Radio Intentional EMC Test Report: EDCS - **1401428**

For

CP-8861 Bluetooth Module

FCC ID: LDK88611057

IC : 2461B-88611057

Against the following Specifications :

47 CFR 15.247, 15.205, 15.209

and

RSS-210 Issue 8, RSS-Gen Issue 3, RSS-102

Cisco Systems

EMC Laboratory

170 West Tasman Drive

San Jose, CA 95134

Author: Jose Aguirre
Approved By: Dilip Patel
Title: Regulatory Compliance Manager

This report replaces any previously entered test report under EDCS- **1401428**

This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

Section 1: Overview

Test Summary

The samples were assessed against the tests detailed in section 3 under the requirements of the following standards:

Emissions:
CFR47 Part 15.247
RSS-210
RSS102

Notes:

1) Measurements were made in accordance with FCC docket #:DA 00-0705, ET docket 96-8 measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.

Section 2: Assessment Information

2.1 General

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal Government.

With regard to this assessment, the following points should be noted:

a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results, due to production tolerances and measurement uncertainties.

b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.

c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).

d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

e) All AC testing was performed at one or more of the following supply voltages:
110V (+/-10%) 60Hz

f) Cisco Systems, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). The scope of accreditation, certificate number 1178-01 is referenced in appendix C, along with further details.

This report must not be reproduced except in full, without written approval of Cisco Systems, Inc.

2.2 Start Date of Testing

02-March-2014

2.3 Report Issue Date

Cisco Systems, Inc. uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,
170 West Tasman Drive
San Jose, CA 95134,
USA

Registration Numbers for Industry Canada

Cisco System Site	Site Identifier
Building P, 10m Chamber	Company #: 4624-2
Building P, 5m Chamber	Company #: 4624-1
Building N, 5m Chamber	Company #: 6111
Building I, 5m Chamber	Company #: 6112

Test Engineers

Jose Aguirre

2.5 Equipment Assessed (EUT)

CP-8861

2.6 EUT Description

The CP-8861 802.11AC IP Phone supports the following modes of operation. The modes are further defined in the radio Theory of Operation. The modes included in this report represent the worst case data for all modes.

This specification is applied to the IEEE802.11a/b/g/n/ac W-LAN + Bluetooth 3.0/HS.

- Broadcom BCM4339 inside
- Compliant with IEEE802.11a/b/g/n/ac
- Compliant with Bluetooth specification v3.0+HS
- Supports standard SDIO v3.0 host interface
- Interface support for Bluetooth is Host Controller Interface (HCI)
- RoHS compliant

The following Antenna(s) are supported by this product

Frequency	Part number	Antenna Type	Antenna Gain (dBi)
2400-2483.5MHz	Internal	Omni-directional	3.11

2.7 Scope of Assessment

Tests have been performed in accordance with the relevant Test and Assessment Plan (TAP), a copy of which is contained in Appendix F of this report, and the relevant Cisco Systems, Inc. radio test procedures (EDCS-420238). This test report may not cover all of the tests highlighted in the test plan.

2.8 Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

Emission level [dBuV] = Indicated voltage level [dBuV] + Cable Loss [dB] + Other correction factors [dB]

The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss..

Note: to convert the results from dBuV/m to uV/m use the following formula:-

Level in uV/m = Common Antilogarithm [(X dBuV/m)/20] = Y uV/m

Measurement Uncertainty Values

voltage and power measurements	**± 2 dB**
conducted EIRP measurements	**± 1.4 dB**
radiated measurements	**± 3.2 dB**
frequency measurements	**± 2.4 10-7**
temperature measurements	**± 0.54º.**
humidity measurements	**± 2.3%**
DC and low frequency measurements	**± 2.5%.**

2.9 Report Template Control No.

EDCS#703456

Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Technical Requirements / Details	Result
FCC 15.247 (b) (1) RSS-210 A8.4 (2)	**Peak Output Power**: 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 watt.	Pass
FCC 15.247 (a) (1) RSS-210 A8.1 (b)	**Carrier Separation**: For frequency hopping systems according to a hopping channel carrier frequencies that are separated by 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	Pass
FCC 15.247 (a) (1) RSS-210 A8.1 (a)	**20 dB Bandwidth**: The bandwidth of a frequency hopping channel is the – 20 dB emission bandwidth, measured with the hopping stopped, between upper and lower frequency from top carrier (dBc) down.	Reference

FCC 15.247 (a) (iii) RSS-210 A8.1 (d)	**No. of Hopping Frequencies / Time Occupancy**: 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.	Pass
FCC 15.247 (d) RSS-210 A8.5	**Conducted Spurious Emissions / Band-Edge:** 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 §15.209(a) is not required	Pass
FCC 15.247 (d) RSS-210 A8.5 FCC 15.205 (a) RSS-Gen 7.2.2	**Restricted band**: Unwanted emissions falling within the restricted bands, as defined in FCC 15.205 (a) and RSS-Gen 7.2.2 must also comply with the radiated emission limits specified in FCC 15.209 (a) and RSS-Gen 7.2.5.	Pass

Radiated Emissions (General requirements)

Basic Standard	Technical Requirements / Details	Result
FCC 15.209 (a) RSS-Gen 7.2.5	**TX Spurious Emissions:** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the filed strength limits table in this section.	Pass

* MPE calculation is recorded in a separate report

Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. During preliminary testing all three planes (X,Y & Z) were evaluated to determine "Worst Case". The data collected determine that the orientation used for this report was demined "Worst Case".

4.1 Sample Details

Sample Number	Equipment Details	Serial Number	Part Number
S01	CP-8861	FCH18018UG2	68-5283-01

The following antennas were evaluated as part of this testing process. The antennas listed reflect the maximum gain allowed for each family type of antenna:

Fixed internal Dual Band Antenna, Gain = 3.11dBi (no external antenna can be used.)

4.2 System Details

System #	Description	Samples
1	Radio Test Sample	S01

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Bluetooth Test Mode	System is connected to the spectrum analyzer and placed in either continuous TX Mode or Duty Cycle Mode with Hopping Function Turned ON or OFF per test requirements via test utility software.

4.4 Test Mode, Modulation and Data Packet Type Description

Test Mode	Modulation	Data Packet
A	GFSK	DH1
B	π/4-DQPSK	2-DH3
C	8-DPSK	3-DH1
Note1: Table above represents the worst case scenarios for all modulation and data packet type combinations.		

4.4.1 Test Mode and worst case Determination

Item	Test Item	Test Mode	Test Frequency (MHz)
1	20 dB Bandwidth	A, B & C	2441
2	Output Power	All available modulation and packet type	2402, 2441, 2480
	Worst Case	Mode C (Note: 1)	
3	Channel Seperation	Any with hopping enable	2441, 2442
4	Number of Channels	Any with hopping enable	2402 – 2483.5
5	Dwell Time	A, B & C	2441
	Average Time Occupancy	A, B & C w/ hopping enable	
6	Band-Edge	A, B & C w/hopping enabled & hopping disabled	2402, 2480
7	Out of Band Conducted Emissions	A	2402, 2441, 2480
8	Restricted Band	A	2402, 2441, 2480
9.1	TX Radiated Emissions below 1GHz	A	2402, 2441,2480
9.2	TX Radiated Emissions above 1GHz	A	2402, 2441, 2480
10.1	RX Radiated Emissions below 1GHz (per IC requirement)	Receive / Idle	--------
10.2	RX Radiated Emissions above 1GHz (per IC requirement)	Receive / Idle	---------
Note1: Worst case is determined as the combination of modulation and packet type with the highest output power.			

Section 5: Modifications

5.1 Sample Modifications Performed During Assessment

No modifications were performed during assessment.

Appendix A: Formal Test Results

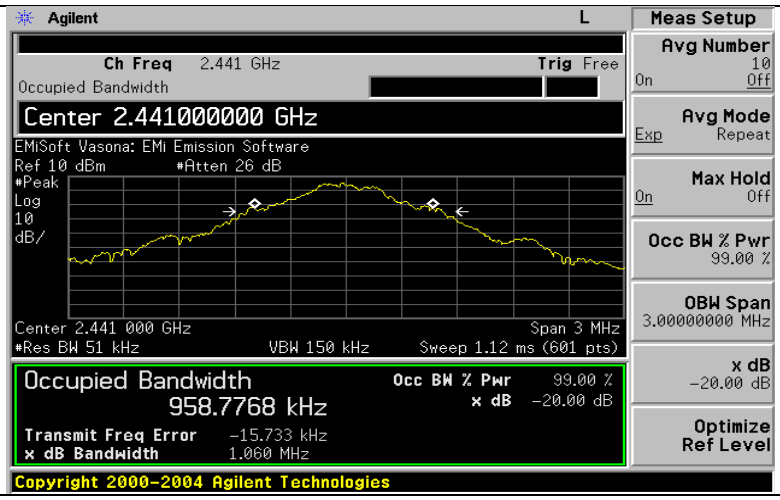
20dB Bandwidth

20dB bandwidth of a frequency hopping channel is the 2400-2483.5MHz with hopping function disabled.

Test Data Table

Frequency (MHz)	20dB BW (MHz)	99% BW (MHz)	Modulation Type
2.441	1.060	0.959	GFSK
2.441	1.374	1.218	π/4-DQPSK
2.441	1.349	1.195	8-DPSK

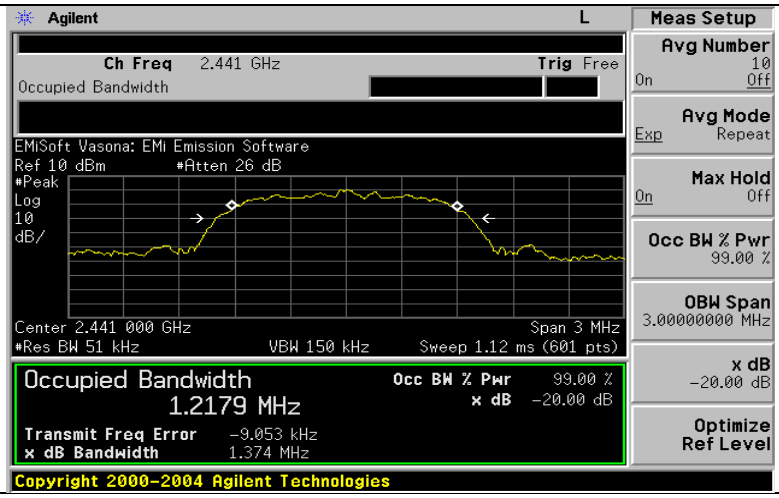
Graphical Test Results



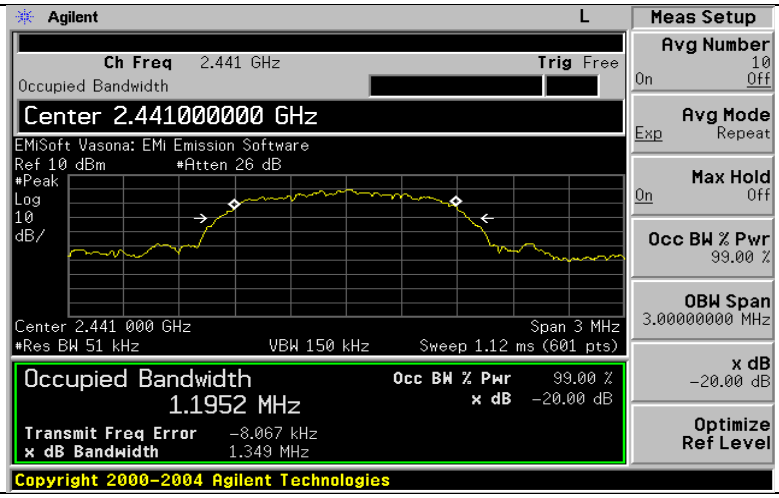
Title: **20dB Bandwidth Ch 39: 2441MHz with GFSK modulation (DH1 Packet)**

Note: 20dB bandwidths are the same for all channels with the same modulation type.

