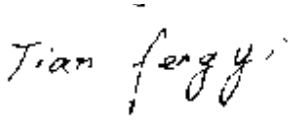
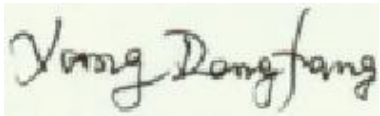
TEST REPORT

Report No.:	**Z09J0250135**	**Page 1 of 42**
Applicant:	China National Analytical Center GuangZhou.	
Applicant Address:	Building NO.34， NO.100 Xianlie Zhong Road， Guangzhou ， Guangdong， P.R.China	
Sample Description:	Digestion System	
Model:	DS-360	
FCC ID	WTTSISPDS-360	
Test Location:	EMC Laboratory of Guangzhou GRG Metrology and Test Technology Co., Ltd.	
Test Specification:	FCC PART 15 :2008	
Test Date:	2009-04-01 to 2009-08-21	
Test Result:	*According to the kind and extend of tests performed the test item passed test specification.*	

Tested By:	**Reviewed By:**	**Approved By:**
Tian Fengyi / Test Engineer	Yang Dengfang / Manager	Frank.Chen / Vice-President
		
Date: *27th Sep. 2009*	Date: *27th Sep. 2009*	Date: *27th Sep. 2009*

Other Aspects:

None

Abbreviations: *ok / P = passed; fail / F = failed; n.a. / N = not applicable*

1 Test Summary

Test	Test Requirement	Standard Paragraph	Result
Antenna Requirement	FCC PART 15 :2008	Section 15.247 (c)	PASS
Occupied Bandwidth	FCC PART 15 :2008	Section 15.247 (a1)	PASS
Carrier Frequencies Separated	FCC PART 15 :2008	Section 15.247(a)(1)	PASS
Hopping Channel Number	FCC PART 15 :2008	Section 15.247(a)(1)(iii)	PASS
Dwell Time	FCC PART 15 :2008	Section 15.247(a)(1)(iii)	PASS
Pseudorandom Frequency Hopping Sequence	FCC PART 15 :2008	Section 15.247(a)(1)	PASS
Maximum Peak Output Power	FCC PART 15 :2008	Section 15.247(b)(1)	PASS
RF Exposure Compliance Requirement	FCC PART 15 :2008	15.247(b)(4)& TCB Exclusion List (7 July 2002)	PASS
Conducted Emission	FCC PART 15 :2008	Section 15.207	PASS
Conducted Spurious Emission (30MHz to 25GHz)	FCC PART 15 :2008	Section 15.209 &15.247(d)	PASS
Radiated Spurious Emission (30MHz to 25GHz)	FCC PART 15 :2008	Section 15.209 &15.247(d)	PASS
Band Edges Measurement	FCC PART 15 :2008	Section 15.247 (d) &15.205	PASS

♣ The Bluetooth modular was mounted by soldering on a mother PCBA, the voltage of the Bluetooth was supplied by one output of the PCBA is DC 3.3V.

Contents

2 General Information

2.1 Client Information

Applicant:	China National Analytical Center GuangZhou.
Address of Applicant:	Building NO.34，NO.100 Xianlie Zhong Road，Guangzhou，Guangdong，P.R.China

2.2 Manufacturer Information

Manufacturer:	China National Analytical Center GuangZhou.
Address of Applicant:	Building NO.34，NO.100 Xianlie Zhong Road，Guangzhou，Guangdong，P.R.China

2.3 General Description of E.U.T.

Product Name:	Digestion System
Model:	DS-360
Number of Channels:	79 Channels
Channel Separation:	1 MHz
Type of Modulation:	FHSS (Frequency Hopping Spread Spectrum);
Dwell time:	The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)
Antenna Type:	Integral
Power Supply:	DC 3.3V

2.4 Description of Support Units

The Bluetooth modular was mounted by soldering on a mother PCBA, the voltage of the Bluetooth was supplied by one output of the PCBA is DC 3.3V.

2.5 Standards Applicable for Testing

The standard used was FCC PART 15 Subpart C: 2008. ANSI C63.4:2003.

2.6 Test Location

All tests were performed at:

EMC Laboratory of Guangzhou GRG Metrology and Test Technology Co., Ltd.

No tests were sub-contracted.

2.7 Other Information Requested by the Customer

None.

2.8 Test Facility

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC Listed Lab No. 688188
China	CNAS No.L0446
China	DILAC No.DL175
VCCI	VCCI No.2914

3 Equipments Used during Test

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Semi-anechoic chamber	ETS-LINGGREN	RFD-F/A-100	3730	2010-04-10
Test Receiver	ROHDE & SCHWARZ	ESU 40	100012	2010-06-02
Log period antenna	ETS-LINGGREN	3142C	00075971	2010-08-03
Bi-log antenna	Schaffner-chase	CBL6443	5070	2009-12-08
Horn antenna	SCHWARZBECK	BBHA 9120 E	BBHA9120E318	2010-08-03
Horn antenna	ETS.LINDGREN	3117	00075824	2010-08-03
Coaxial	GRGT	Cable 2	N/A	2010-07-01
LISN	SCHWARZBECK	NSLK 8127	8127450	2010-07-01
Signal generator	ROHDE & SCHWARZ	SML03	103002	2010-06-05

4 Test Results

4.1 E.U.T. test conditions

Type of antenna: **Integral**

Operating Environment:

Temperature: **24 °C**

Humidity: **48 % RH**

Atmospheric Pressure: **101 kPa**

Test frequencies: **According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:**

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top. 1 near middle and 1 near bottom

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2416	28	2430
1	2403	15	2417	29	2431
2	2404	16	2418	30	2432
3	2405	17	2419	31	2433
4	2406	18	2420	32	2434
5	2407	19	2421	33	2435
6	2408	20	2422	34	2436
7	2409	21	2423	35	2437
8	2410	22	2424	36	2438
9	2411	23	2425	37	2439
10	2412	24	2426	38	2440
11	2413	25	2427	39	2441
12	2414	26	2428	40	2442
13	2415	27	2429	41	2443

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	2444	55	2457	68	2470
43	2445	56	2458	69	2471
44	2446	57	2459	70	2472
45	2447	58	2460	71	2473
46	2448	59	2461	72	2474
47	2449	60	2462	73	2475
48	2450	61	2463	74	2476
49	2451	62	2464	75	2477
50	2452	63	2465	76	2478
51	2453	64	2466	77	2479
52	2454	65	2467	78	2480
53	2455	66	2468		
54	2456	67	2469		

Test frequency is the lowest channel: 0 channel(2402MHz), middle channel: 39 channel(2441MHz) and highest channel: 78 channel(2480MHz)

4.2 Antenna Requirement

4.2.1 Standard requirement

15.203 requirement:
For intentional device, according to 15.203. an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
15.247(c) (1)(i) requirement:
(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi 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 6 dBi.

4.2.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna gain:
The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Channel / Modulation & Gain	Low channel	Mid channel	High channel
Conducted power [dBm] GFSK	17.03	16.18	15.56
Radiated power [dBm] GFSK	18.70	18.18	17.50
Gain [dB]	1.67	2.00	1.94

Test result: The unit does meet the FCC requirements.

4.3 Occupied Bandwidth

Test Requirement: FCC Part 15 C

Test Method: Based on FCC Part15 C Section 15.247 & DA 00-705

Test Date: 2009-07-06

Test Status: Test in fixing operating frequency at lowest, Middle, highest channel.

Power supply: DC 3.3V

Test Procedure:

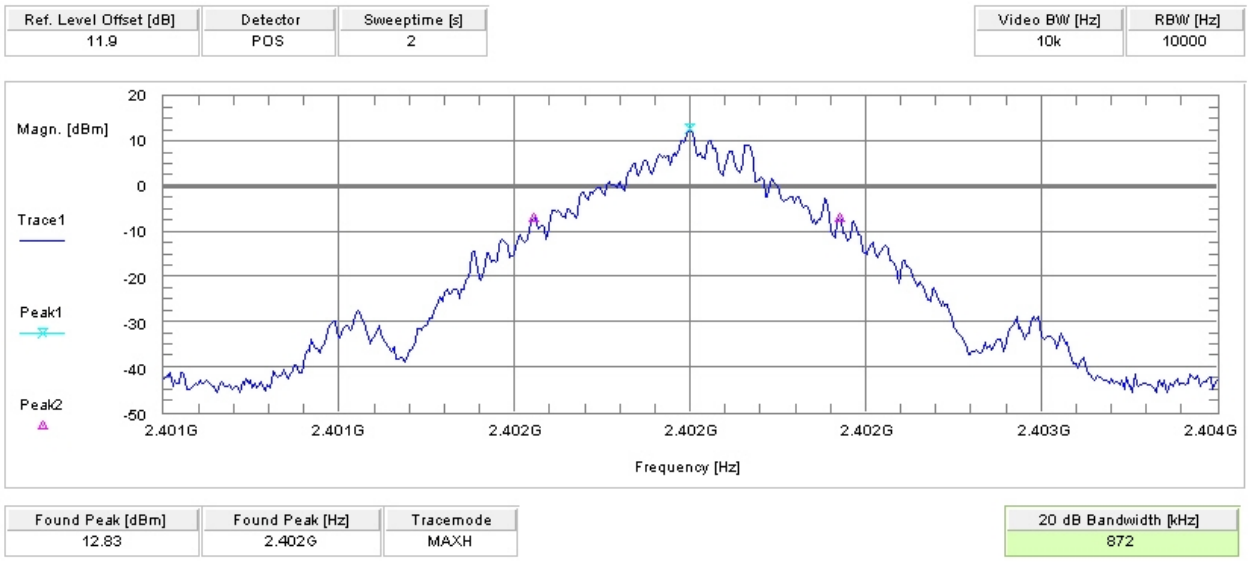
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel;
3. Set the spectrum analyzer: RBW >= 1% of the 20dB bandwidth (set 10kHz). VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points or 99% bandwidth.
5. Bandwidth value is OBW value.

Test result:

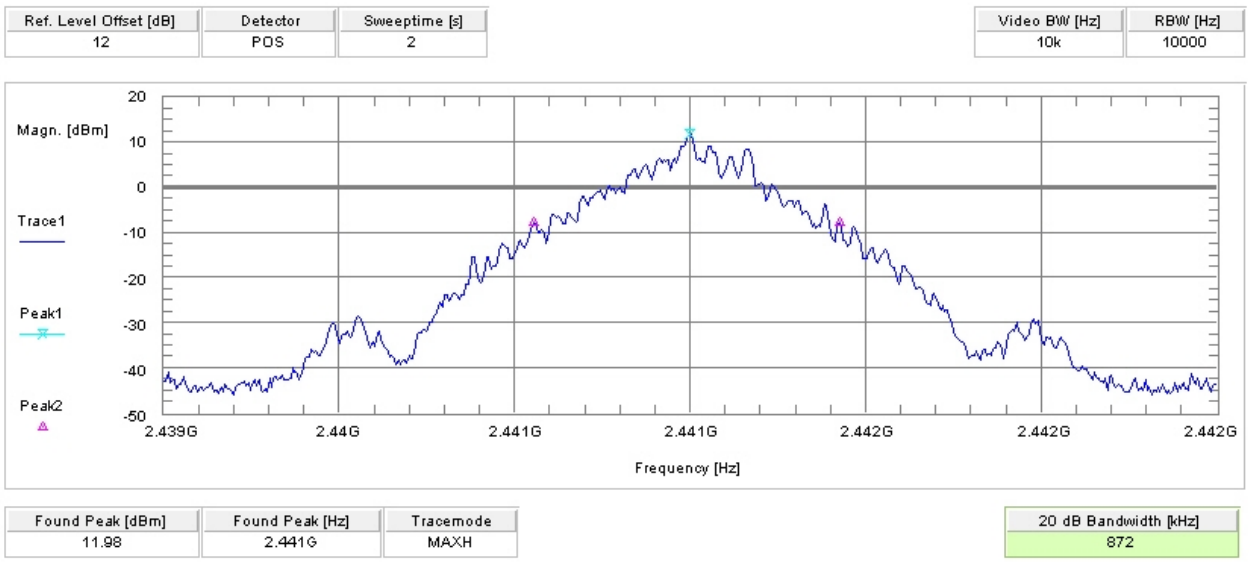
Frequency(MHz) / Modulation Mode	20 dB BANDWIDTH(kHz)		
	2402	2411	2480
GFSK	872	872	872
Pi/4 DQPSK	1172	1172	1172
8 DPSK	1184	1184	1184
Limit	＜1500kHz		
Result	PASS		
Measurement Uncertainty:	±2kHz		

Result plot as follows:

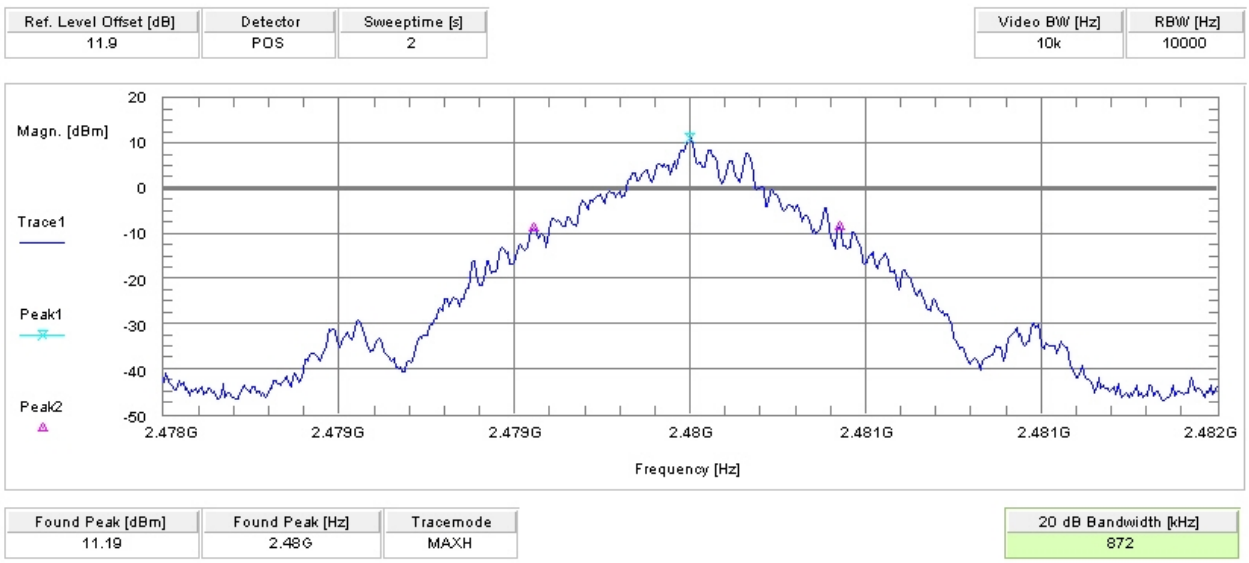
Plot 1 GFSK, Lowest Channel:



Plot 2 GFSK, Middle Channel:

