

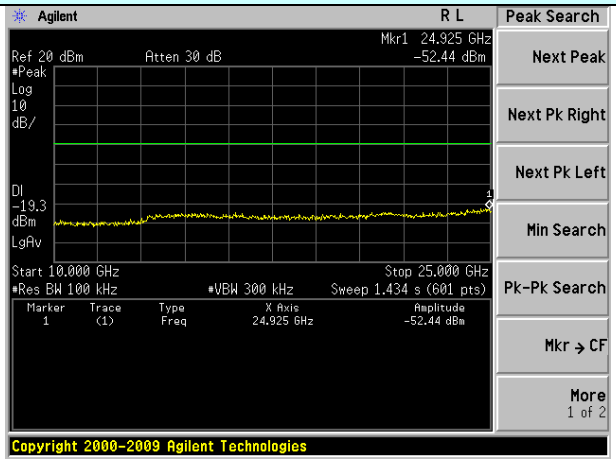


10GHz~25GHz

Test channel:	Middle channel

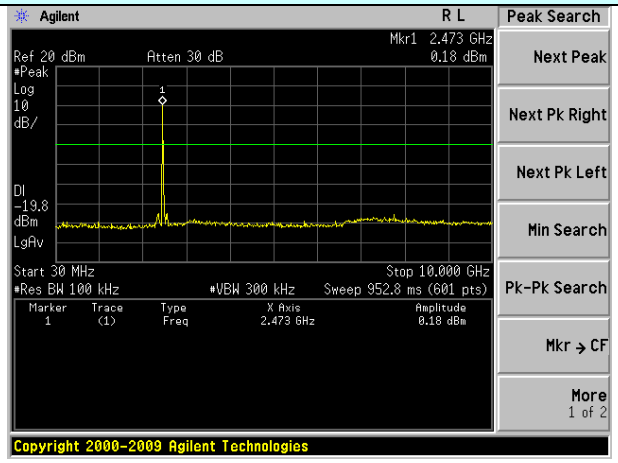


30MHz~10GHz

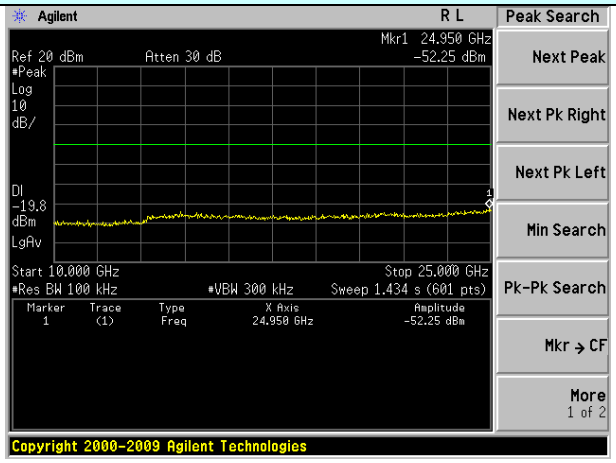


10GHz~25GHz

Test channel:	Highest channel

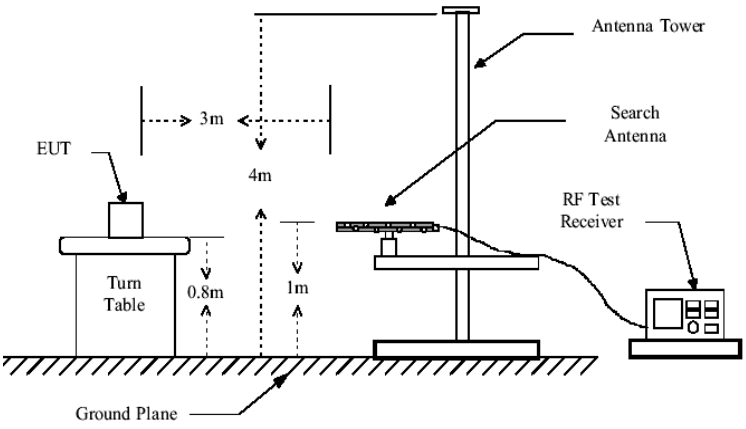


30MHz~10GHz

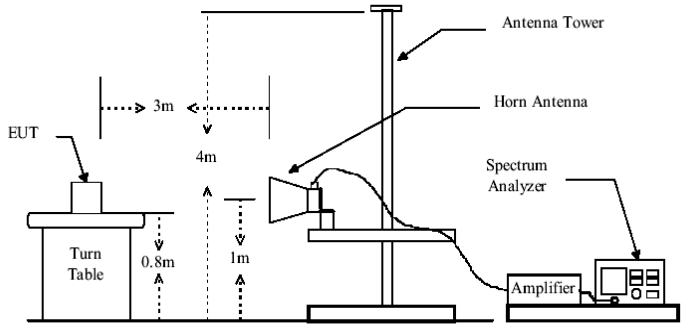


10GHz~25GHz

7.10.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2003</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 25GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz
 