Graphical Test Results



Title: **20dB Bandwidth Ch 39: 2441MHz with π/4-DQPSK modulation (2-DH3 Packet)**



Title: **20dB Bandwidth Ch 39: 2441MHz with 8-DPSK modulation (3-DH1 Packet)**

Note: 20dB bandwidths are the same for all channels with the same modulation type.

Peak Output Power

15.247 & RSS-210 A8.4:

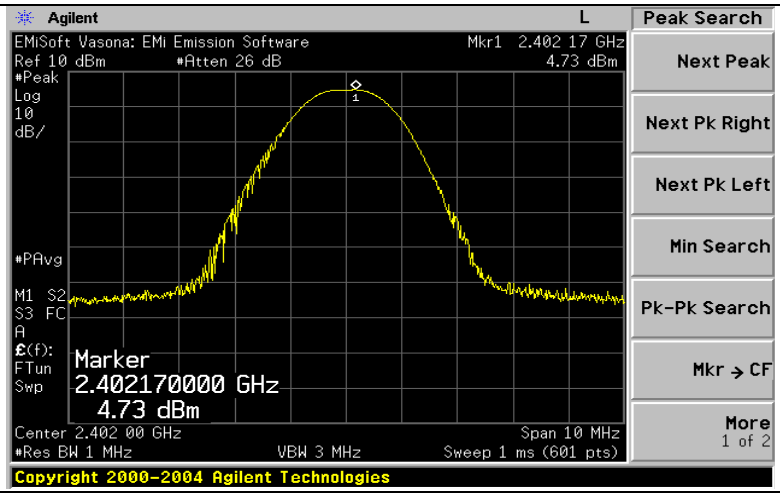
The maximum conducted output power of the intentional radiator for systems using frequency hopping systems in the 2400-2483.5MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Data Table

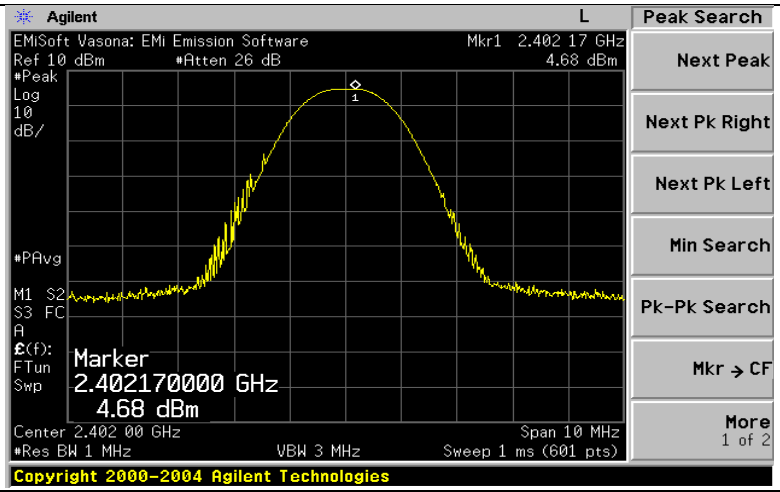
Frequencies (MHz)	Modulation	Data rate (Mbps)	Packet Type	Peak Output Power (dBm)	Limits (dBm)	Results
2402	GSFK	1 Mbps	DH1	4.73	30	Pass
2402	GSFK	1 Mbps	DH3	4.68	30	Pass
2402	GSFK	1 Mbps	DH5	4.66	30	Pass
2402	π/4-DQPSK	2 Mbps	2-DH1	2.62	30	Pass
2402	π/4-DQPSK	2 Mbps	2-DH3	2.65	30	Pass
2402	π/4-DQPSK	2 Mbps	2-DH5	2.62	30	Pass
2402	8-DPSK	3 Mbps	3-DH1	2.98	30	Pass
2402	8-DPSK	3 Mbps	3-DH3	2.93	30	Pass
2402	8-DPSK	3 Mbps	3-DH5	2.95	30	Pass
2441	GSFK	1 Mbps	DH1	5.55	30	Pass
2441	GSFK	1 Mbps	DH3	5.43	30	Pass
2441	GSFK	1 Mbps	DH5	5.46	30	Pass
2441	π/4-DQPSK	2 Mbps	2-DH1	3.35	30	Pass
2441	π/4-DQPSK	2 Mbps	2-DH3	3.41	30	Pass
2441	π/4-DQPSK	2 Mbps	2-DH5	3.39	30	Pass
2441	8-DPSK	3 Mbps	3-DH1	3.85	30	Pass
2441	8-DPSK	3 Mbps	3-DH3	3.80	30	Pass
2441	8-DPSK	3 Mbps	3-DH5	3.76	30	Pass
2480	GSFK	1 Mbps	DH1	3.76	30	Pass
2480	GSFK	1 Mbps	DH3	3.69	30	Pass
2480	GSFK	1 Mbps	DH5	3.68	30	Pass
2480	π/4-DQPSK	2 Mbps	2-DH1	1.58	30	Pass
2480	π/4-DQPSK	2 Mbps	2-DH3	1.64	30	Pass
2480	π/4-DQPSK	2 Mbps	2-DH5	1.61	30	Pass
2480	8-DPSK	3 Mbps	3-DH1	2.08	30	Pass
2480	8-DPSK	3 Mbps	3-DH3	2.03	30	Pass
2480	8-DPSK	3 Mbps	3-DH5	2.03	30	Pass

Note: Worst case is determined as the modulation with Highest Output Power.
Worst cases emissions to be determined as DH1, 2-DH3 & 3-DH1

Graphical Test Results

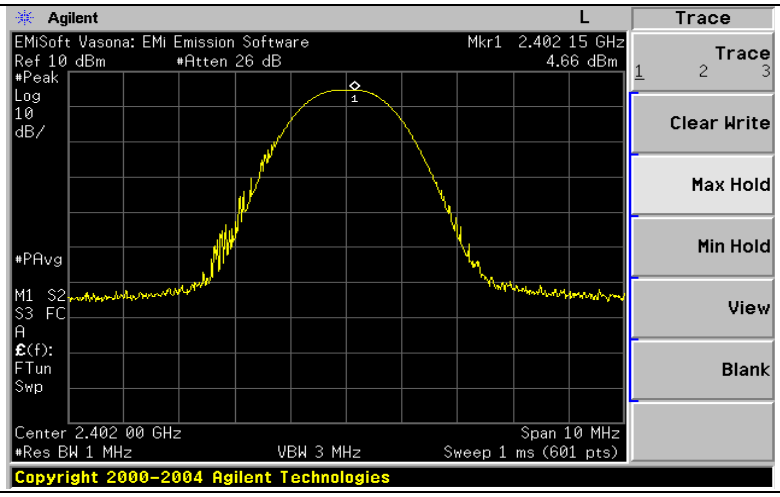


Title: Peak Output Power Ch 0: 2402MHz with GFSK modulation / DH1 packet type

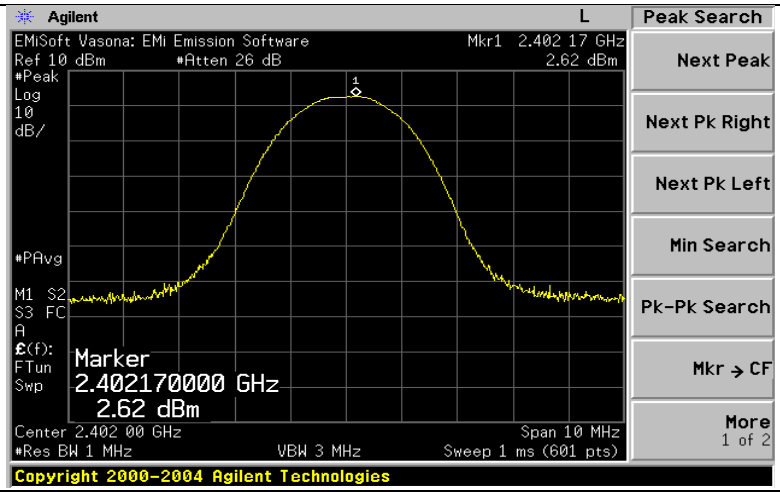


Title: Peak Output Power Ch 0: 2402MHz with GFSK modulation (DH3 packet type)

Graphical Test Results

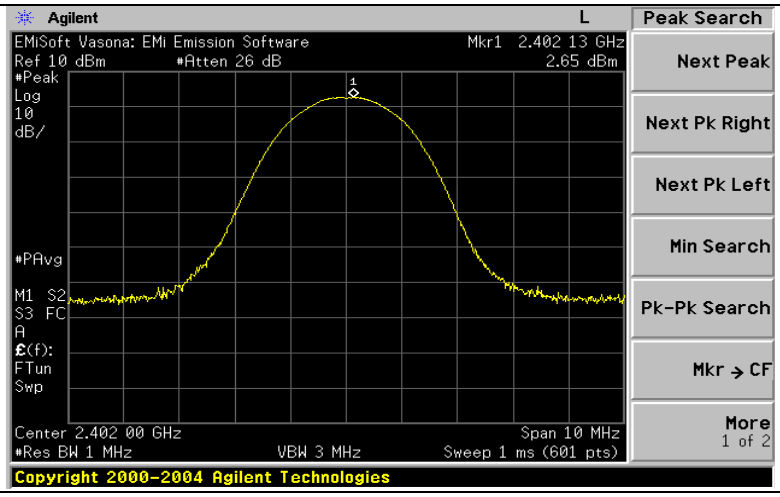


Title: Peak Output Power Ch 0: 2402MHz with GFSK modulation (DH5 packet type)

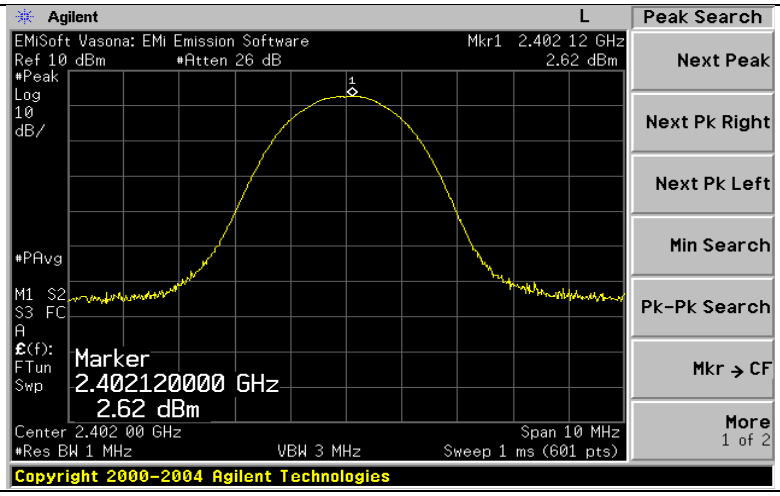


Title: Peak Output Power Ch 0: 2402MHz with π/4-DQPSK modulation (2-DH1 packet)