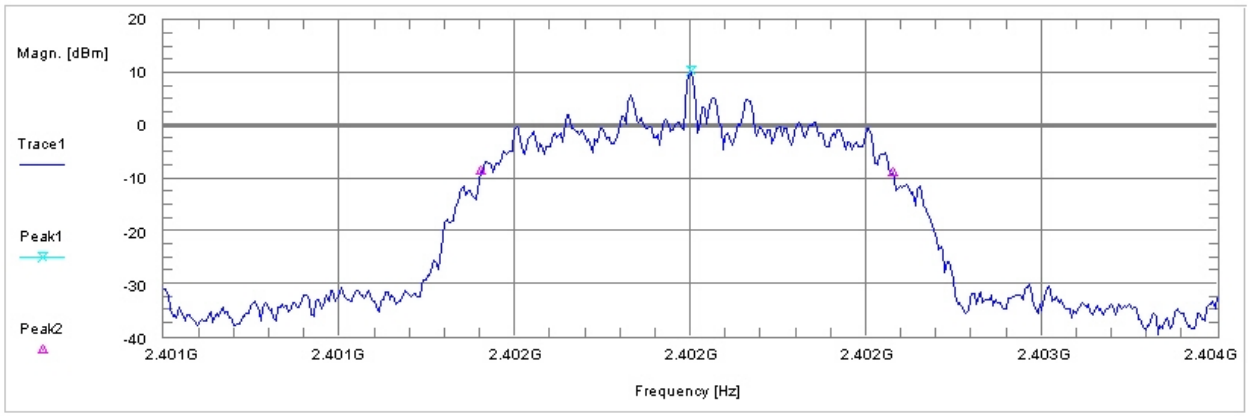


Plot 3 GFSK, Highest Channel:



Plot 4 Pi/4 DQPSK, Lowest Channel:

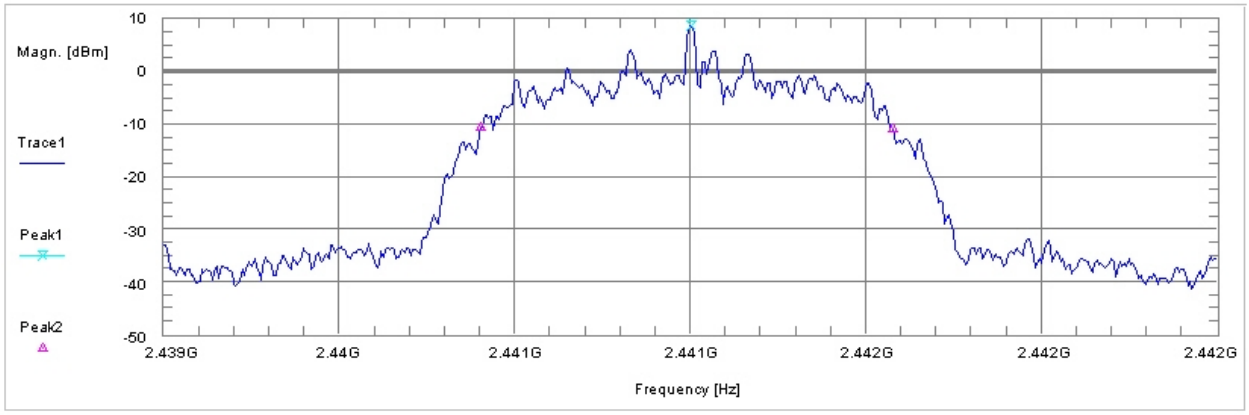
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.6	POS	2	10k	10000



Found Peak [dBm]	Found Peak [Hz]	Tracemode	20 dB Bandwidth [kHz]
10.42	2.402G	MAXH	1172

Plot 5 Pi/4 DQPSK, Middle Channel:

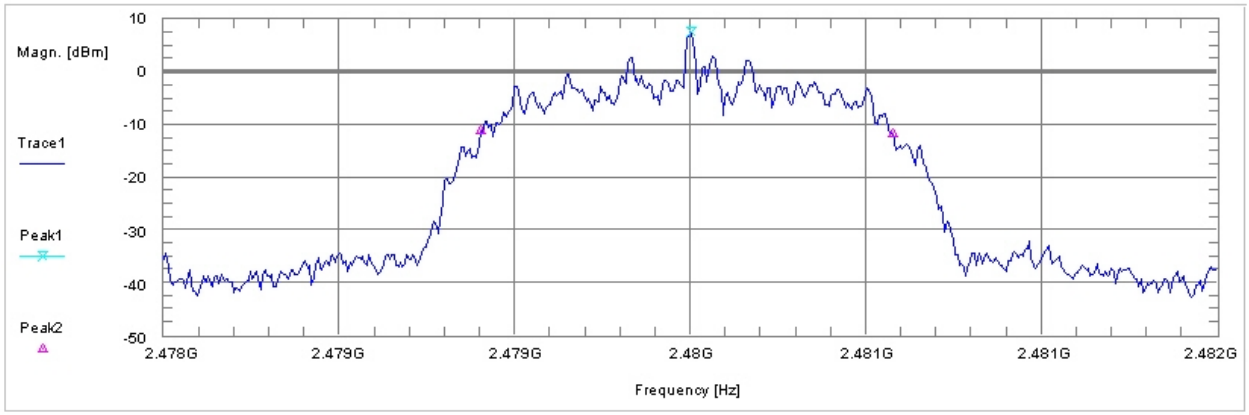
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.7	POS	2	10k	10000



Found Peak [dBm]	Found Peak [Hz]	Tracemode	20 dB Bandwidth [kHz]
8.989	2.441G	MAXH	1172

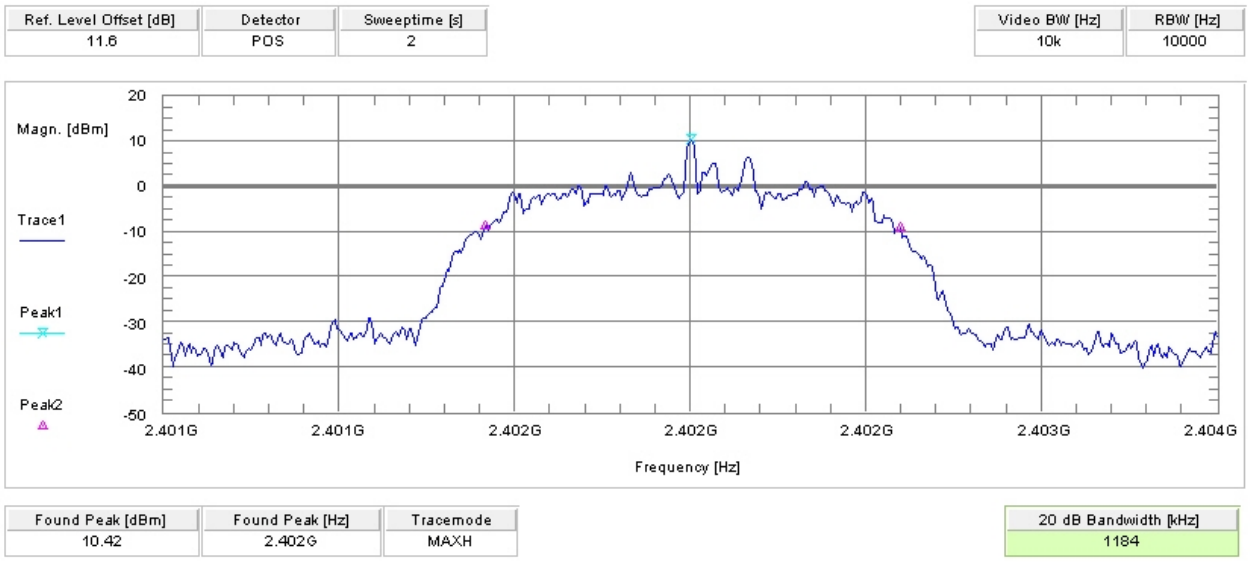
Plot 6 Pi/4 DQPSK, Highest Channel:

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.6	POS	2	10k	10000

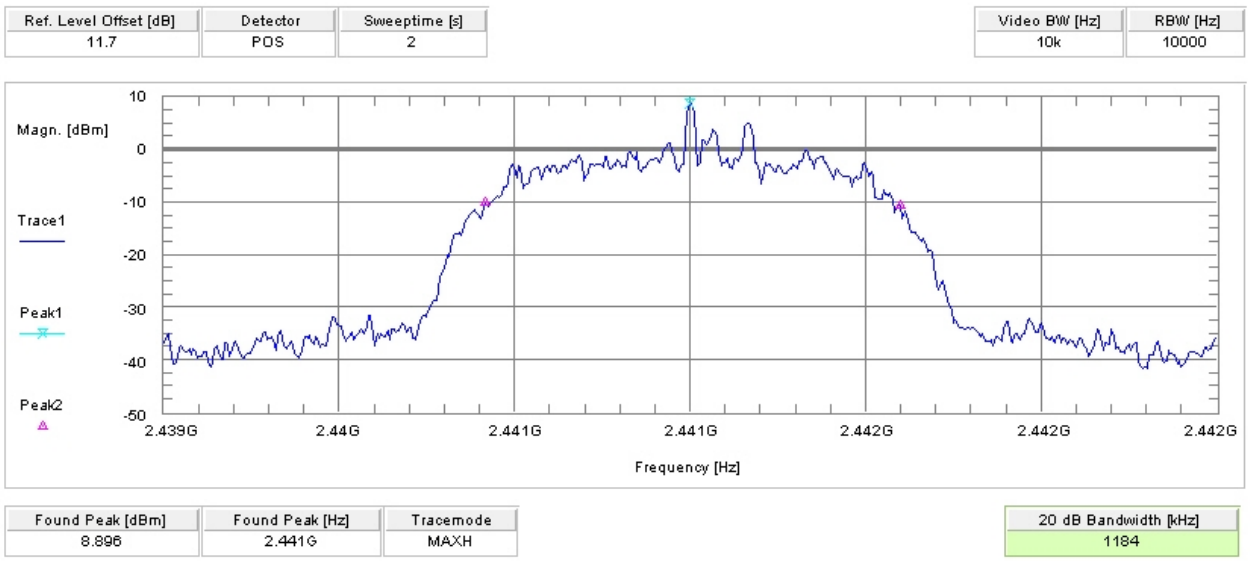


Found Peak [dBm]	Found Peak [Hz]	Tracemode	20 dB Bandwidth [kHz]
7.816	2.48G	MAXH	1172

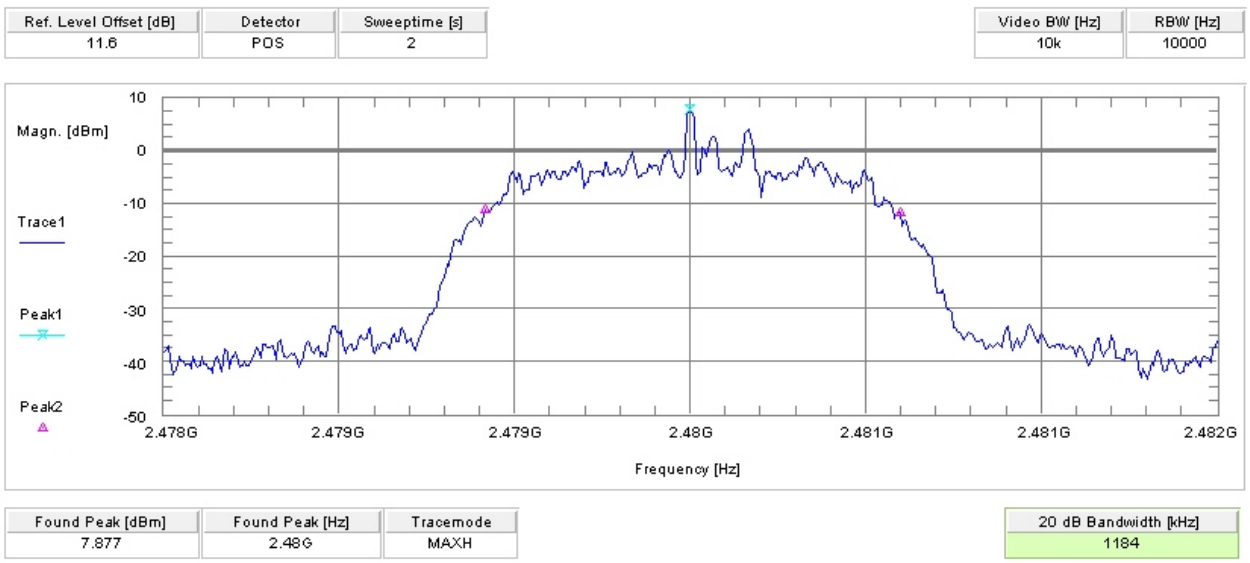
Plot 7 8DPSK, Lowest Channel:



Plot 7 8DPSK, Middle Channel:



Plot 7 8DPSK, Highest Channel:



4.4 Carrier Frequencies Separated

Test Requirement: **FCC Part 15 C**

Test Method: **Based on FCC Part15 C Section 15.247 & DA 00-705**

Test Date: **2009-07-06**

Test requirements: Regulation 15.247(a),(1) 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.

Test Status: **Test in hopping transmitting operating mode.**

Power supply: **DC 3.3V.**

Test Procedure:

1. **Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.**
2. **Set the spectrum analyzer: RBW >= 1% of the span (set 100 kHz). VBW >= RBW, Span = 6MHz. Sweep = auto; Detector Function = Peak. Trace = Max. hold.**
3. **Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.**

Test result:

Channel separation is: ~ 1 MHz

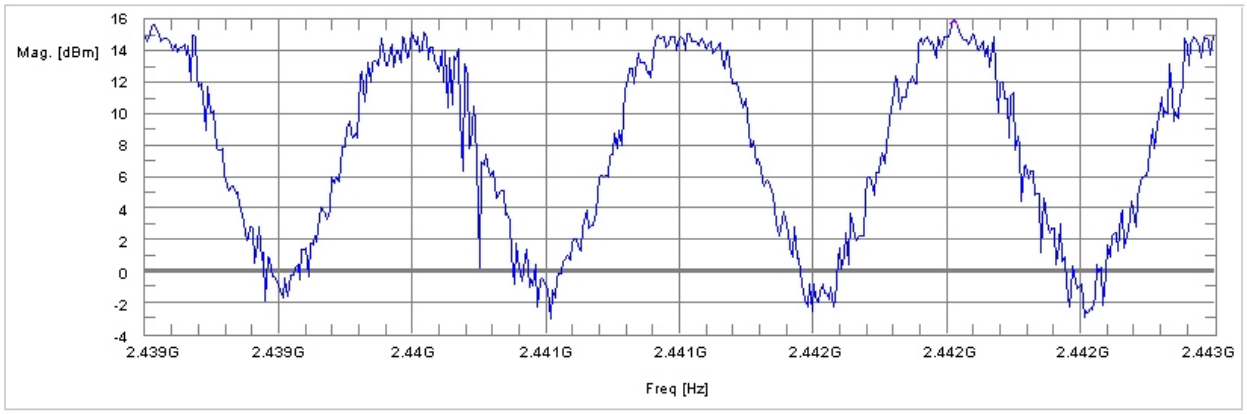
Limits:

Under normal test conditions only:	Minimum 25 kHz or 20 dB Bandwidth of the hopping system

Test result: The unit does meet the FCC requirements.