Above 1GHz</td></tr>
</table>

	
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.
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
37.87	40.15	15.59	0.66	32.06	24.34	40.00	-15.66	Vertical
65.32	43.93	11.62	0.92	31.89	24.58	40.00	-15.42	Vertical
93.64	35.88	14.91	1.16	31.74	20.21	43.50	-23.29	Vertical
153.79	40.91	10.52	1.60	32.00	21.03	43.50	-22.47	Vertical
258.02	39.66	14.10	2.18	32.17	23.77	46.00	-22.23	Vertical
383.16	34.29	16.74	2.79	31.93	21.89	46.00	-24.11	Vertical
58.16	36.46	14.70	0.86	31.94	20.08	40.00	-19.92	Horizontal
85.61	41.92	13.19	1.09	31.73	24.47	40.00	-15.53	Horizontal
191.65	37.26	12.57	1.81	32.12	19.52	43.50	-23.98	Horizontal
247.31	38.97	14.08	2.12	32.16	23.01	46.00	-22.99	Horizontal
345.91	35.05	16.26	2.61	32.03	21.89	46.00	-24.11	Horizontal
513.32	33.91	18.90	3.37	31.48	24.70	46.00	-21.30	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
4806.00	43.87	31.78	8.60	39.56	44.69	74.00	-29.31	Vertical
7209.00	37.26	38.07	11.65	36.32	50.66	74.00	-23.34	Vertical
9612.00	39.53	37.50	14.14	37.21	53.96	74.00	-20.04	Vertical
4806.00	41.43	31.78	8.60	39.56	42.25	74.00	-31.75	Horizontal
7209.00	35.99	38.07	11.65	36.32	49.39	74.00	-24.61	Horizontal
9612.00	36.80	37.50	14.14	37.21	51.23	74.00	-22.77	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
4806.00	32.00	31.78	8.60	39.56	32.82	54.00	-21.18	Vertical
7209.00	23.60	38.07	11.65	36.32	37.00	54.00	-17.00	Vertical
9612.00	26.49	37.50	14.14	37.21	40.92	54.00	-13.08	Vertical
4806.00	28.91	31.78	8.60	39.56	29.73	54.00	-24.27	Horizontal
7209.00	21.99	38.07	11.65	36.32	35.39	54.00	-18.61	Horizontal
9612.00	23.02	37.50	14.14	37.21	37.45	54.00	-16.55	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.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

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
4884.00	40.43	31.76	8.66	39.54	41.31	74	-32.69	Vertical
7326.00	33.49	38.17	11.72	36.21	47.17	74	-26.83	Vertical
9768.00	35.88	37.35	14.25	37.44	50.04	74	-23.96	Vertical
4884.00	37.88	31.76	8.66	39.54	38.76	74	-35.24	Horizontal
7326.00	32.16	38.17	11.72	36.21	45.84	74	-28.16	Horizontal
9768.00	33.01	37.35	14.25	37.44	47.17	74.00	-26.83	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
4884.00	30.40	31.75	8.66	39.54	31.27	54.00	-22.73	Vertical
7326.00	22.34	38.16	11.72	36.21	36.01	54.00	-17.99	Vertical
9768.00	25.11	37.34	14.25	37.44	39.26	54.00	-14.74	Vertical
4884.00	27.43	31.75	8.66	39.54	28.30	54.00	-25.70	Horizontal
7326.00	20.79	38.16	11.72	36.21	34.46	54.00	-19.54	Horizontal
9768.00	21.78	37.34	14.25	37.44	35.93	54.00	-18.07	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.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

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
4956.00	41.24	31.71	8.73	39.51	42.17	74.00	-31.83	Vertical
7434.00	34.43	38.26	11.79	36.10	48.38	74.00	-25.62	Vertical
9912.00	36.77	37.17	14.38	37.70	50.62	74.00	-23.38	Vertical
4956.00	38.73	31.71	8.73	39.51	39.66	74.00	-34.34	Horizontal
7434.00	33.12	38.26	11.79	36.10	47.07	74.00	-26.93	Horizontal
9912.00	33.96	37.17	14.38	37.70	47.81	74.00	-26.19	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
4956.00	30.40	31.71	8.73	39.51	31.33	54.00	-22.67	Vertical
7434.00	21.58	38.26	11.79	36.10	35.53	54.00	-18.47	Vertical
9912.00	24.62	37.17	14.38	37.70	38.47	54.00	-15.53	Vertical
4956.00	27.15	31.71	8.73	39.51	28.08	54.00	-25.92	Horizontal
7434.00	19.89	38.26	11.79	36.10	33.84	54.00	-20.16	Horizontal
9912.00	20.97	37.17	14.38	37.70	34.82	54.00	-19.18	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.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*