Graphical Test Results

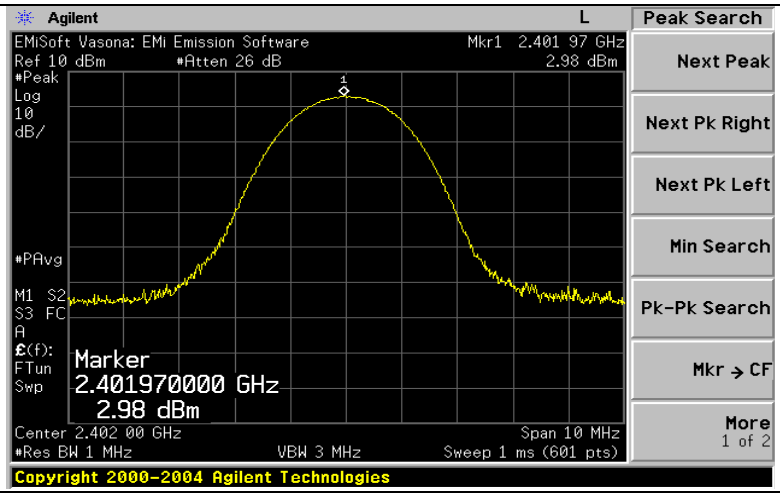


Title: **Peak Output Power Ch 0: 2402MHz with π/4-DQPSK modulation (2-DH3 packet)**

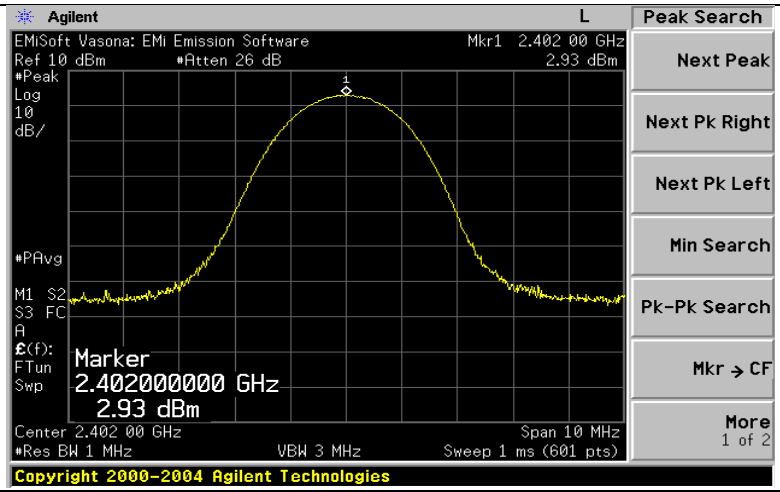


Title: **Peak Output Power Ch 0: 2402MHz with π/4-DQPSK modulation (2-DH5 packet)**

Graphical Test Results

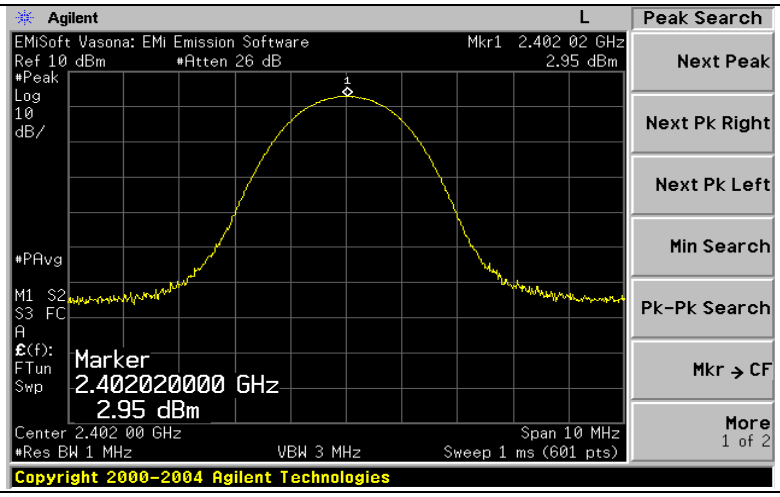


Title: Peak Output Power Ch 0: 2402MHz with 8-DPSK modulation (3-DH1 packet)

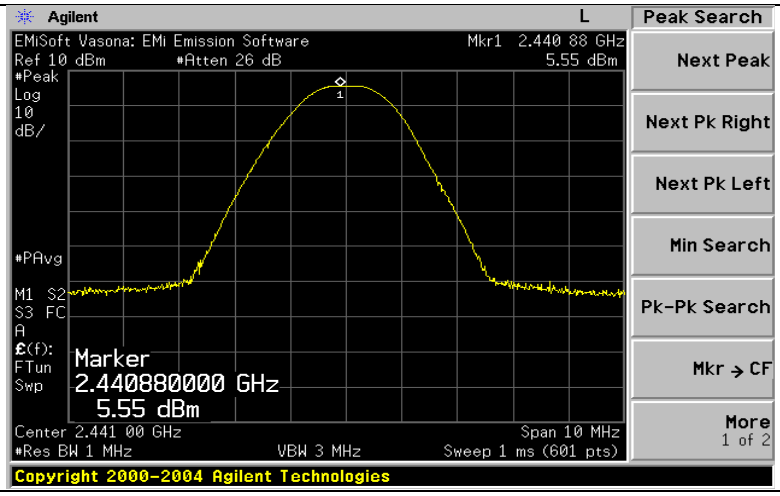


Title: Peak Output Power Ch 0: 2402MHz with 8-DPSK modulation (3-DH3 packet)

Graphical Test Results

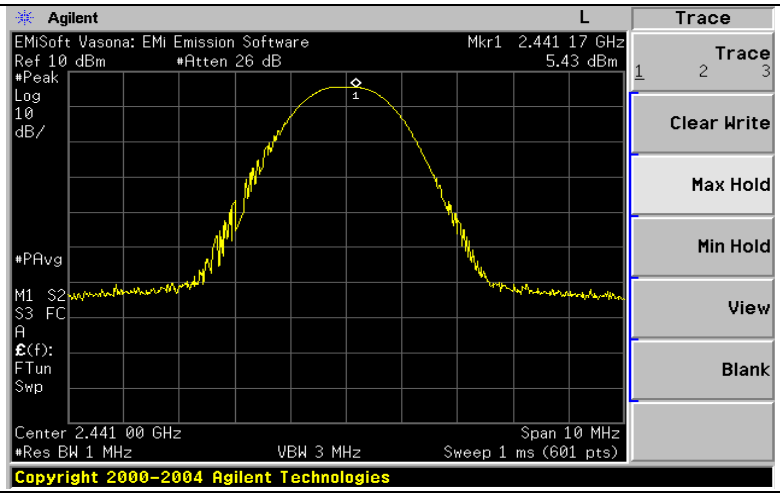


Title: Peak Output Power Ch 0: 2402MHz with 8-DPSK modulation (3-DH5 packet)

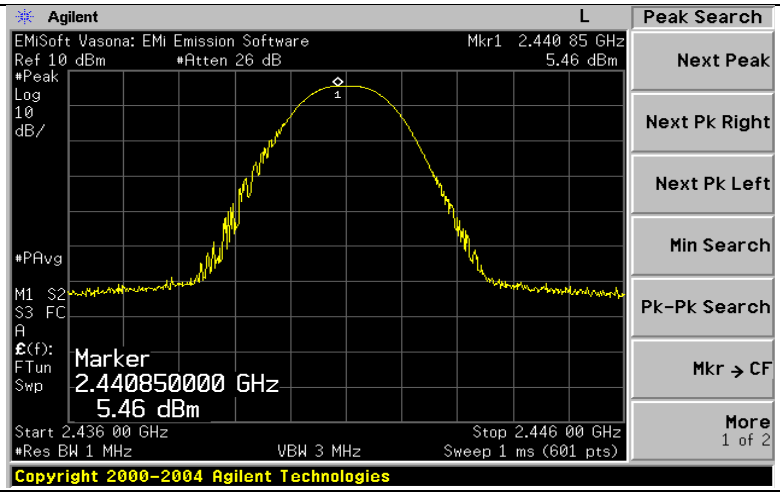


Title: Peak Output Power Ch 39: 2441MHz with GFSK modulation (DH1 packet)

Graphical Test Results

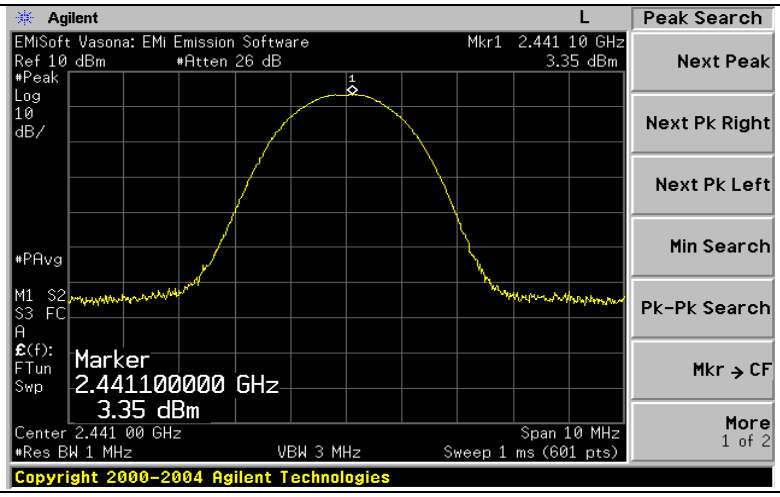


Title: Peak Output Power Ch 39: 2441MHz with GFSK modulation (DH3 packet type)

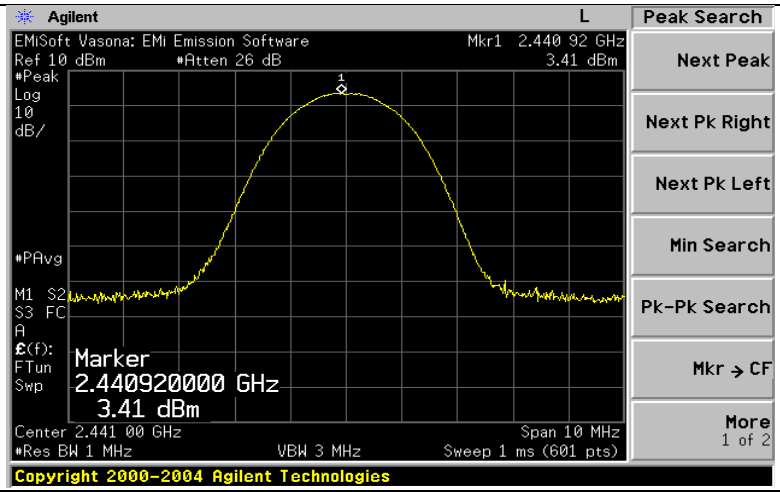


Title: Peak Output Power Ch 39: 2441MHz with GFSK modulation (DH5 packet)