Modulation: GFSK

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12	POS	5m	100k	100000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.443G	MAXH	15.95	2.442G

4.5 Hopping Channel Number

Test Requirement:	**FCC Part15 C**
Test Method:	**Based on FCC Part15 C Section 15.247 & DA 00-705**
Test Date:	**2009-07-06**
Requirements:	**Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.**
Test Status:	**Test in hopping transmitting operating mode.**
Power supply:	**DC 3.3V**

Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 300 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

Test result: The number of hopping channel is 79

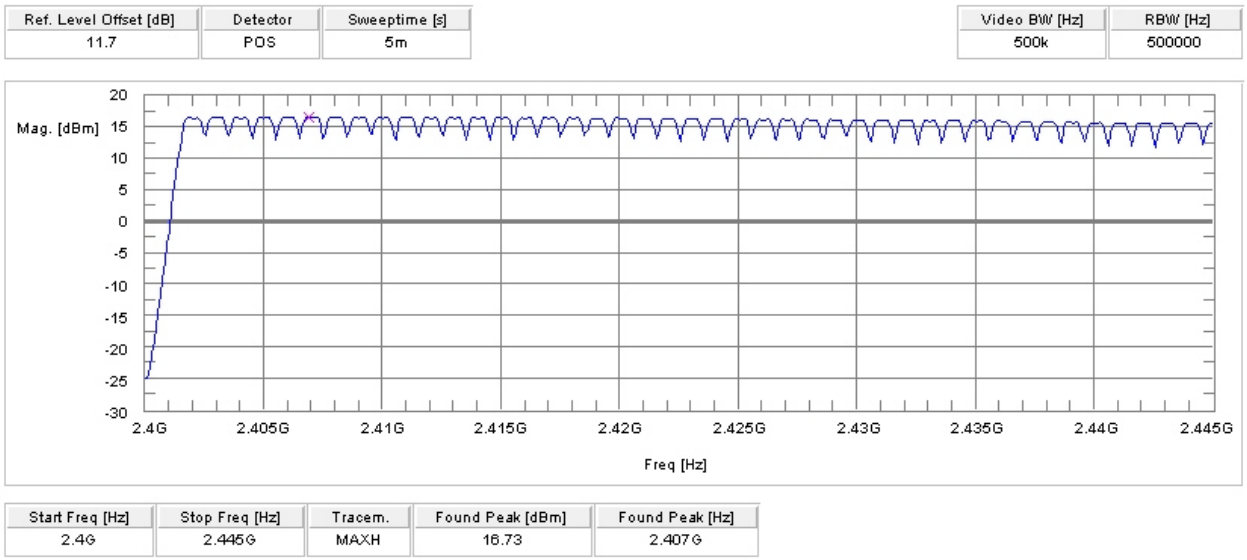
Limits:

Under normal test conditions only:	at least 15 non-overlapping channels

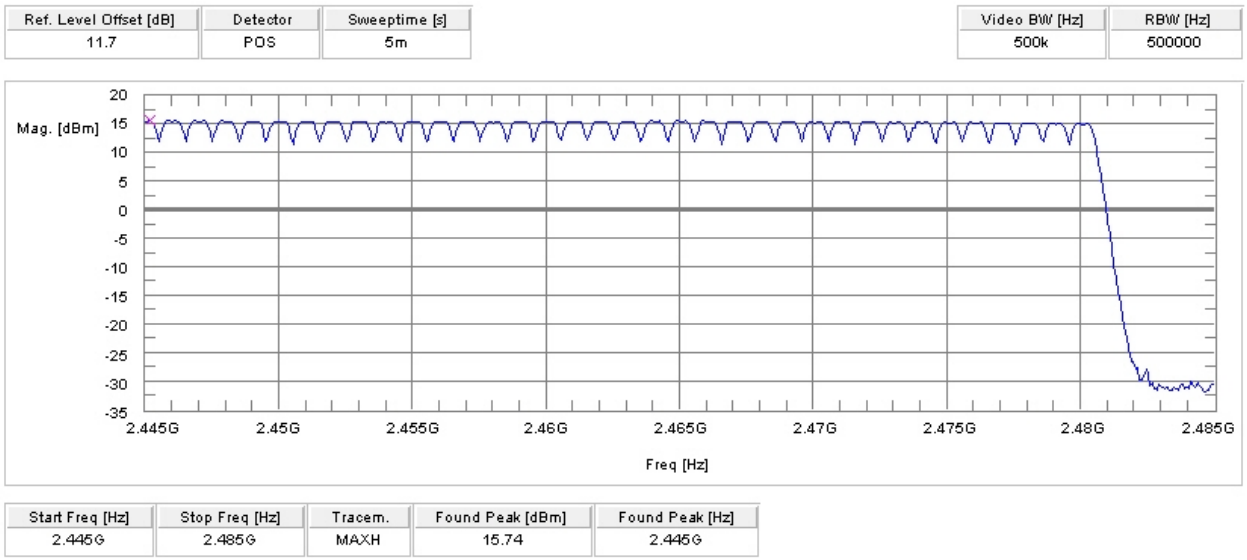
Test result: The unit does meet the FCC requirements.

Modulation Mode: GFSK

Plot 1 of 2:



Plot 2 of 2:



4.6 Dwell Time

Test Requirement:	**FCC Part 15 C**
Test Method:	**Based on FCC Part15 C Section 15.247 & DA 00-705**
Test Date:	**2009-07-06**
Test requirements:	**Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.**
Test Status:	**Test in hopping transmitting operating mode.**
Power supply:	**DC 3.3V.**

Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. centered on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Max hold;
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). Repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

For Bluetooth devices:

The dwell time of 0.4 s within a 31.6 second period in data mode is independent from the packet type (packet length).

The calculation for a 31.6 second period is a follows:

Dwell time = time slot length * hop rate / number of hopping channels *31.6 s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time = 625 µs * 1600 1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

For multi-slot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time = 5 * 625 µs * 1600 * 1/5 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

This is according the Bluetooth Core Specification V 1.1 & V 1.2 & V2.0 (+ critical errata) for all Bluetooth devices.

Therefore, all Bluetooth devices comply with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

4.7 Pseudorandom Frequency Hopping Sequence

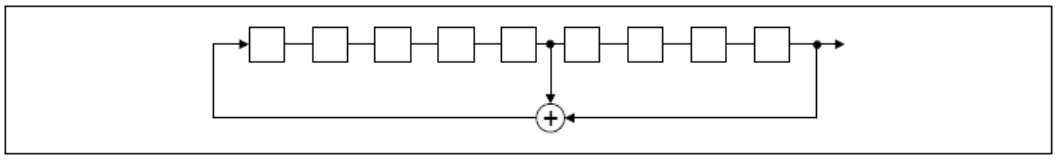
4.7.1 Standard requirement

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.

4.7.2 EUT Pseudorandom Frequency Hopping Sequence

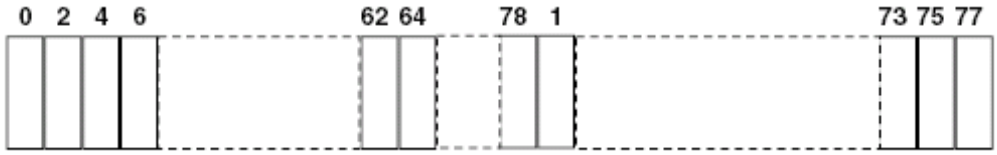
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: 2^9 -1 = 511 bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

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.

4.8 Maximum Peak Output Power

Test Requirement: **FCC Part 15.247 & DA 00-705**

Test Method: **Base on ANSI 63.4.**

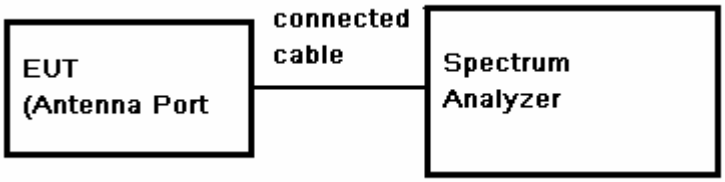
Test Date: **2009-07-06**

Test Limit: **Regulation 15.247 (b)(1)For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.**
Refer to the result "Hopping channel number" of this document. The 1 watt (30.0dBm) limit applies.

Test mode: **Test in fixing frequency transmitting mode.**

Power supply: **DC 3.3V.**

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

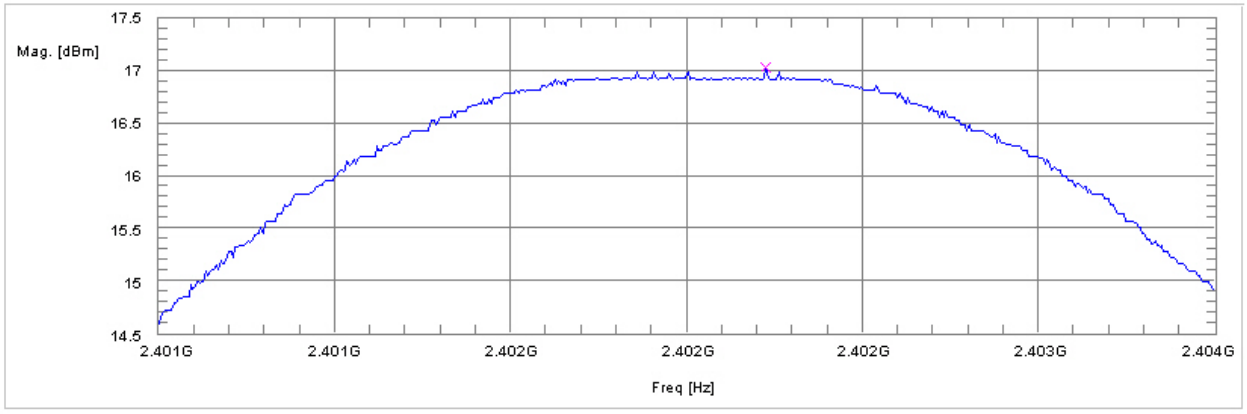
Test result:

Frequency(MHz) / Modulation Mode	Max. Peak Output Power(dBm)		
	2402	2411	2480
GFSK	17.03	16.18	15.56
Pi/4 DQPSK	14.99	13.63	12.61
8 DPSK	15.34	14.02	13.01
Limit	Under normal test conditions only, for frequency range 2400-2483.5 MHz		Max. 1.0 Watt
Result	PASS		
Measurement Uncertainty:	±2dB		

Result plot as follows:

Plot 1 GFSK:

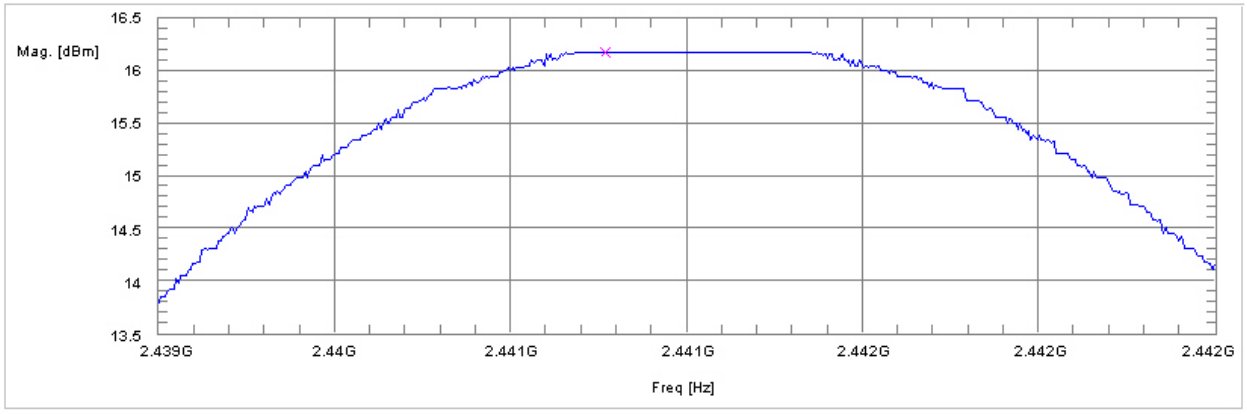
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.9	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.401G	2.404G	MAXH	17.03	2.402G

Plot 2 GFSK:

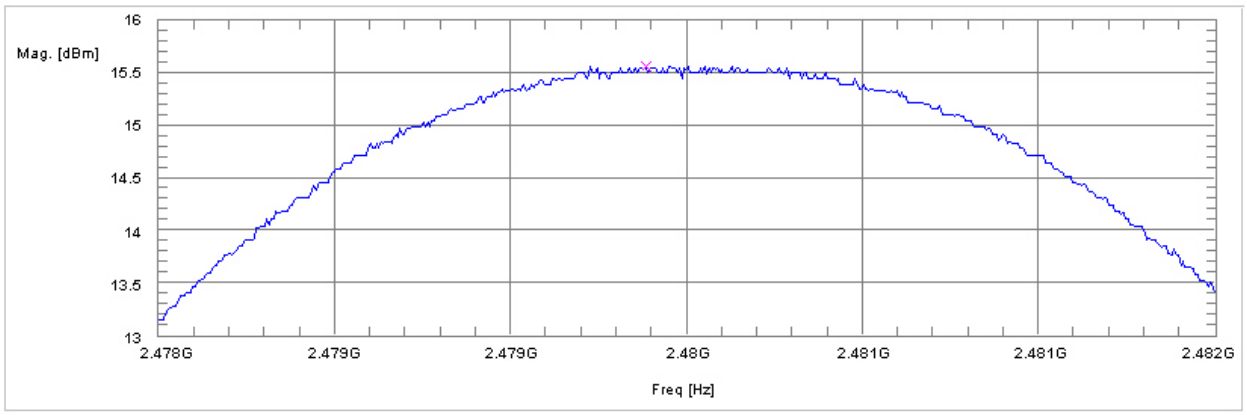
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
12	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.442G	MAXH	16.18	2.441G

Plot 3 GFSK:

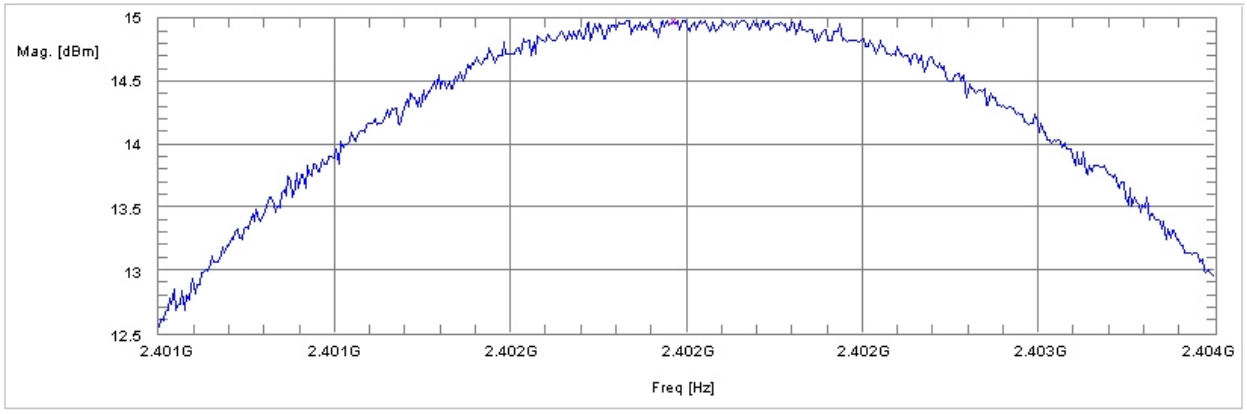
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.9	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.478G	2.482G	MAXH	15.56	2.48G