Graphical Test Results

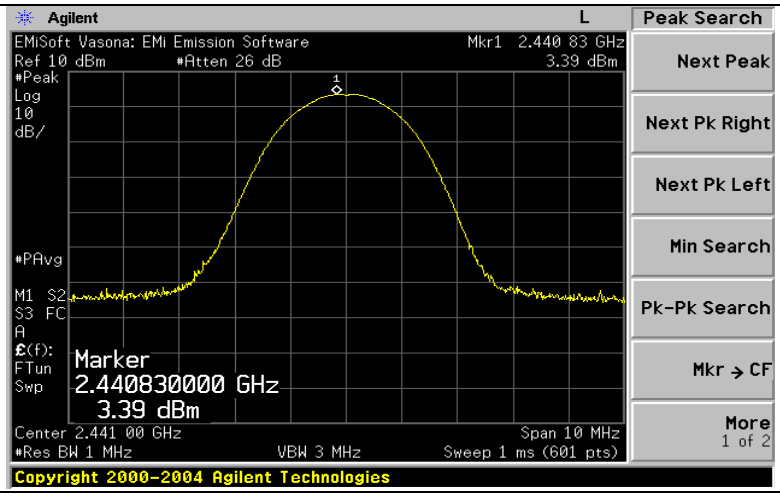


Title: Peak Output Power Ch 39: 2441MHz with π/4-DQPSK modulation (2-DH1 packet)

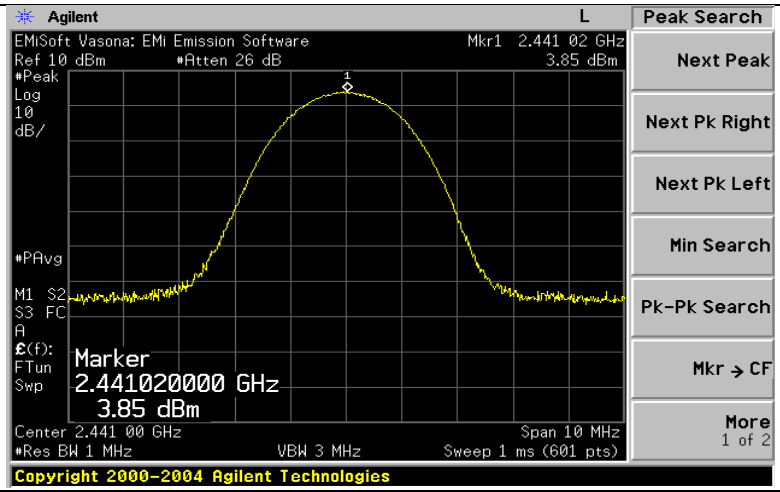


Title: Peak Output Power Ch 39: 2441MHz with π/4-DQPSK modulation (2-DH3 packet)

Graphical Test Results

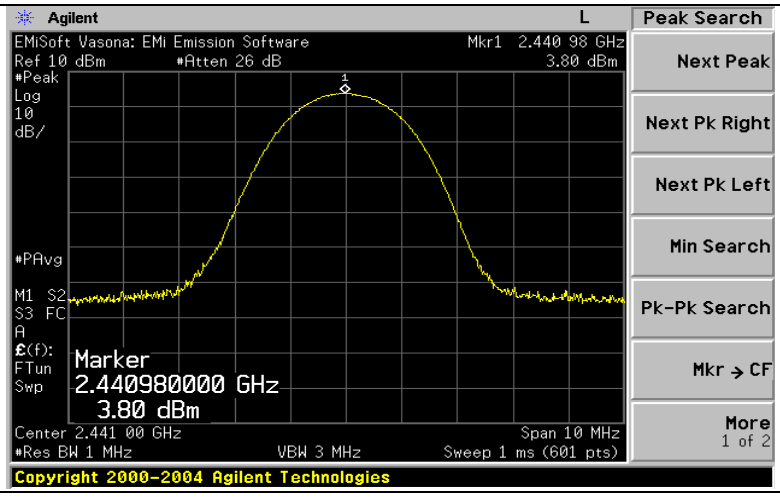


Title: **Peak Output Power Ch 39: 2441MHz with π/4-DQPSK modulation (2-DH5 packet)**

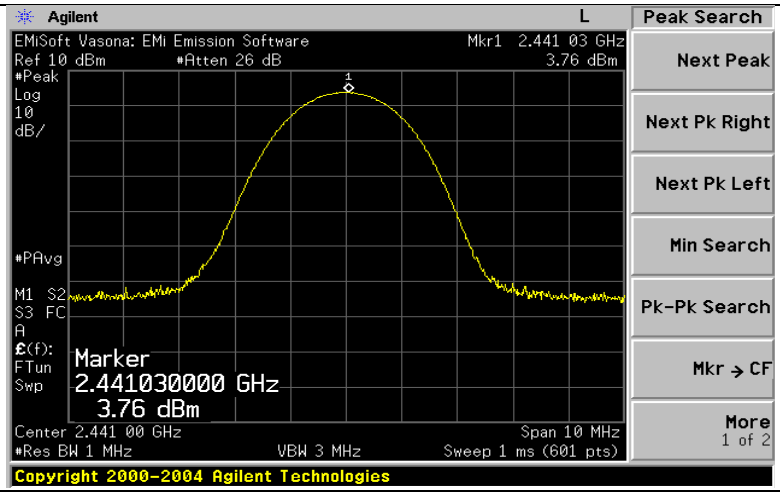


Title: **Peak Output Power Ch 39: 2441MHz with 8-DPSK modulation (3-DH1 packet)**

Graphical Test Results

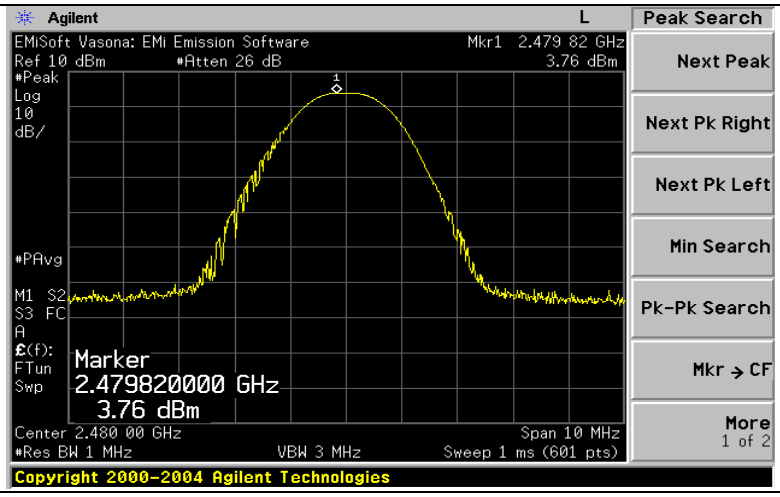


Title: **Peak Output Power Ch 39: 2441MHz with 8DPSK modulation (3-DH3 packet)**

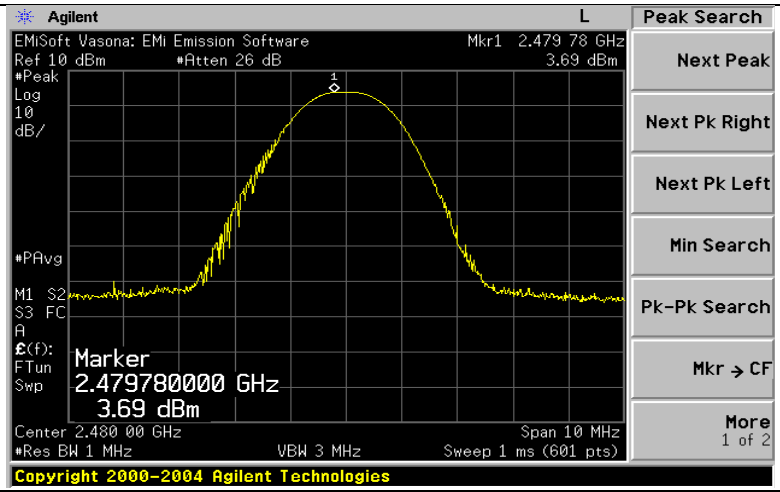


Title: **Peak Output Power Ch 39: 2441MHz with 8DPSK modulation (3-DH5 packet)**

Graphical Test Results

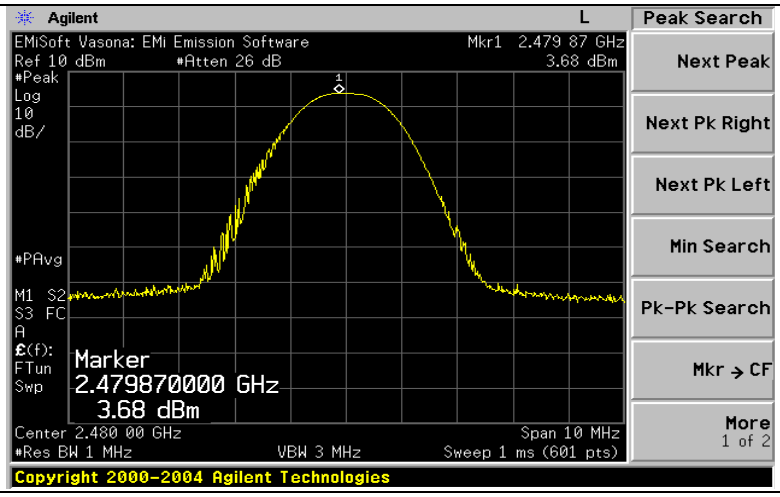


Title: **Peak Output Power Ch 78: 2480MHz with GFSK modulation (DH1 packet)**

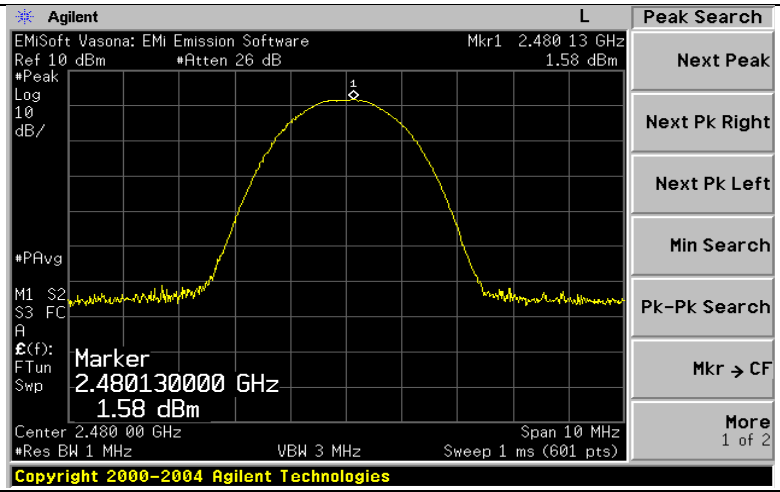


Title: **Peak Output Power Ch 78: 2480MHz with GFSK modulation (DH3 packet)**

Graphical Test Results

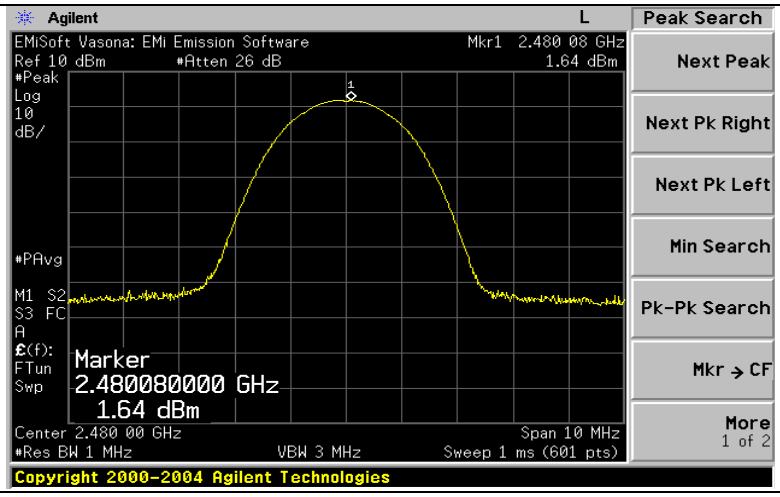


Title: **Peak Output Power Ch 78: 2480MHz with GFSK modulation (DH5 packet)**

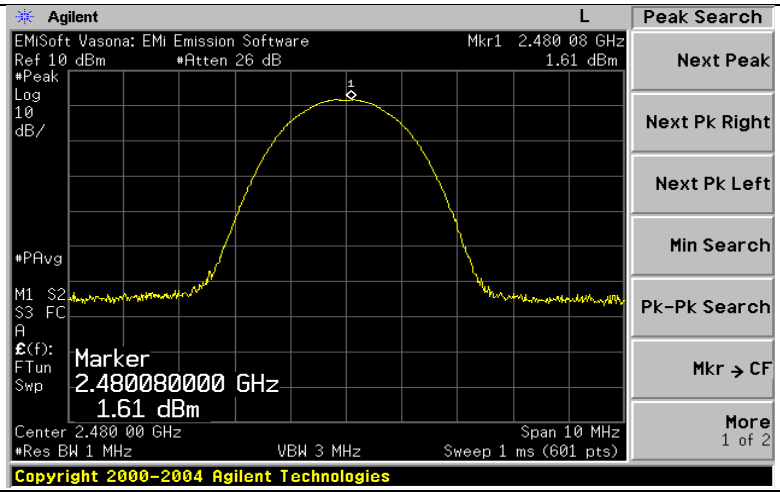


Title: **Peak Output Power Ch 78: 2480MHz with π/4-DQPSK modulation (2-DH1 packet)**

Graphical Test Results

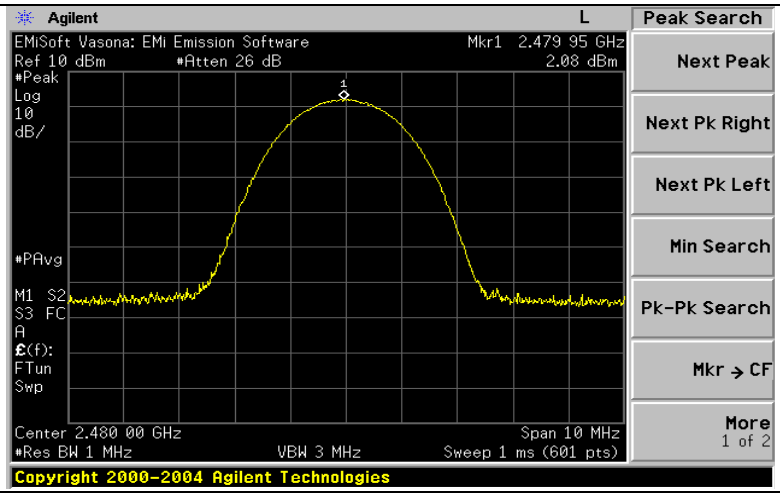


Title: **Peak Output Power Ch 78: 2480MHz with π/4-DQPSK modulation (2-DH3 packet)**

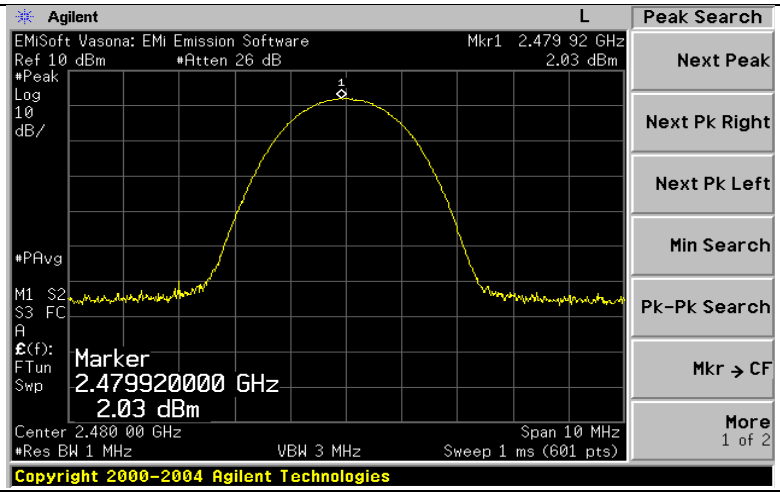


Title: **Peak Output Power Ch 78: 2480MHz with π/4-DQPSK modulation (2-DH5 packet)**

Graphical Test Results

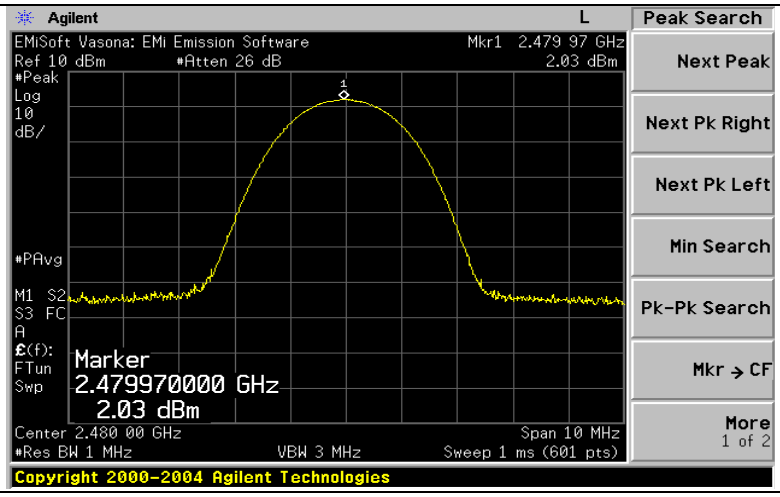


Title: **Peak Output Power Ch 78: 2480MHz with 8-DPSK modulation (3-DH1 packet)**



Title: **Peak Output Power Ch 78: 2480MHz with 8-DPSK modulation (3-DH3 packet)**

Graphical Test Results



Title: **Peak Output Power Ch 78: 2480MHz with 8-DPSK modulation (3-DH5 packet)**

Overall Result: PASS

Measurement procedure as per KDB Publication DA 00-705

Carrier Frequency Seperation

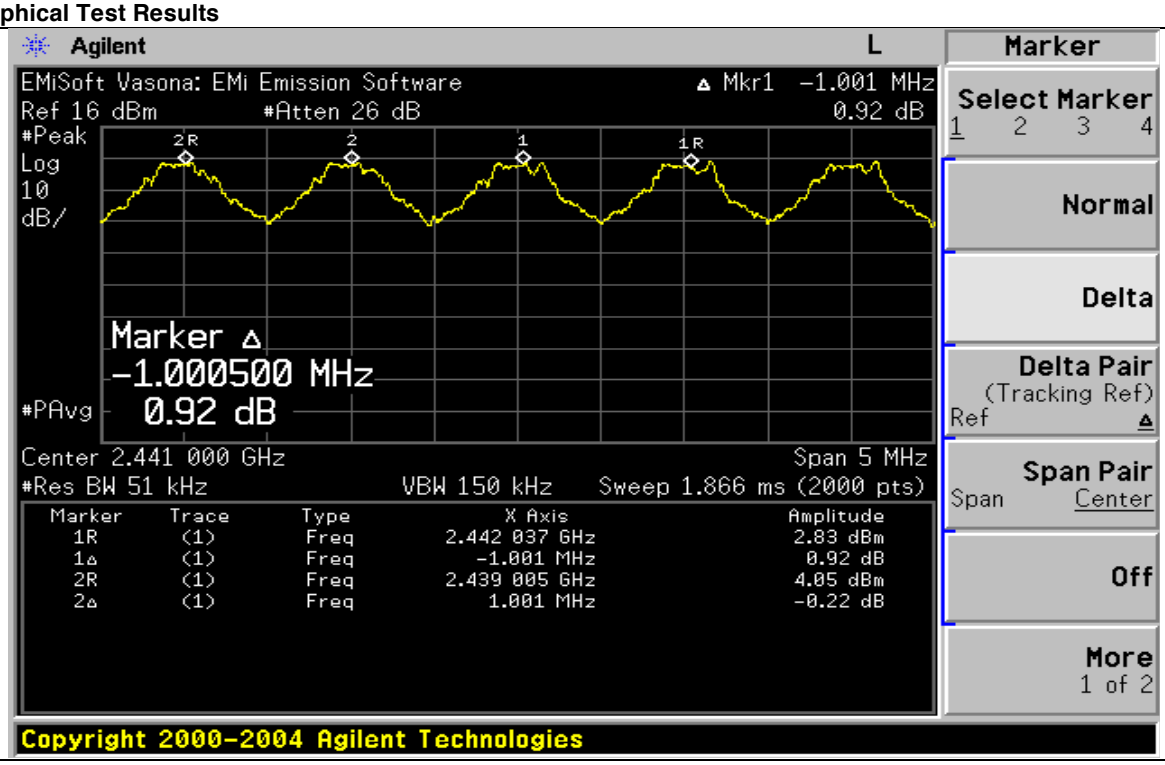
15.247 & RSS-210 A8.1:

For frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel frequencies that are seperated by 25kHz or two-thirds of the 20dB bandwidth of the hopping cahnnel, whichever is greater, provided the system operates with an output power no greater than 0.125W.

Test Data Table

Frequency (MHz)	Carrier Frequency Separation (KHz)	Limits (KHz)	Results
2440 & 2441	1000.00	850	Pass
2442 & 2443	1000.00	850	Pass

Graphical Test Results



Title: **Carrier Frequency Speration between 2441 MHz & 2442 MHz**

Overall Result: PASS

Measurement procedure as per KDB Publication DA 00-705

Number of Hopping Frequencies

15.247 & RSS-210 A8.1:

Frequency hopping systems operating in the band 2400-2483.5MHz shall use at least 15 hopping hannels.