Plot 4 Pi/4 DQPSK:

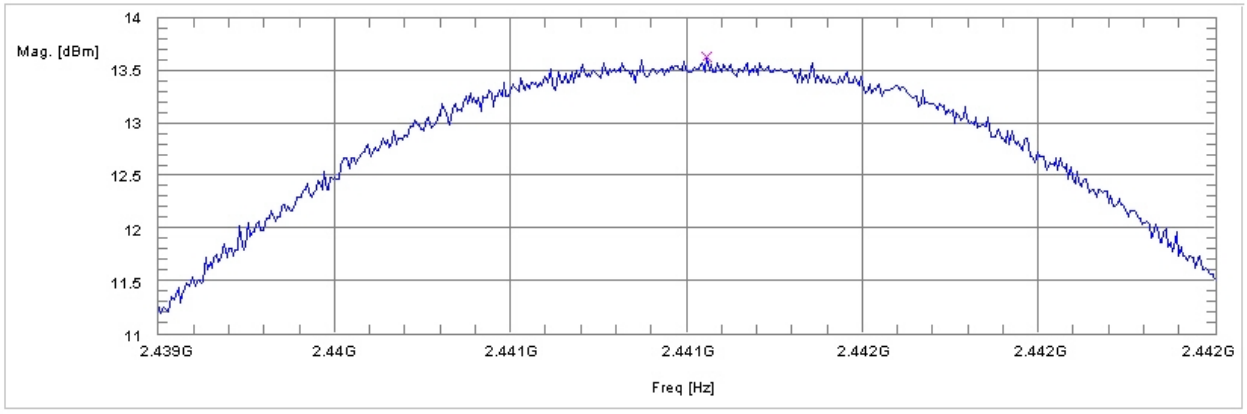
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.6	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.401G	2.404G	MAXH	14.99	2.402G

Plot 5 Pi/4 DQPSK:

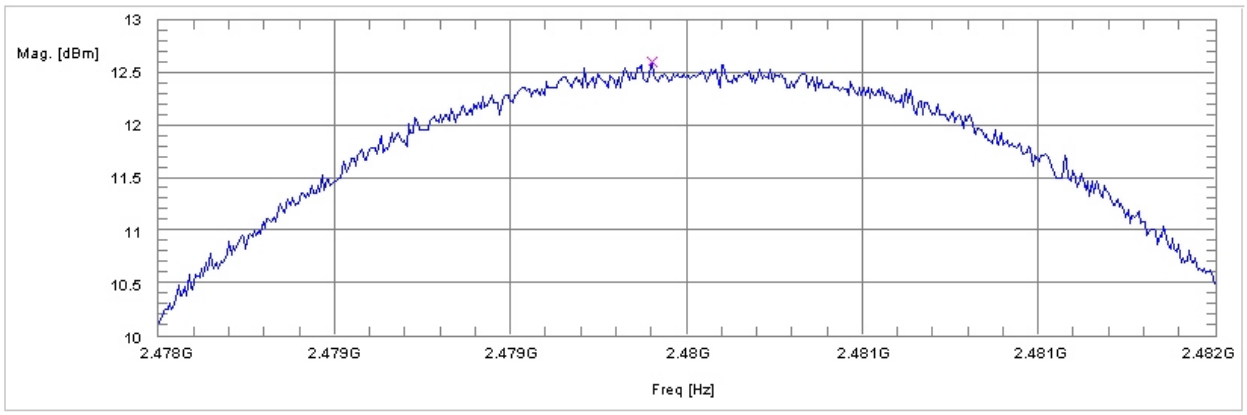
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.7	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.442G	MAXH	13.63	2.441G

Plot 6 Pi/4 DQPSK:

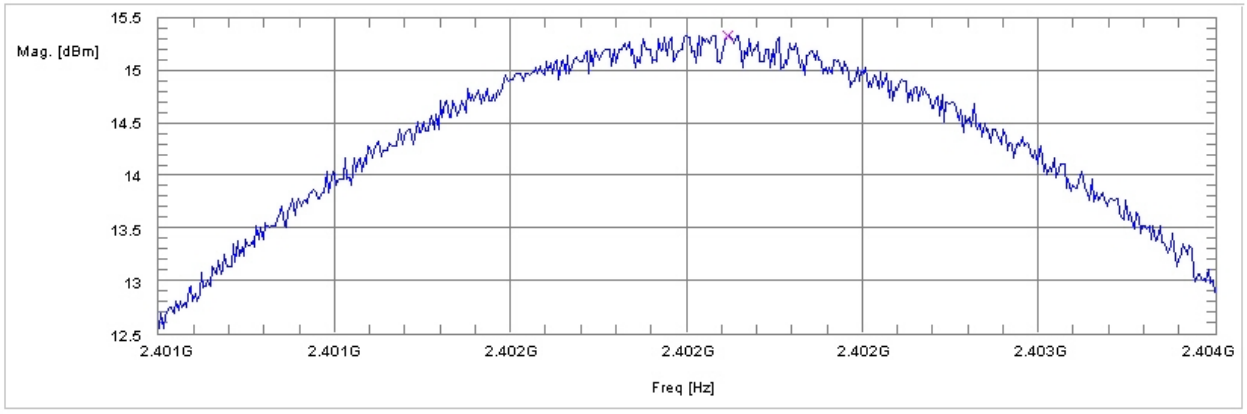
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.6	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.478G	2.482G	MAXH	12.61	2.48G

Plot 7 8DPSK:

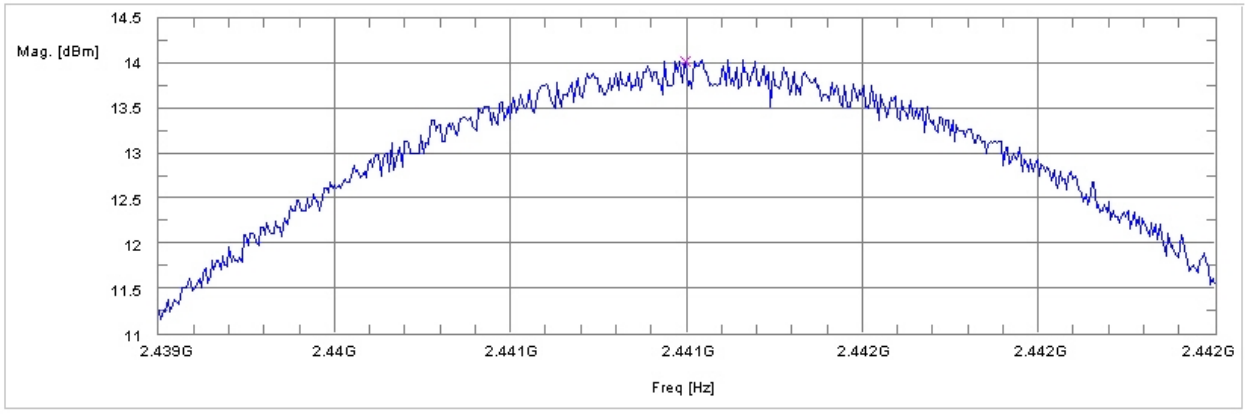
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.6	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.401G	2.404G	MAXH	15.34	2.402G

Plot 8 8DPSK:

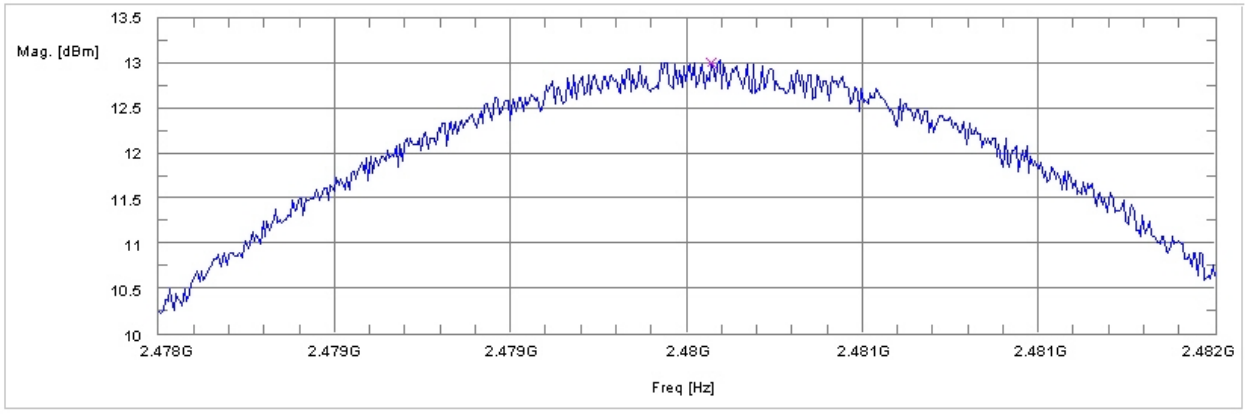
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.7	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.442G	MAXH	14.02	2.441G

Plot 9 8DPSK:

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.6	POS	5m	3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.478G	2.482G	MAXH	13.01	2.48G

4.9 Conducted Spurious Emissions

Test Requirement: **FCC Part 15.247**

Test Method: **Based on FCC Part 15 C Section 15.247**

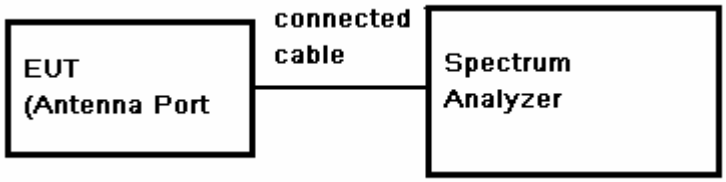
Test Date: **2009-07-06**

Power supply: **DC 3.3V**

Test requirements: (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Based on either an RF conducted or a radiated measurement. Provided the transmitter demonstrates compliance with the peak conducted power limits.

Test Status: Test the lowest, Middle, highest channel.

Test Configuration:



Test Procedure:

1. **Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.**
2. **Set the spectrum analyzer: Sweep = auto; Detector Function = Peak (Max. hold).**

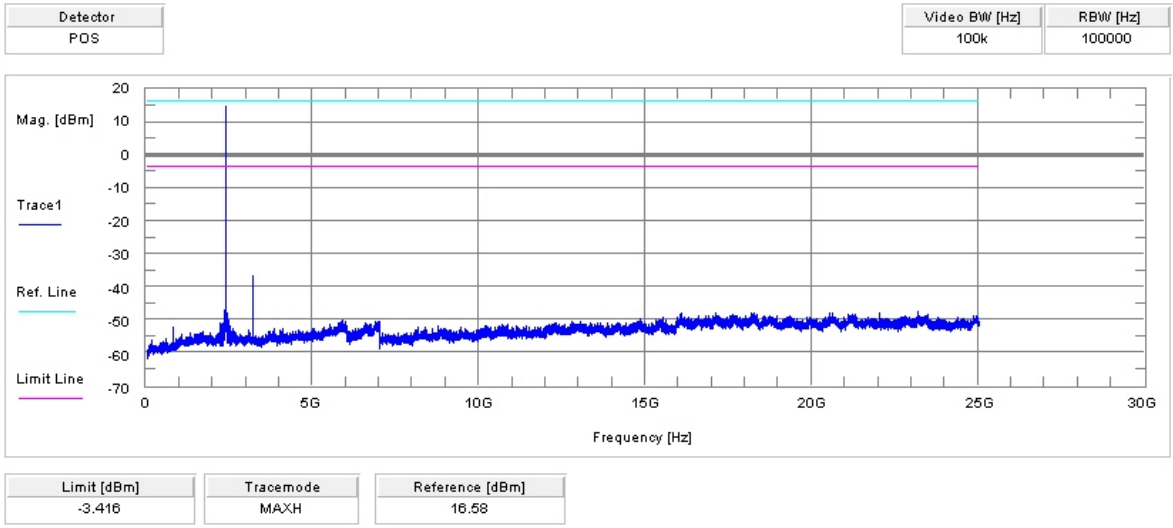
Result & Limits:

Frequency(MHz)	Amplitude of Emission (dBm)	Limit Max. allowed emission power	Results
2402	16.58	30 dBm	Operating frequency
3202	-37.1	-20dBc	complies
2441	15.31	30 dBm	Operating frequency
3251	-37.3	-20 dBc	complies
2480	15.21	30 dBm	Operating frequency
3306	-38.1	-20 dBc	complies

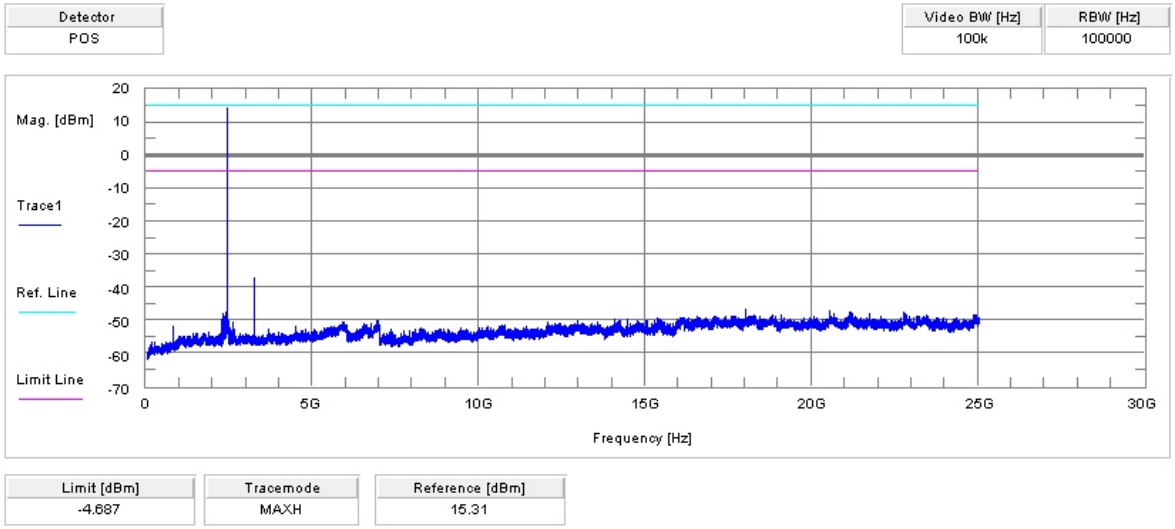
Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test result plot as follows:

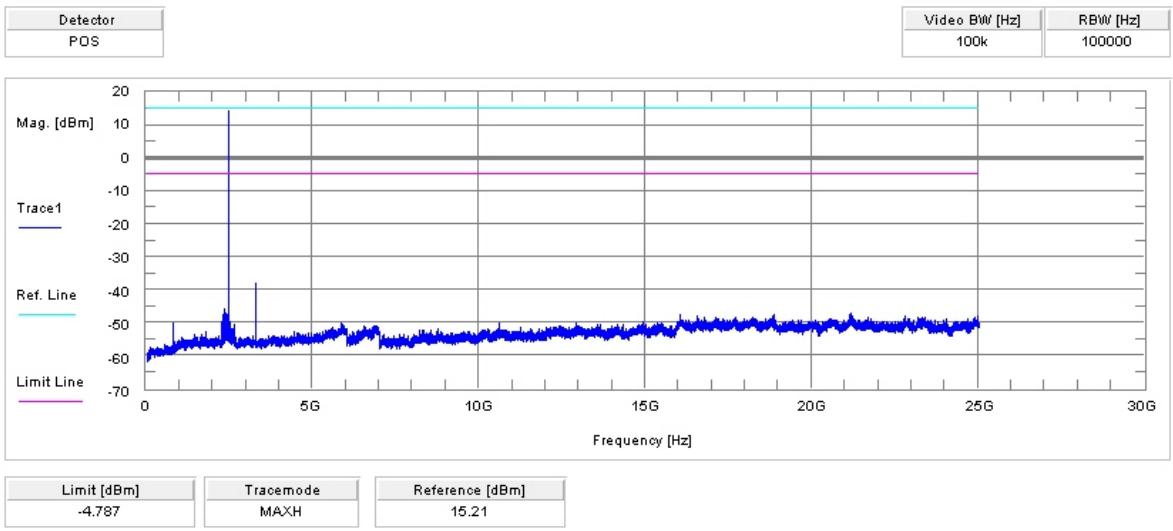
Lowest Channel:



Middle Channel:



Highest Channel:



4.10 Radiated Spurious Emissions

Test Requirement: FCC 15.247(d) & 15.209

Test Method: ANSI C63.4 section 8 & 13

Test Date: 2009-07-07

Test Status: Normal Operating

Test site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Test instrumentation resolution bandwidth 120 kHz and Quasi-Peak detector applies (30 MHz – 1000 MHz). 1MHz resolution bandwidth and Peak and Average-Peak detector apply (1000 MHz – 25GHz).