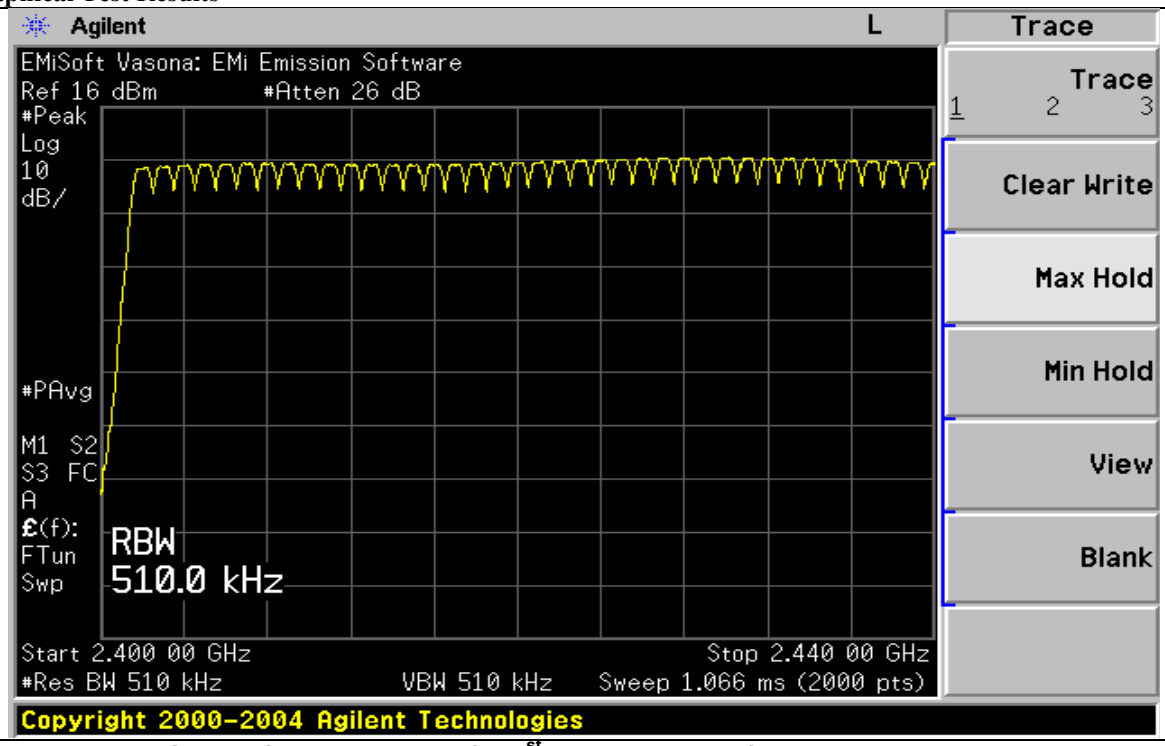
Test Data Table

Frequency (MHz)	Total No. of Channels	Limits	Results
2400 – 2483.5	79	≥ 15	Pass
Total number of hopping frequencies in the 2400-2483.5MHz Band = 79 Channels			

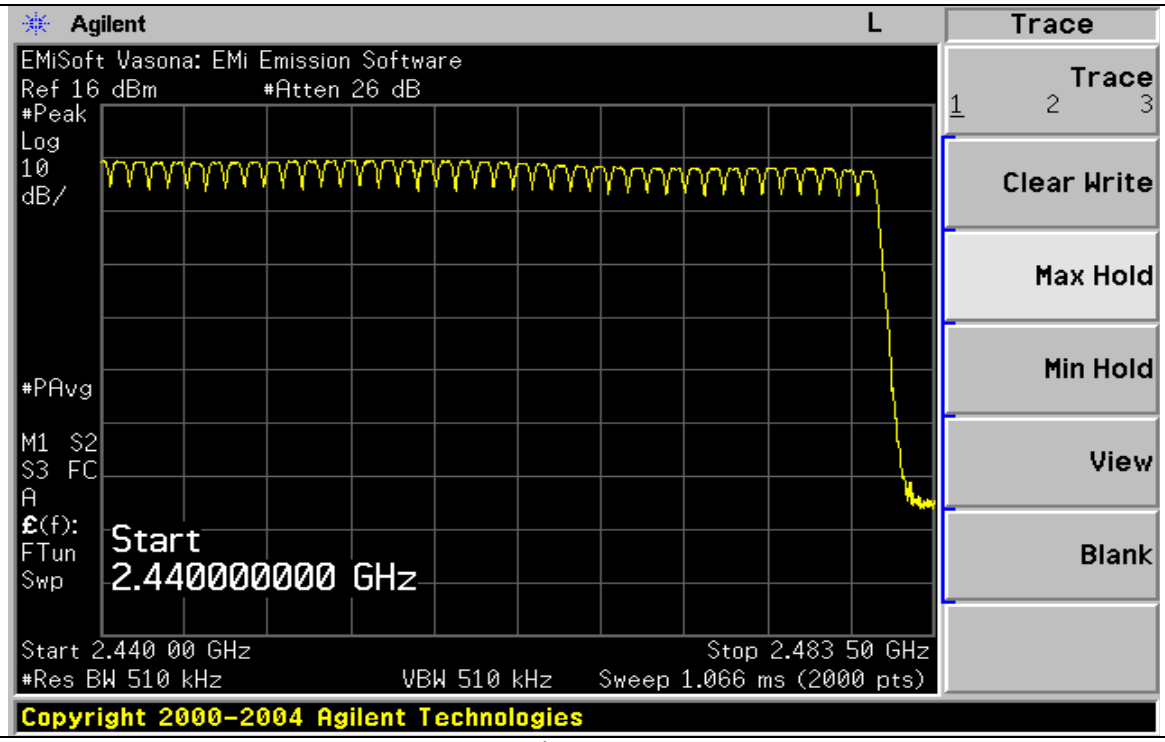
Overall Result: PASS

Measurement procedure as per KDB Publication DA 00-705

Graphical Test Results



Title: **Total No. of Hops Channels = 38.5 for 1st segment in the frequency range 2400-2440MHz**



Title: **Total No. of Hops Channels = 40.5 for 2nd segment in the frequency range 2400-2440MHz**

Average Time of Occupancy

15.247 & RSS-210 A8.1:

Frequency hopping systems operating in the band 2400-2483.5MHz shall use at least 15 hopping 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.

The total sweep time is 0.4(79) = 31.6 seconds.
Due to the number of hops in the 31.6s sweep we determined to reduce the sweep time to 5 s, count the number of hops and multiply by 6.32. The total number of hops will be multiplied by the measured time of one pulse.

Example: Number of Hops in 5s = 50. Total Number of Hops in 31.6s = 50 (6.32) = 316
Single Pulse Width = 0.001s. Time of Occupancy = 316 (0.001) = 0.316s

Calculation:

Packet Type: DH1
DH1 Dwell Time = **0.382ms**
Total bins in 5 s = 52
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 52 (in 5s) x 6.32 = 328.64
Total time occupancy (in 31.6s) = 329 x 0.382ms = **125.3ms** or 0.126s

Packet Type: DH3
DH1 Dwell Time = **1.621 ms**
Total bins in 5 s = 25
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 25 (in 5s) x 6.32 = 158
Total time occupancy (in 31.6s) = 158 x 1.621ms = **256.1ms** or 0.2561s

Packet Type: DH5
DH1 Dwell Time = **2.877 ms**
Total bins in 5 s = 19
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 19 (in 5s) x 6.32 = 120.08 bins
Total time occupancy (in 31.6s) = 120.08 x 2.877ms = **345.5ms** or 0.3455s

Packet Type: 2-DH1
DH1 Dwell Time = **0.3887ms**
Total bins in 5 s = 51
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 51 (in 5s) x 6.32 = 322.3
Total time occupancy (in 31.6s) = 322.3 x 0.3887ms = **125.3ms** or 0.1253s

Calculation (continue):

Packet Type: 2-DH3
DH1 Dwell Time = **1.626 ms**
Total bins in 5 s = 32
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 32 (in 5s) x 6.32 = 202.3
Total time occupancy (in 31.6s) = 202.3 x 1.626ms = **328.8ms** or 0.3288s

Packet Type: 2-DH5
DH1 Dwell Time = **2.878 ms**
Total bins in 5 s = 12
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 12 (in 5s) x 6.32 = 75.84 bins
Total time occupancy (in 31.6s) = 75.84 x 2.878ms = **218.3ms** or 0.219s

Packet Type: 3-DH1
DH1 Dwell Time = **0.3887ms**
Total bins in 5 s = 52
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 52 (in 5s) x 6.32 = 328.6
Total time occupancy (in 31.6s) = 328.6 x 0.3887ms = **127.8ms** or 0.128s

Packet Type: 3-DH3
DH1 Dwell Time = **1.636 ms**
Total bins in 5 s = 25
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 25 (in 5s) x 6.32 = 158
Total time occupancy (in 31.6s) = 158 x 1.636ms = **258.5ms** or 0.259s

Packet Type: 3-DH5
DH1 Dwell Time = **2.883 ms**
Total bins in 5 s = 19
Max. allowed time = 0.4 s x No. of available channels = 0.4s x 79 = 31.6s
Total bins in 31.6s = 19 (in 5s) x 6.32 = 120.08 bins
Total time occupancy (in 31.6s) = 120.08 x 2.883ms = **346.2ms** or 0.347s

Test Data

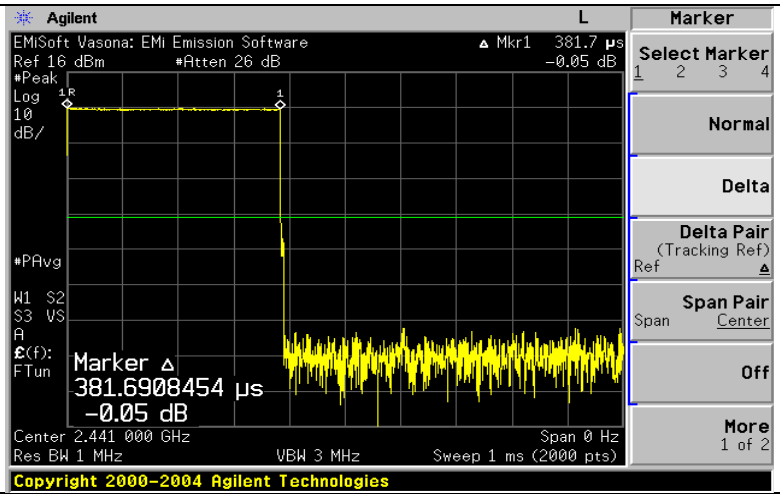
Frequency	Packet	Dwell Time	Time Occupancy	Limits	Results

(MHz)	Type	(ms)	(ms)	(ms)	
2441	DH1	0.382	125.3	400	Pass
2441	DH3	1.621	256.1	400	Pass
2441	DH5	2.877	345.5	400	Pass
2441	2-DH1	0.3887	125.3	400	Pass
2441	2-DH3	1.626	328.8	400	Pass
2441	2-DH5	2.878	218.3	400	Pass
2441	3-DH1	0.3887	127.8	400	Pass
2441	3-DH3	1.636	258.5	400	Pass
2441	3-DH5	2.883	346.2	400	Pass