Receive antenna scan height 1 m – 4 m. polarization Vertical / Horizontal.

Power supply: DC 3.3V

15.209 Limit: 40.0 dBμV/m between 30MHz & 88MHz

43.5 dBμV/m between 88MHz & 216MHz

46.0 dBμV/m between 216MHz & 960MHz

54.0 dBμV/m above 960MHz

15.247(d) limit: (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating. The radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that

Contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

SPURIOUS EMISSION LEVEL (dB(μV/m))								
2402MHz			2441MHz			2480MHz		
F(MHz)	Detector	Level dB(μV/m)	F(MHz)	Detector	Level dB(μV/m)	F(MHz)	Detector	Level dB(μV/m)
7203	1 MHz	41.20	7322	1 MHz	42.40	7436	1 MHz	42.30
Measurement uncertainty			±3 dB					

Limits: § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Limits: § 15.209

Frequency (MHz)	Field strength [μV/m]	Measurement distance (m)
30 — 88	100 (40 dBμV/m)	3
88 — 216	150 (43.5 dBμV/m)	3
216 — 960	200 (46 dBμV/m)	3
above 960	500 (54 dBμV/m)	3

Test Configuration:

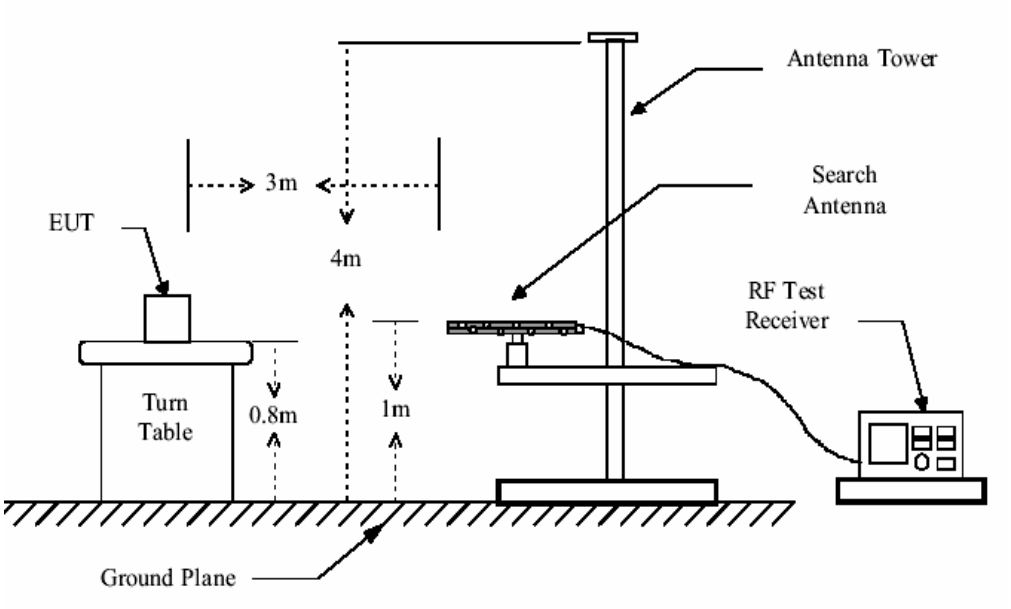


Figure 1. 30MHz to 1GHz radiated emissions test configuration

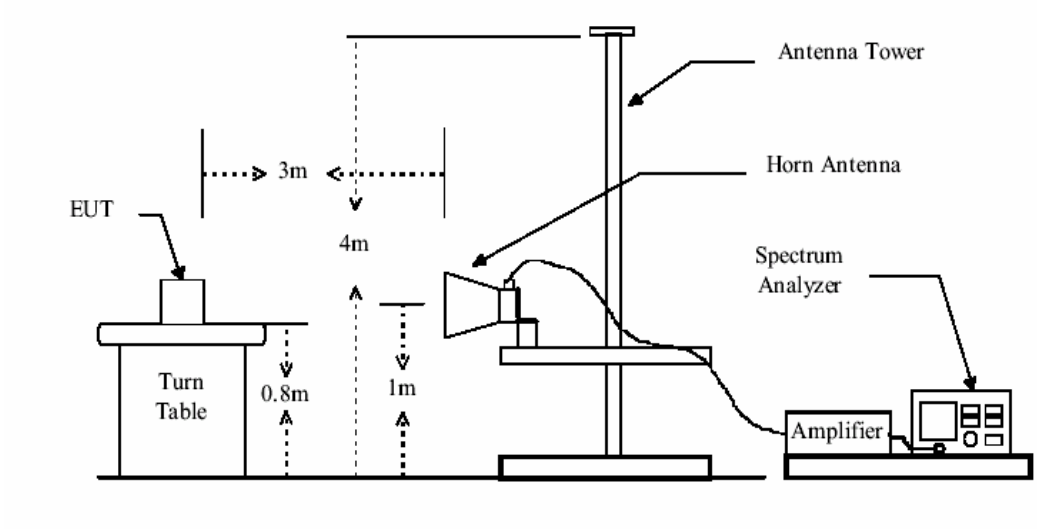


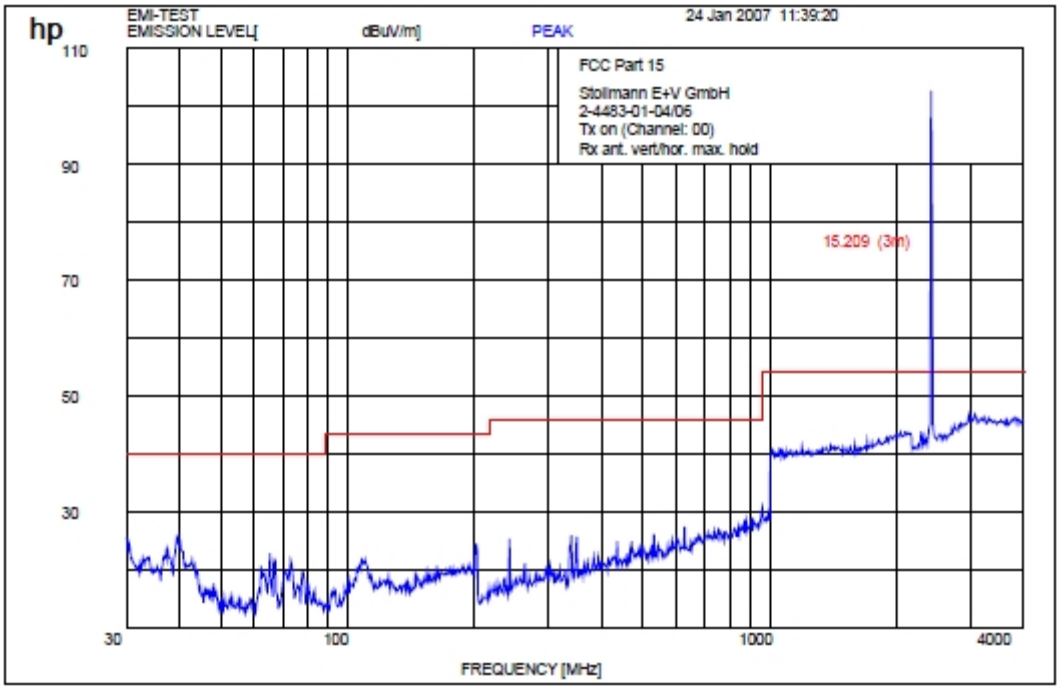
Figure 2. Above 1GHz radiated emissions test configuration

Test Procedure: The procedure used was ANSI Standard C63.4-2003. The receiver was scanned from 30MHz to 25GHz.When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

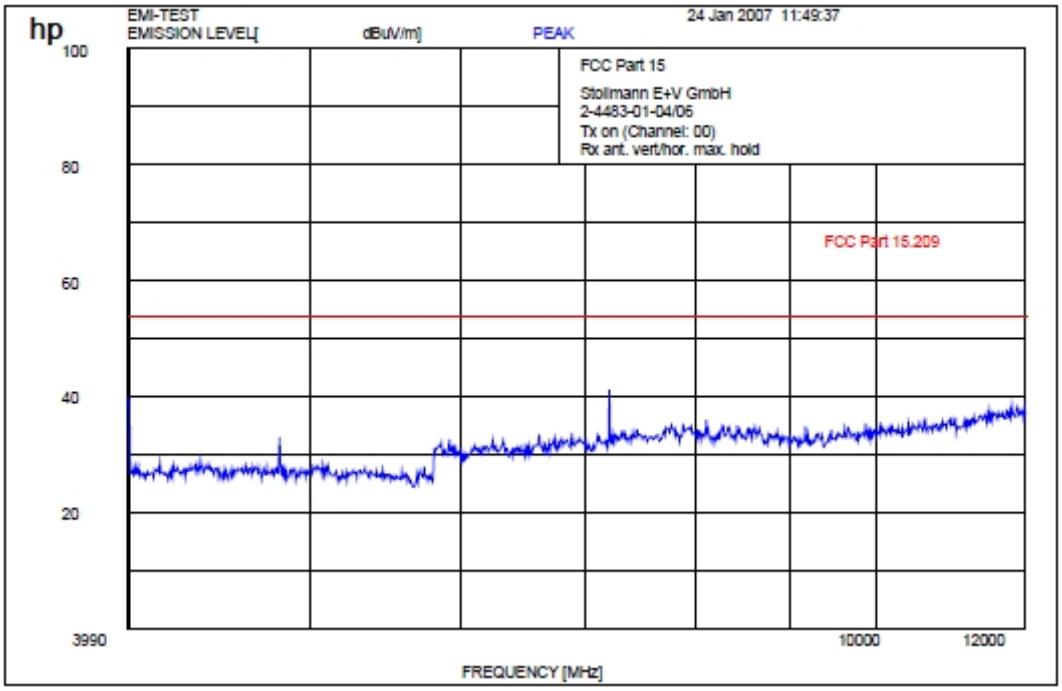
4.10.1 Harmonic and other spurious emissions

Modulation: GFSK

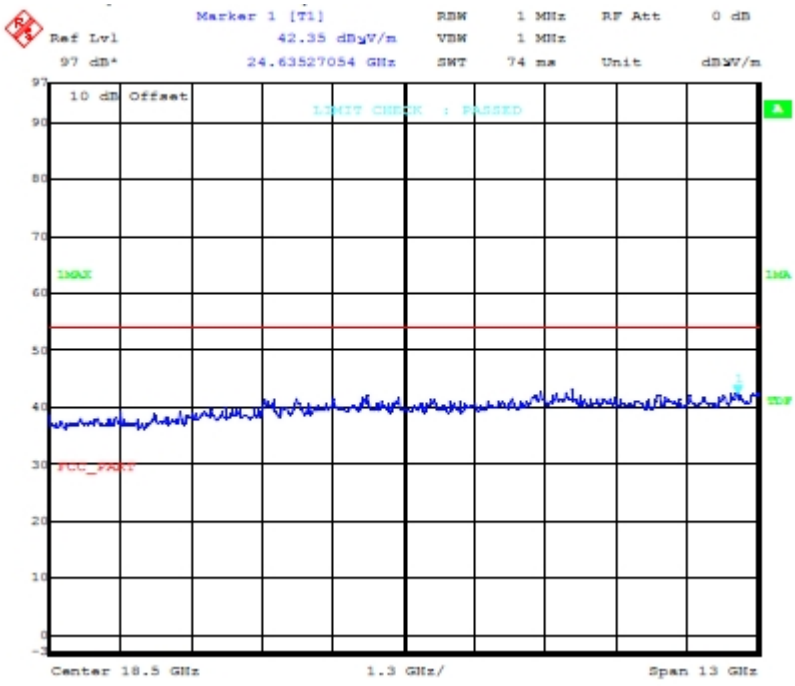
Plot : 0.03 - 4 GHz vertical/horizontal (lowest channel)



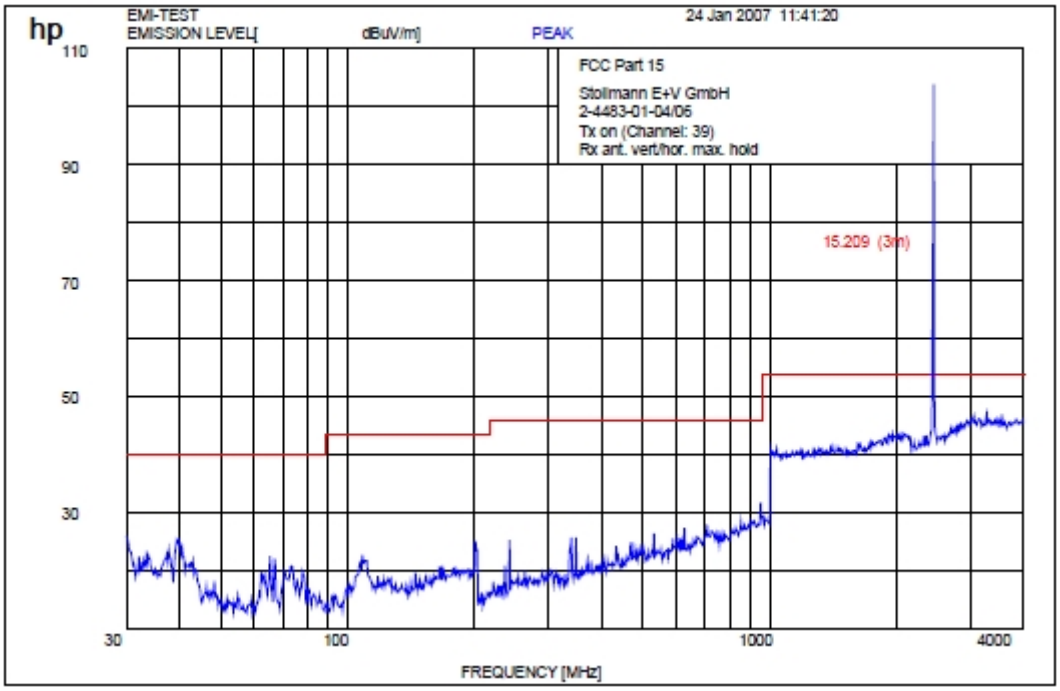
Plot : 4- 12 GHz vertical/horizontal (lowest channel)



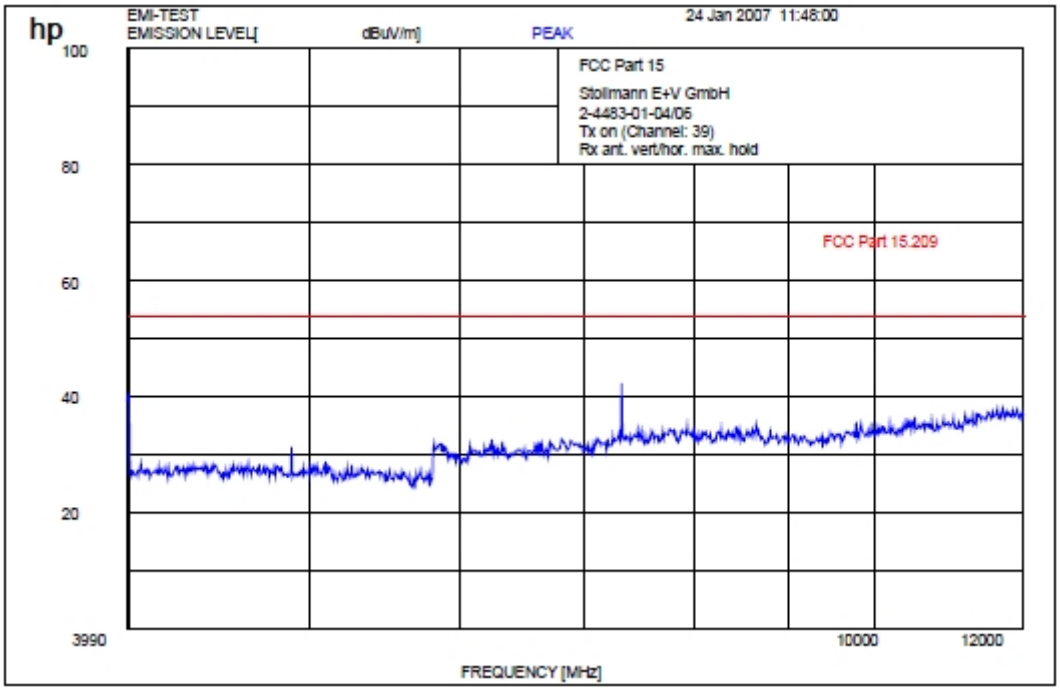
Plot : 12- 25 GHz vertical/horizontal (lowest channel)



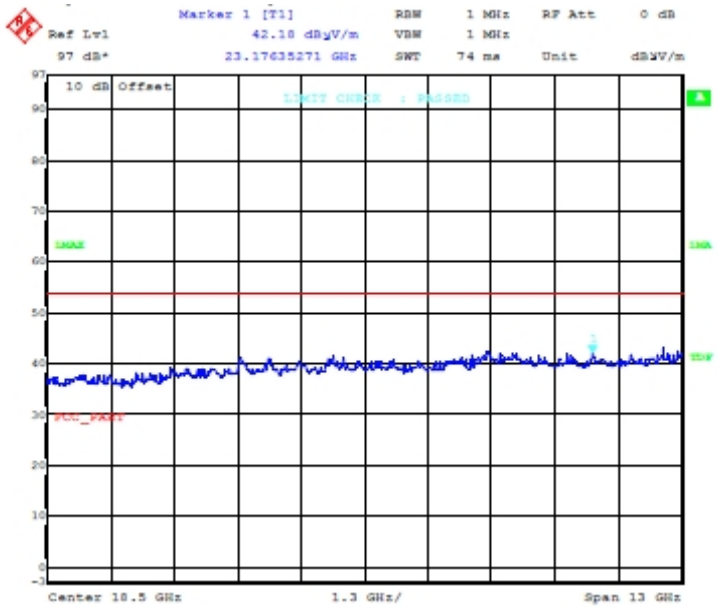
Plot : 0.03 - 4 GHz vertical/horizontal (middle channel)



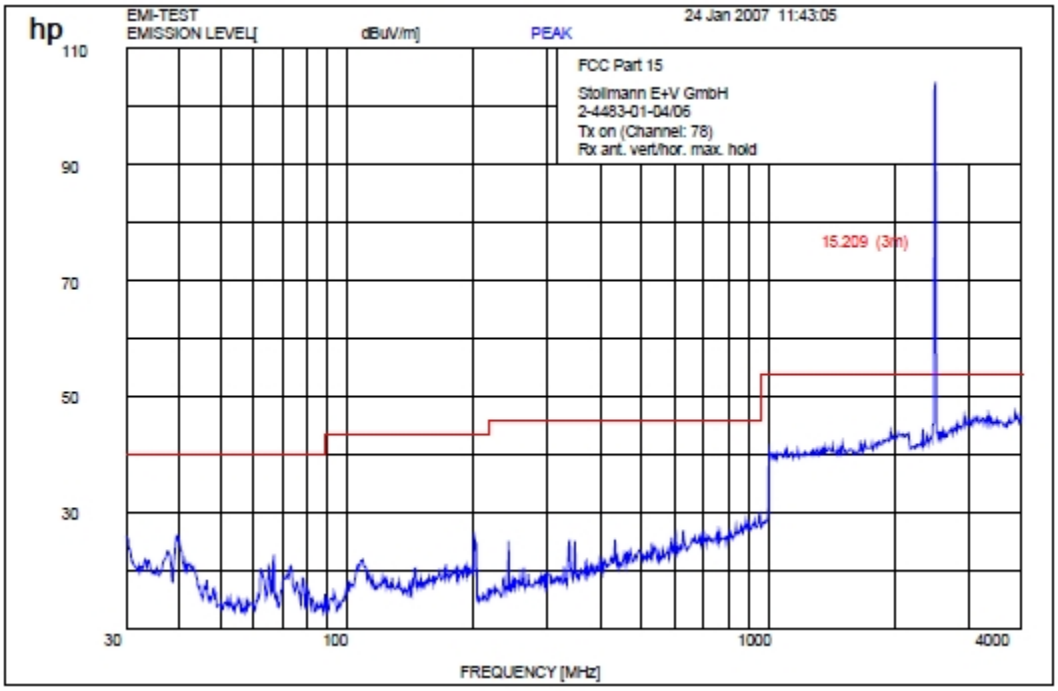
-*Plot : 4- 12 GHz vertical/horizontal (middle channel)



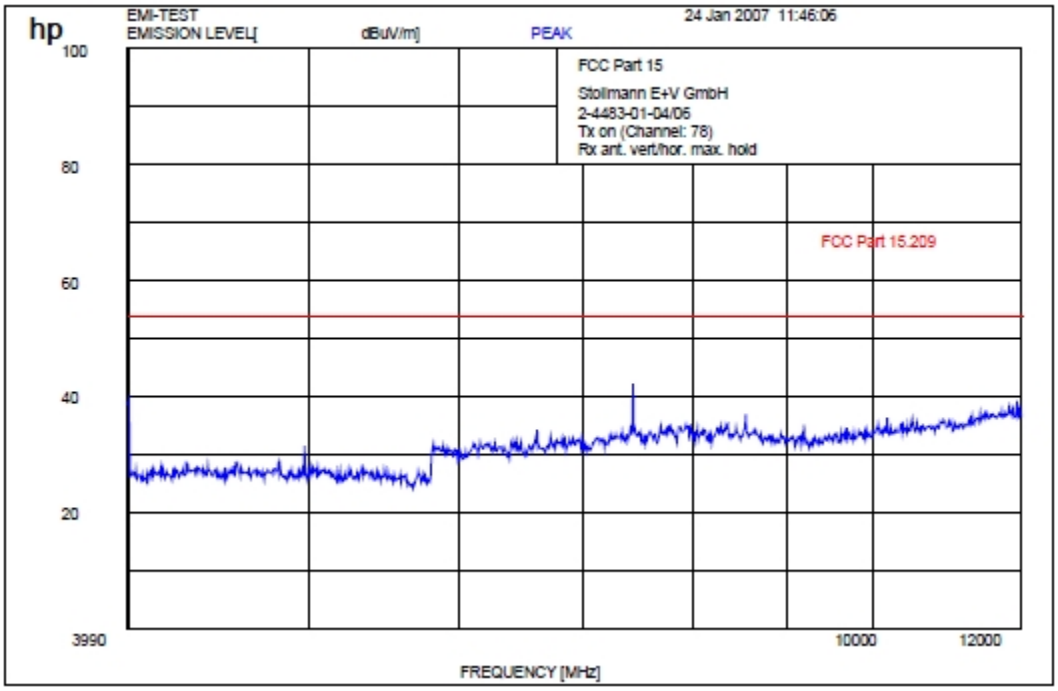
Plot : 12- 25 GHz vertical/horizontal (middle channel)



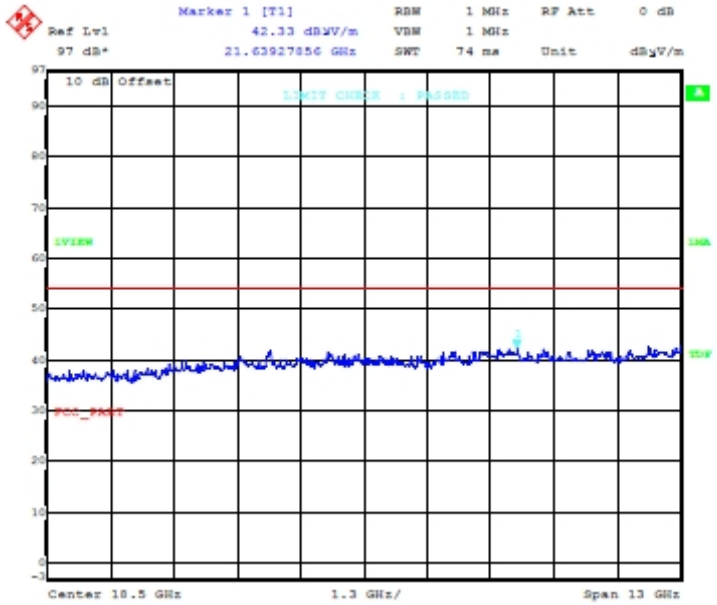
Plot : 0.03 - 4 GHz vertical/horizontal (highest channel)



Plot : 4- 12 GHz vertical/horizontal (highest channel)



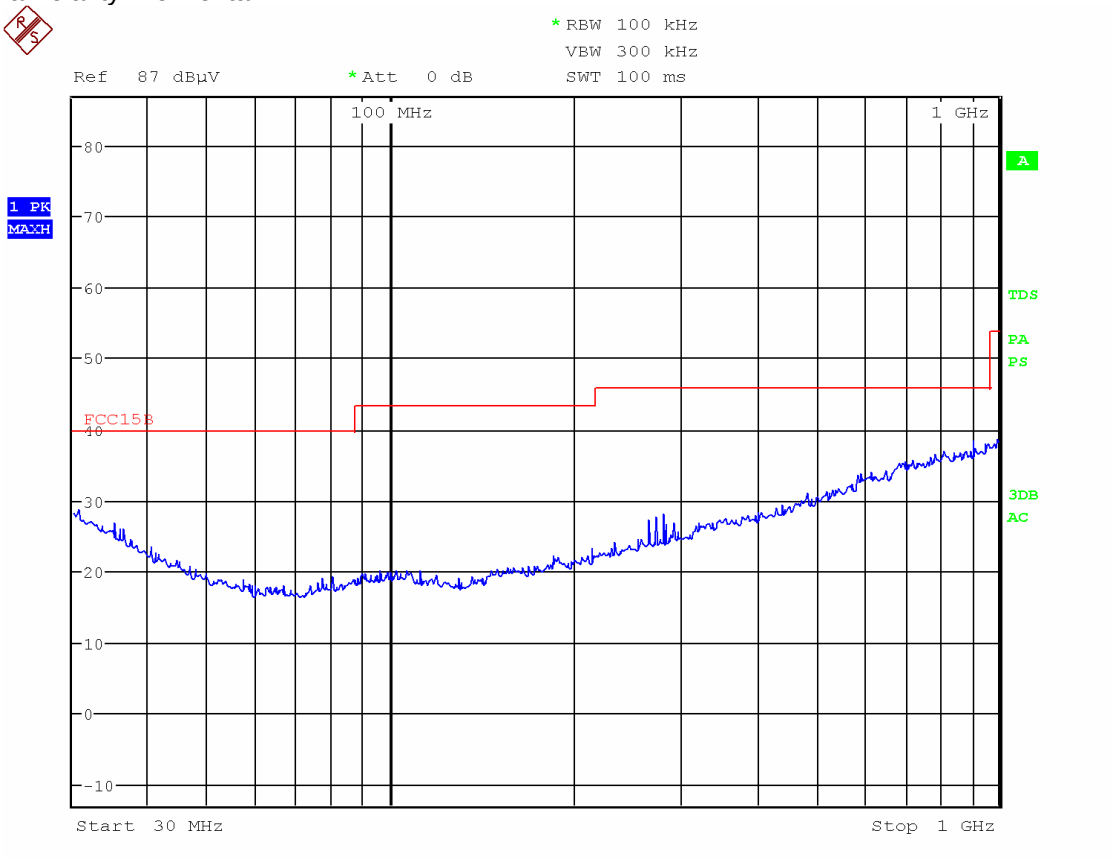
Plot : 12- 25 GHz vertical/horizontal (highest channel)



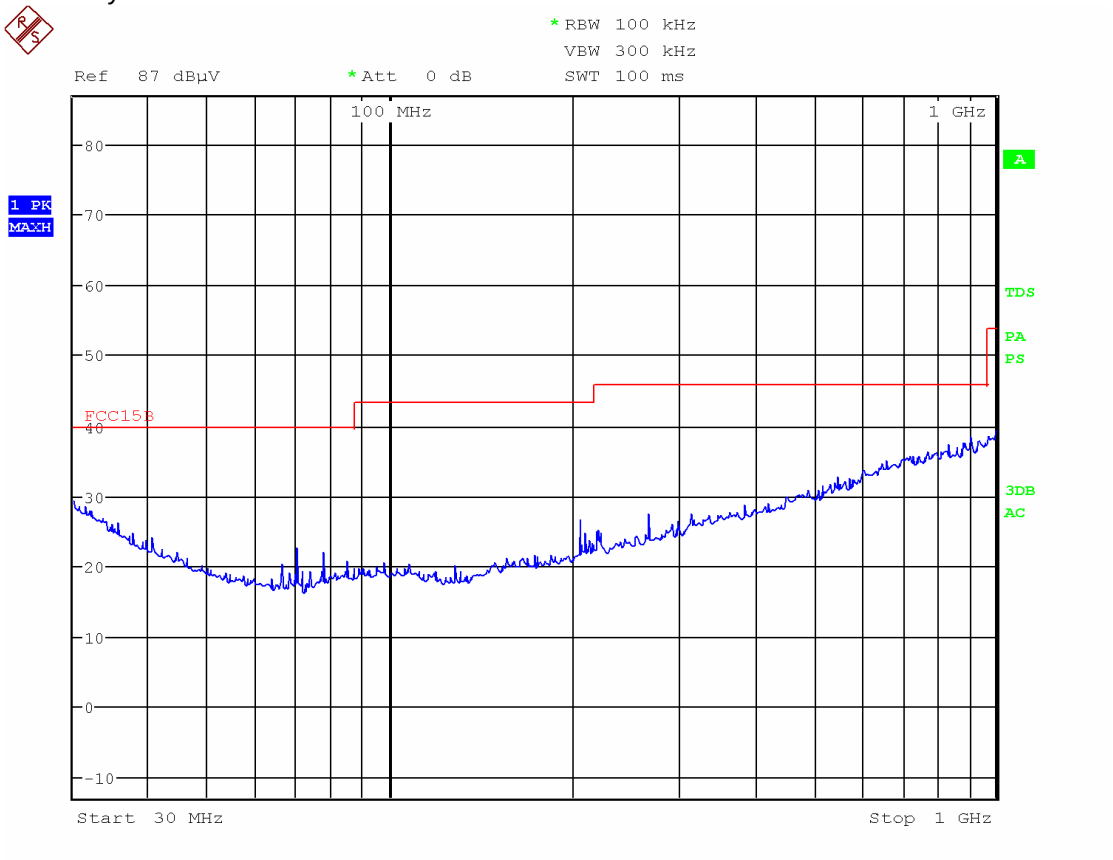
4.10.2 Whole system radiated emissions>30 MHz § 15.209