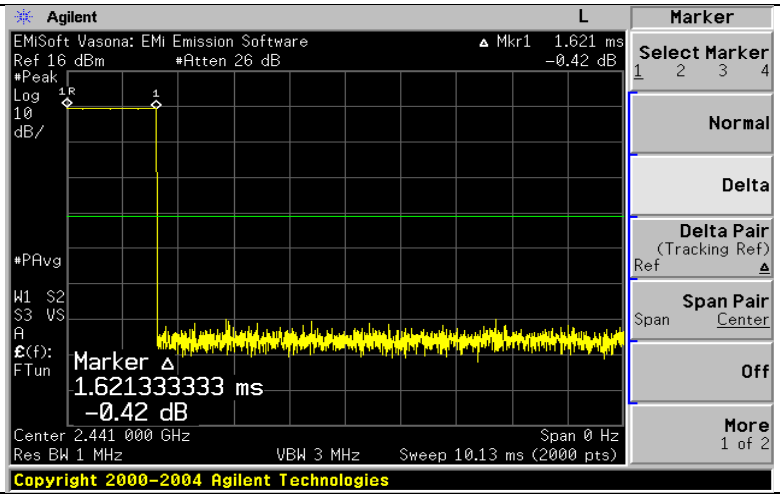
Overall Result: PASS

Measurement procedure as per KDB Publication DA 00-705

Graphical Test Results

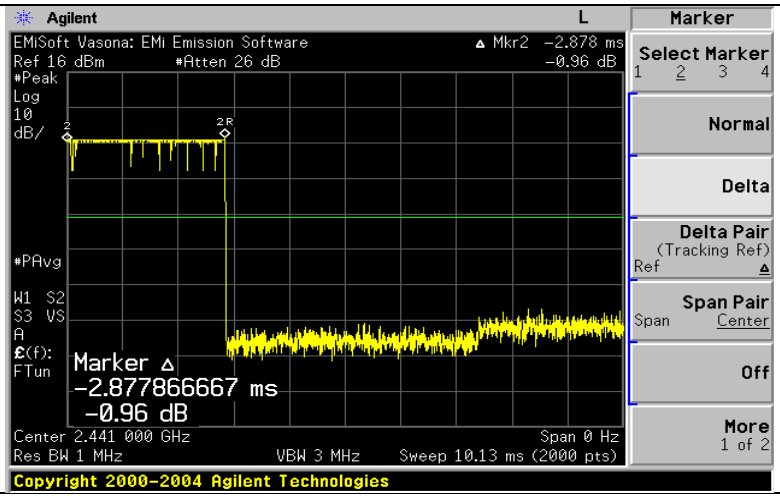


Title: **2441MHz Dwell Time with DH1 packet**

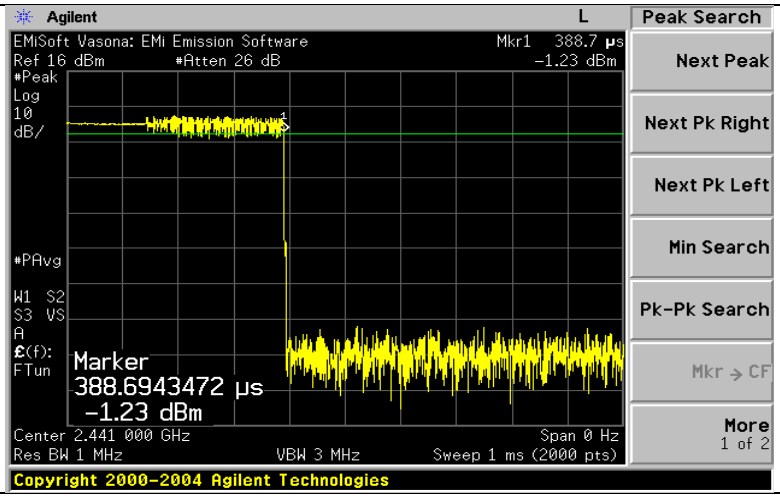


Title: **2441MHz Dwell Time with DH3 packet**

Graphical Test Results

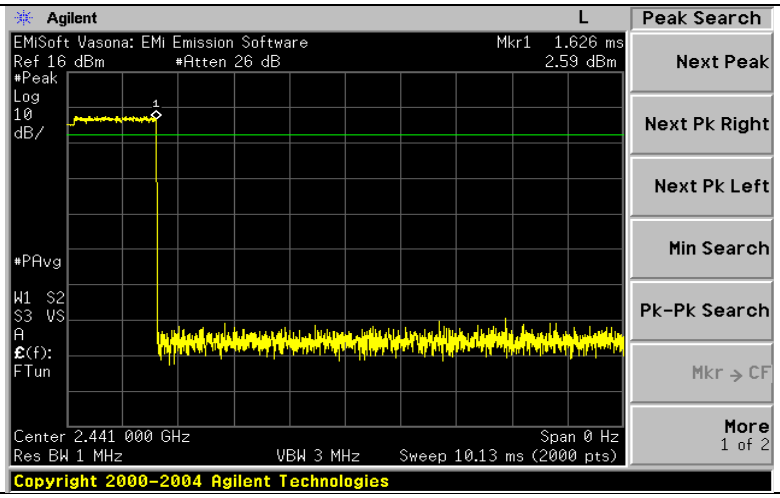


Title: **2441MHz Dwell Time with DH5 packet**

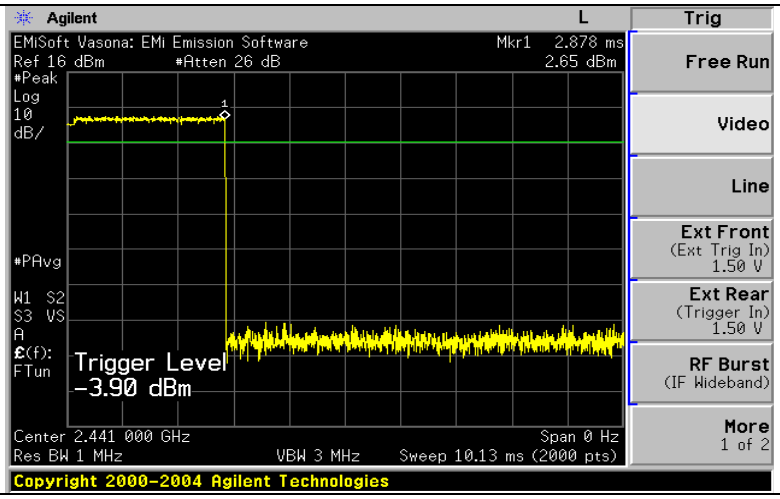


Title: **2441MHz Dwell Time with 2-DH1 packet**

Graphical Test Results

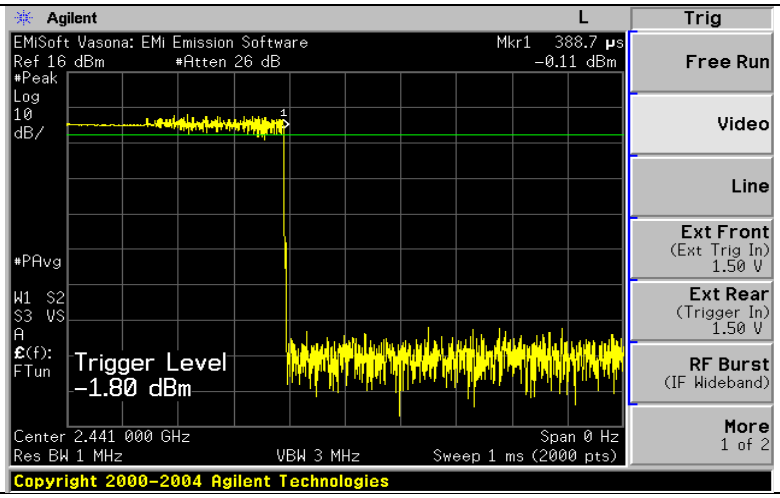


Title: **2441MHz Dwell Time with 2-DH3 packet**

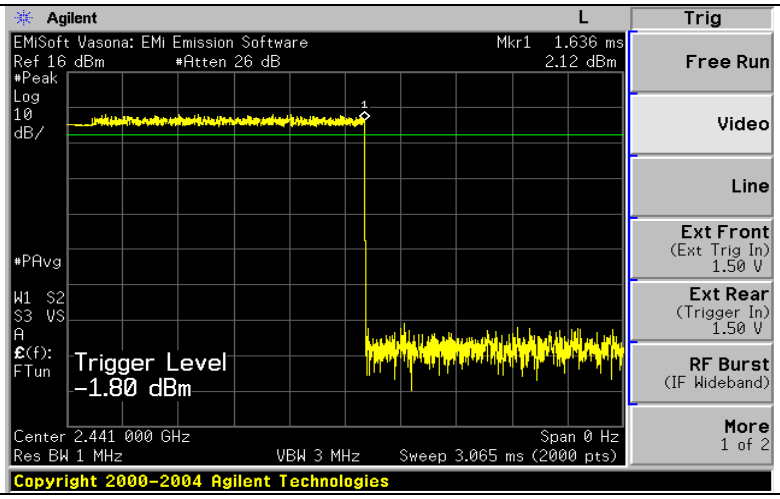


Title: **2441MHz Dwell Time with 2-DH5 packet**

Graphical Test Results

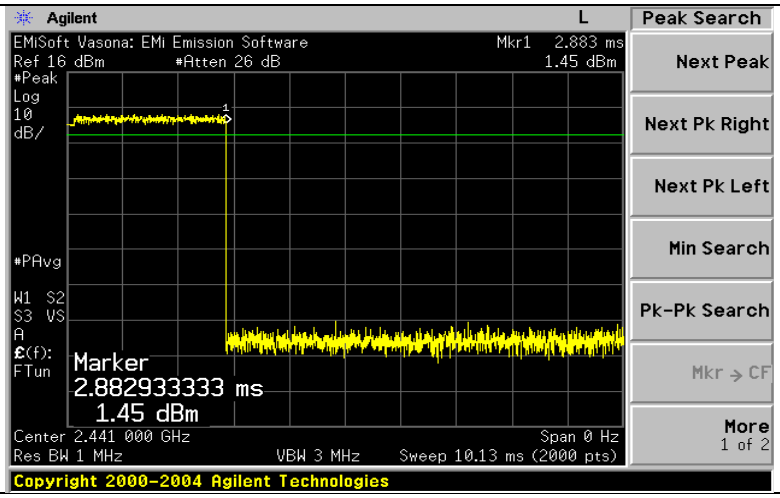


Title: **2441MHz Dwell Time with 3-DH1 packet**

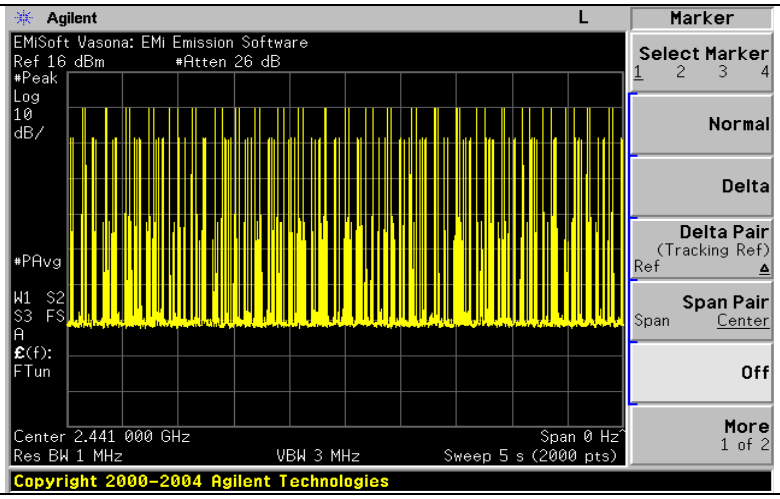


Title: **2441MHz Dwell Time with 3-DH3 packet**

Graphical Test Results

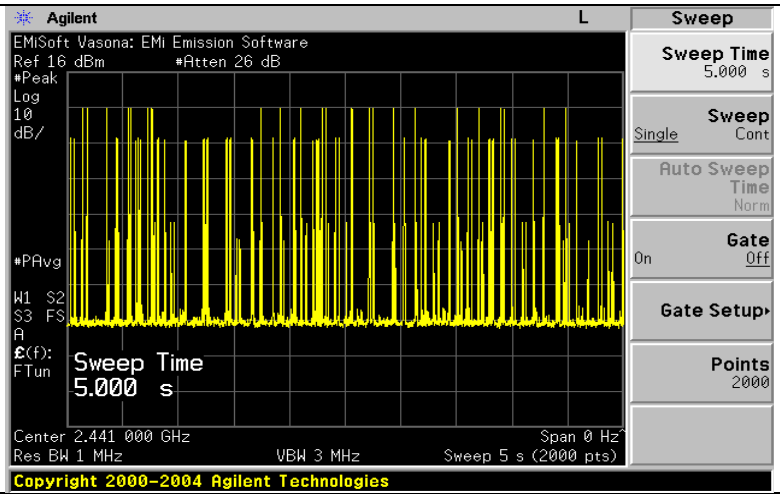