Operation Mode: Heating

Antenna Polarity: Horizontal



Antenna Polarity: Vertical



Test Result:

Frequency (MHz)	Peak Maxhold dB(μV/m)	QP Value dB(μV/m)	QP Limit dB(μV/m)	QP Margin (dB)	Result	Polarity (H/V)
30.36	33.4	27.7	40	12.3	Pass	H
272.80	30.2	25.9	46	20.1	Pass	H
280.20	30.0	24.5	46	21.5	Pass	H
283.84	29.9	25.0	46	21.0	Pass	H
291.24	31.8	25.8	46	20.2	Pass	H
996.60	43.5	37.5	54	16.5	Pass	H

Frequency (MHz)	Peak Maxhold dB(μV/m)	QP Value dB(μV/m)	QP Limit dB(μV/m)	QP Margin (dB)	Result	Polarity (H/V)
40.56	23.2	18.6	40	21.4	Pass	V
66.36	20.0	16.6	40	23.4	Pass	V
70.04	22.2	19.7	40	20.3	Pass	V
77.40	20.6	18.1	40	21.9	Pass	V
212.96	18.5	12.4	43.5	31.1	Pass	V
902.88	34.5	28.3	46	17.7	Pass	V

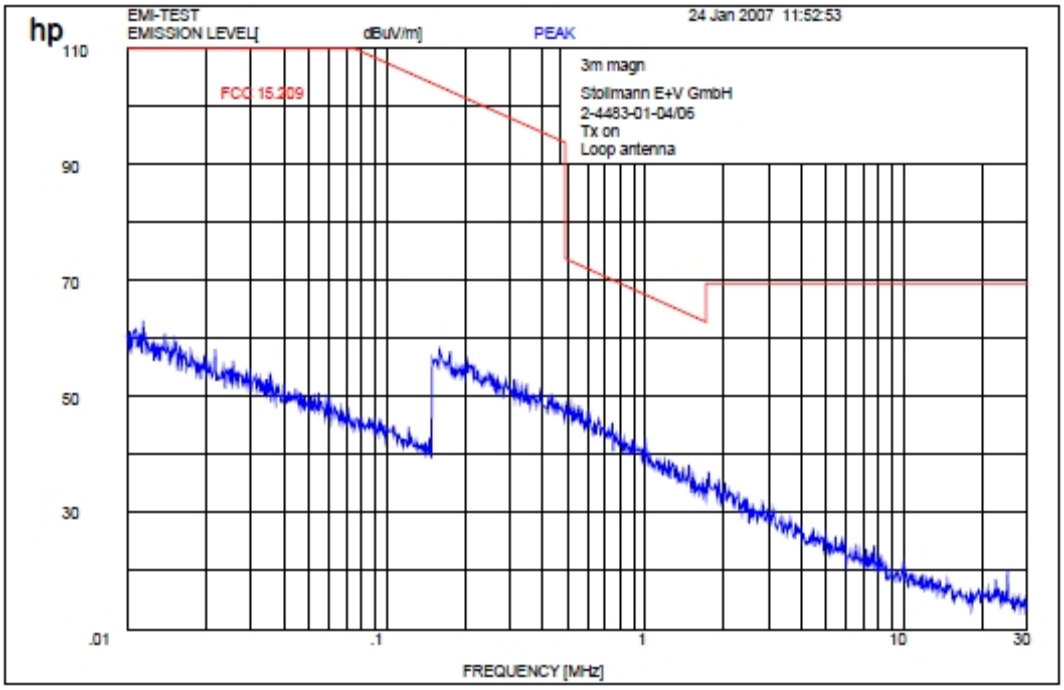
4.11 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209

Modulation: GFSK

Measured at 10 m distance.

Values recalculated with 40 Db/decade according to FCC rules.

Plot 1:



Limits:

Frequency (MHz)	Field strength [µV/m]	Measurement distance (m)
0.009 — 0.490	2400/F(kHz)	300
0.490 — 1.705	24000/F(kHz)	30
1.705 — 30.0	30 / 29.5 dBµV/m	30

4.12 Conducted Emissions <30 MHz § 15.207

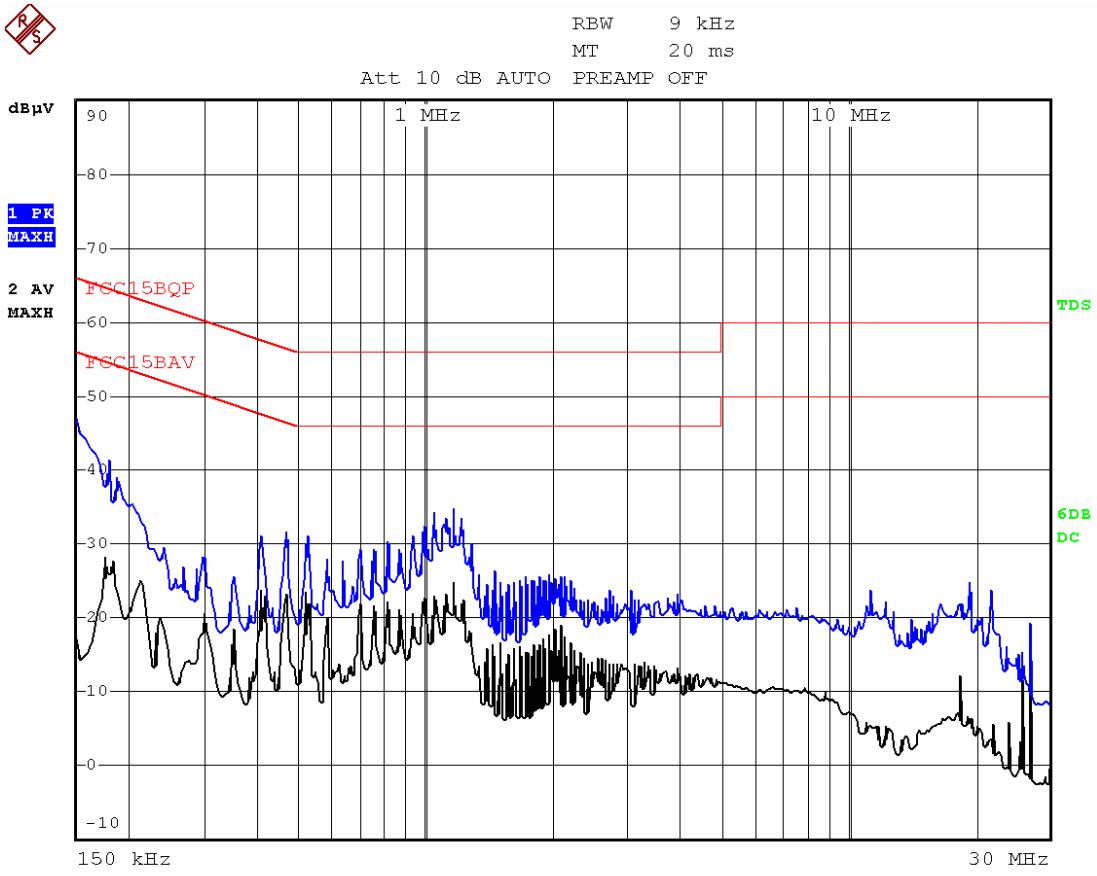
Test Requirement:	(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50μH / 50ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.
Test Method:	Base on ANSI 63.4
Test Date:	2009-07-07
Test Site:	Shielded Room
Power Supply:	120V / 60Hz
Limit:	Quasi-peak: 66 to 56 dBμV, Average: 56 to 46 dBμV between 0.15MHz & 0.5MHz; Quasi-peak: 56 dBμV, Average: 46 dBμV between 0.5MHz & 5MHz; Quasi-peak: 60 dBμV, Average: 50 dBμV between 5MHz & 30MHz;
Detector:	The conducted emission was measured via an EMI receiver with Peak and Average detector, and 9kHz RBW.

Test Result:

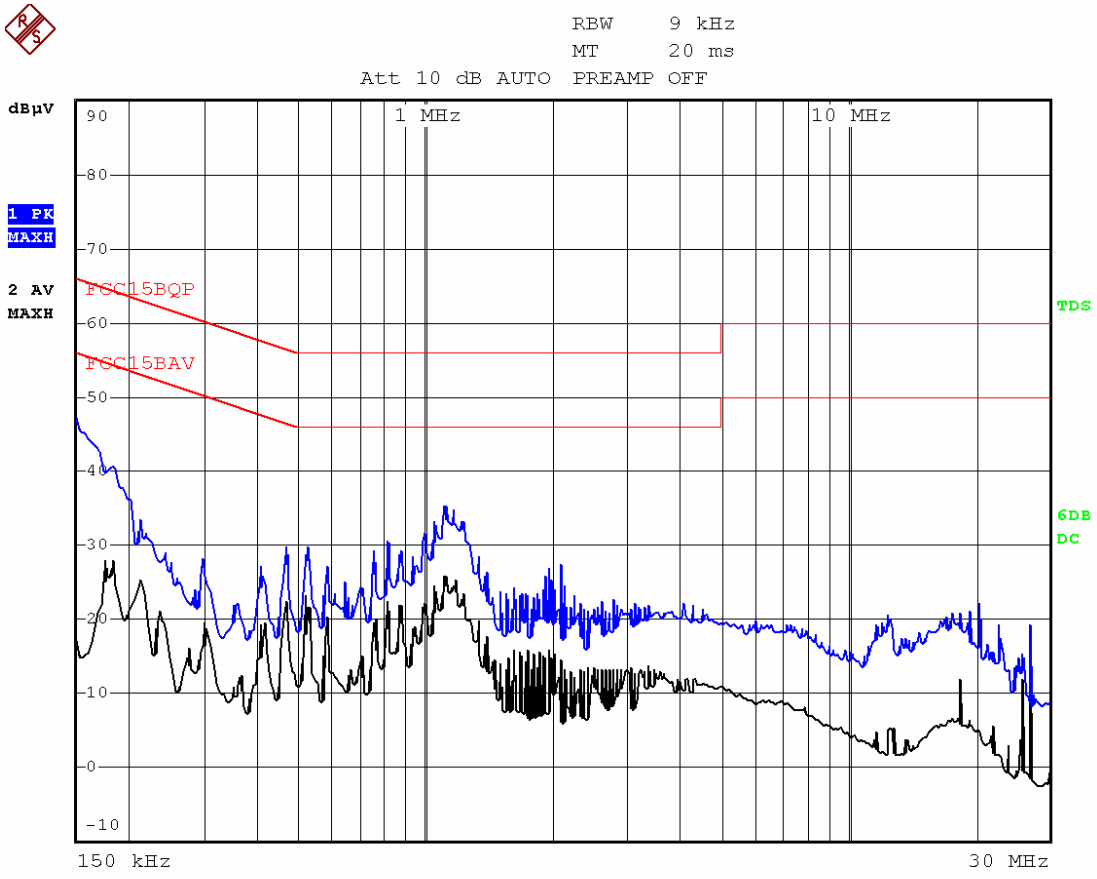
Frequency (MHz)	QP Value (dBμV)	QP Limit (dBμV)	QP Margin (dB)	AVG Value (dBμV)	AVG Limit (dBμV)	AVG Margin (dB)	Result	Line
0.150	38.4	66	27.6	21.1	56	34.9	Pass	Line
0.406	26.8	57.7	30.9	23.7	47.7	24.0	Pass	Line
0.466	26.3	56.5	30.2	23.0	46.5	23.5	Pass	Line
0.526	24.3	56	31.7	21.3	46	24.7	Pass	Line
0.814	26.4	56	29.6	22.0	46	24.0	Pass	Line
1.166	29.3	56	26.7	21.4	46	24.6	Pass	Line

Frequency (MHz)	QP Value (dBμV)	QP Limit (dBμV)	QP Margin (dB)	AVG Value (dBμV)	AVG Limit (dBμV)	AVG Margin (dB)	Result	Line
0.150	38.1	66	27.9	16.9	56	39.1	Pass	Neutral
0.294	20.8	60.4	39.6	16.9	50.4	33.5	Pass	Neutral
0.466	25.8	56.5	30.7	22.7	46.5	23.8	Pass	Neutral
0.526	24.4	56	31.6	21.1	46	24.9	Pass	Neutral
0.814	26.7	56	29.3	21.9	46	24.1	Pass	Neutral
1.118	31.2	56	24.8	25.5	46	20.5	Pass	Neutral

Plot 1 of 2: Line



Plot 2 of 2: Neutral

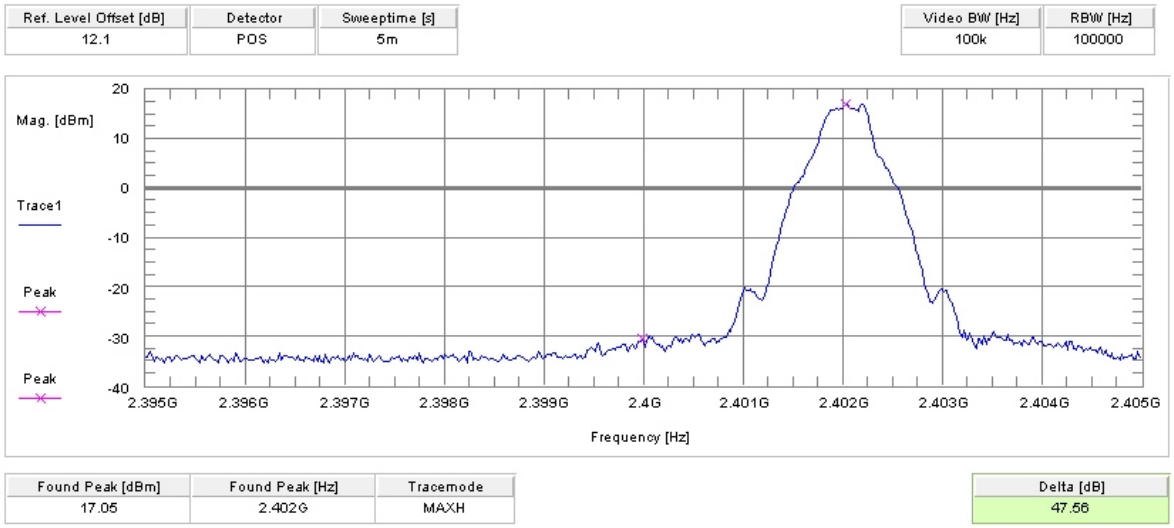


4.13 Band Edges Requirement

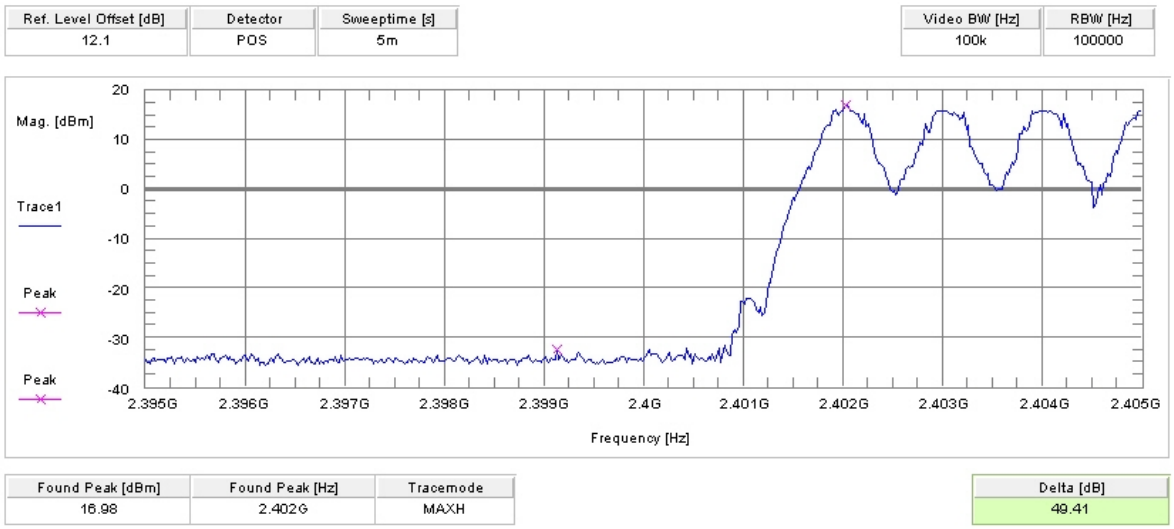
Test Requirement:	**FCC Part 15 C**
Test Method:	**Based on ANSI 63.4**
	Operation within the band 2400 – 2483.5 MHz
Test Date:	**2009-07-07**
Power supply:	**DC 3.3V**
Requirements:	**Section 15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.**
Method of Measurement:	Set RBW of spectrum analyzer to 100 kHz and VBW of spectrum analyzer to 300 kHz with suitable frequency span including 100 kHz bandwidth from band edge. The band edges was measured and recorded.

Modulation: GFSK

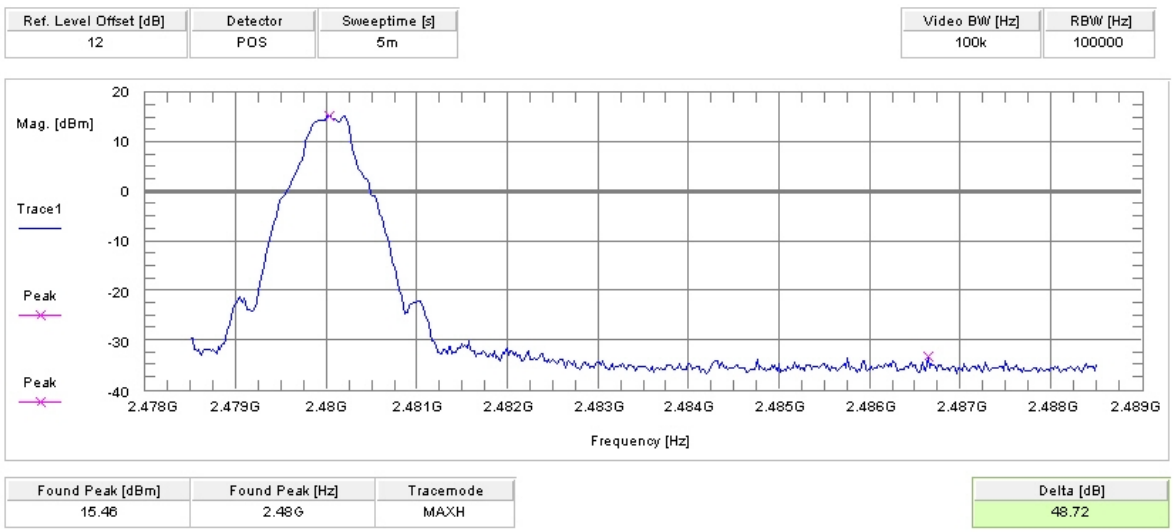
Plot 1 of 4 (hopping off, lowest frequency):



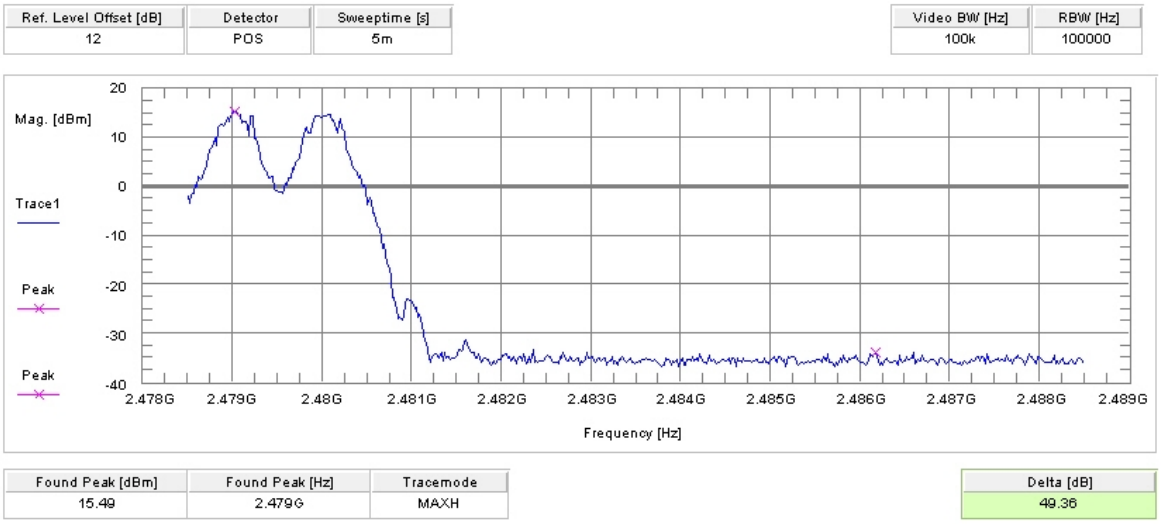
Plot 2 of 4 (hopping on, lowest frequency):



Plot 3 of 4 (hopping off, highest frequency):



Plot 4 of 4 (hopping on, highest frequency):



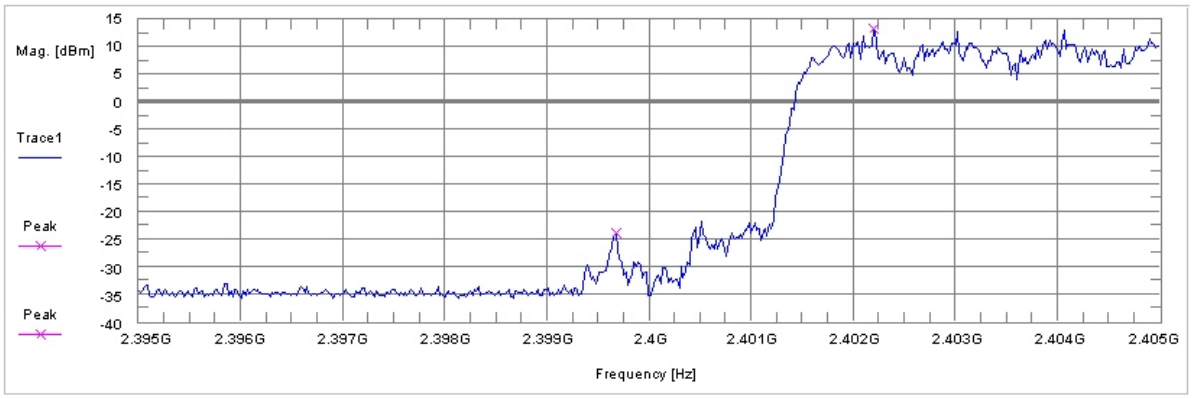
Results:

SZENARIO	DELTA VALUE [dB]
hopping off, lowest frequency	47.56
hopping on, lowest frequency	49.41
hopping off, highest frequency	48.72
hopping on, highest frequency	49.36
Measurement uncertainty	±1,5dB

Modulation: widest

Plot 1 of 4 (hopping on, lowest frequency):

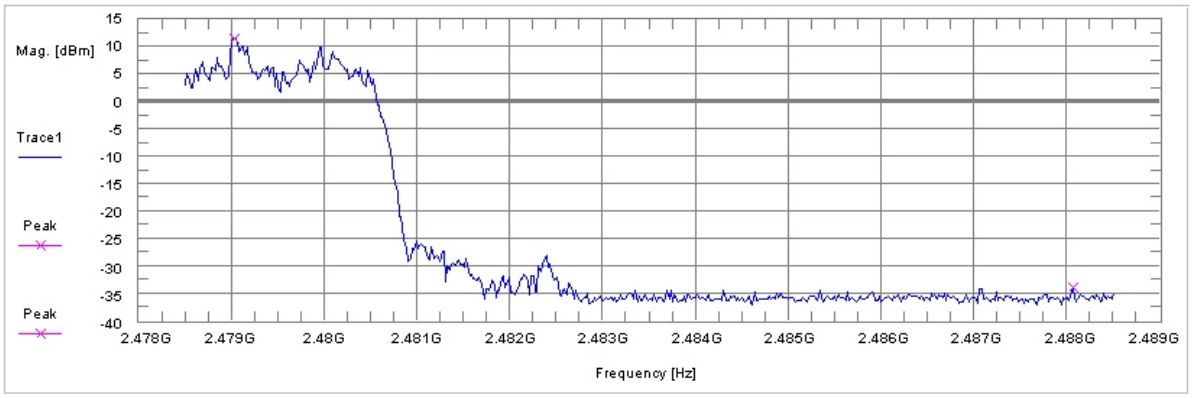
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.8	POS	5m	100k	100000



Found Peak [dBm]	Found Peak [Hz]	Tracemode	Delta [dB]
13.48	2.402G	MAXH	37.4

Plot 2 of 4 (hopping on, highest frequency):

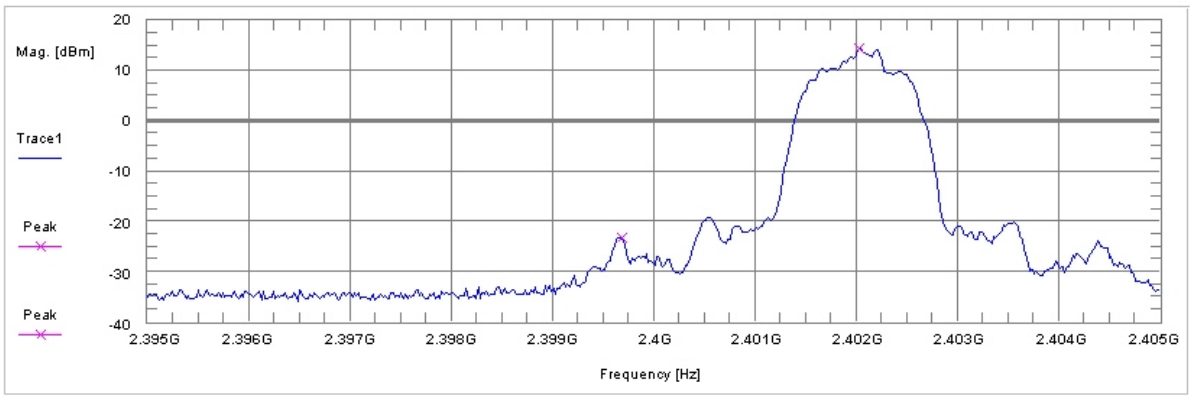
Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.7	POS	5m	100k	100000



Found Peak [dBm]	Found Peak [Hz]	Tracemode	Delta [dB]
11.69	2.479G	MAXH	45.7

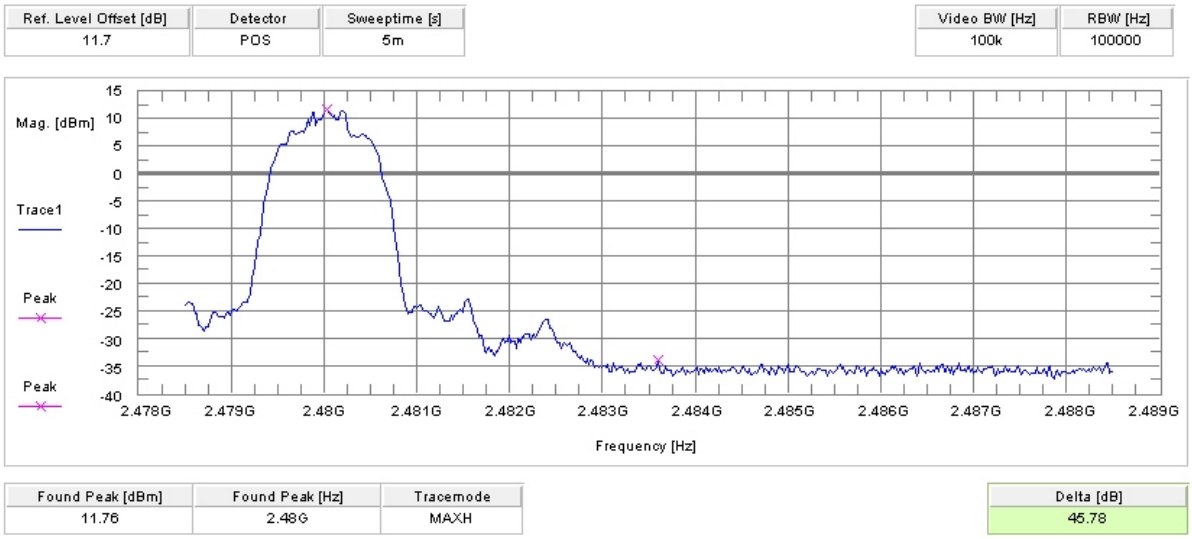
Plot 3 of 4 (hopping off, lowest frequency):

Ref. Level Offset [dB]	Detector	Sweeptime [s]	Video BW [Hz]	RBW [Hz]
11.8	POS	5m	100k	100000



Found Peak [dBm]	Found Peak [Hz]	Tracemode	Delta [dB]
14.41	2.402G	MAXH	37.59

Plot 4 of 4 (hopping off, highest frequency):



Results:

SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	37.59
hopping on, lowest frequency	37.40
hopping off, highest frequency	45.78
hopping on, highest frequency	45.70
Measurement uncertainty	±1,5dB

Limits:

Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).