Title: **2441MHz Dwell Time with 3-DH5 packet**

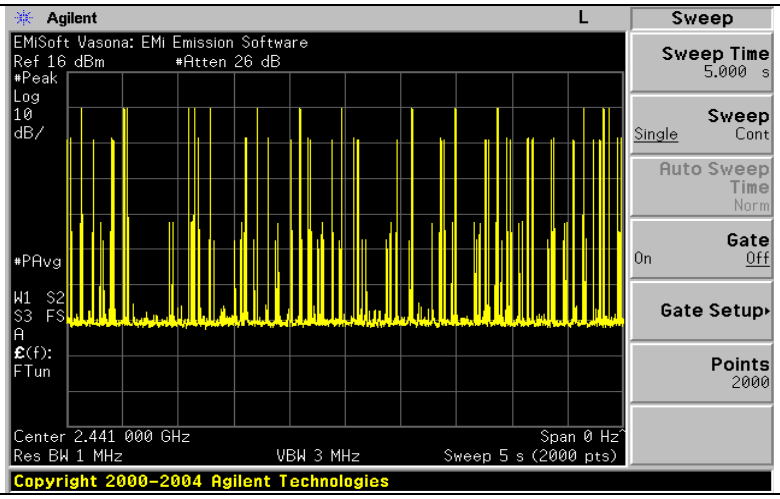


Title: **Time Occupancy in 5s with DH1 packet; Total bins in 5s = 52**

Graphical Test Results

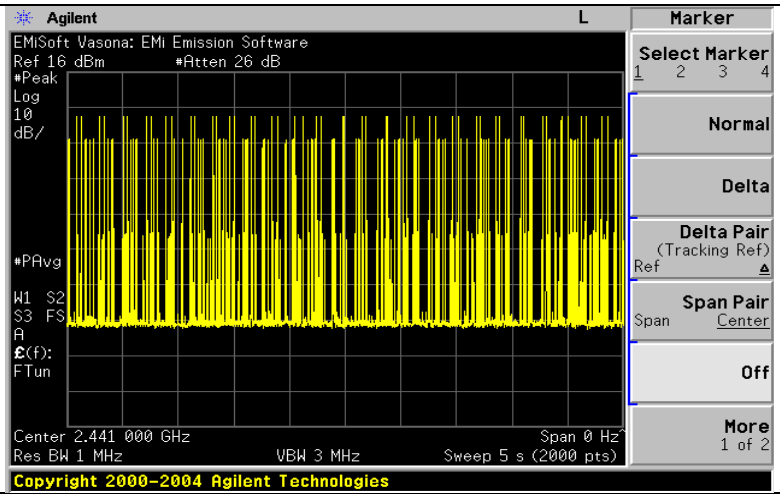


Title: **Time Occupancy in 5s with DH3 packet; Total bins in 5s = 25**

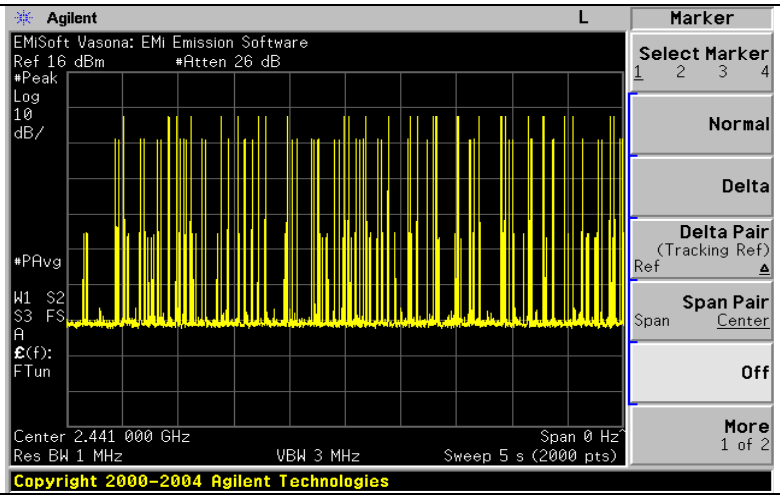


Title: **Time Occupancy in 5s with DH5 packet; Total bins in 5s = 19**

Graphical Test Results

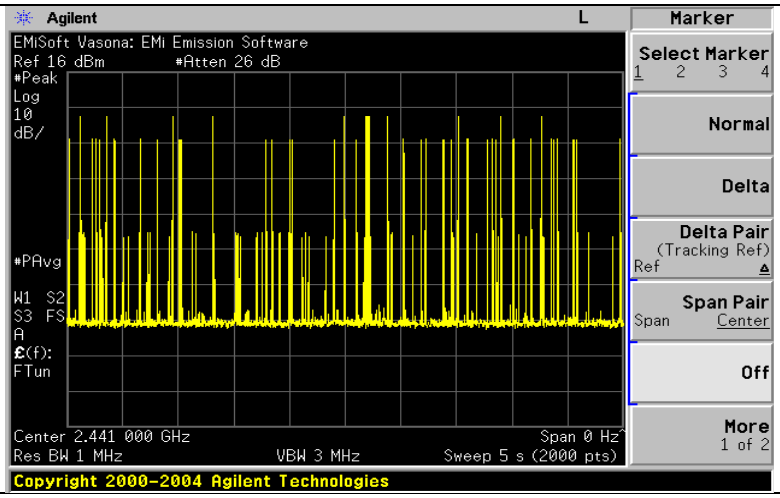


Title: **Time Occupancy in 5s with 2-DH1 packet; Total bins in 5s = 51**

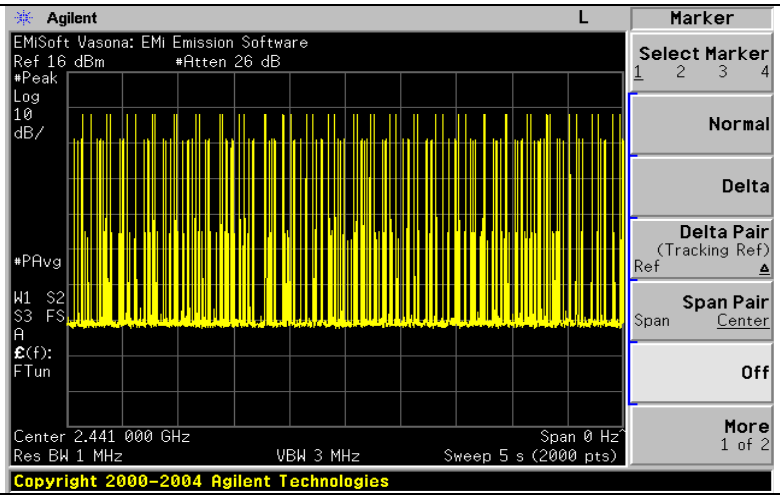


Title: **Time Occupancy in 5s with 2-DH3 packet; Total bins in 5s = 32**

Graphical Test Results

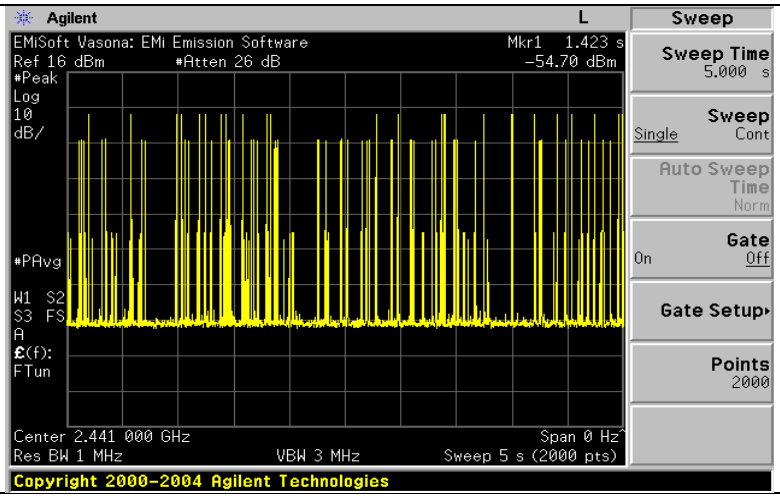


Title: **Time Occupancy in 5s with 2-DH5 packet; Total bins in 5s = 12**

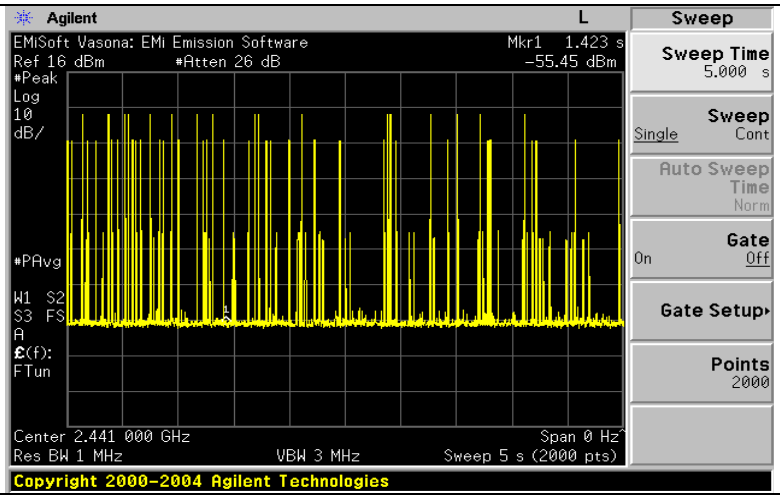


Title: **Time Occupancy in 5s with 3-DH1 packet; Total bins in 5s = 52**

Graphical Test Results



Title: **Time Occupancy in 5s with 3-DH3 packet; Total bins in 5s = 25**



Title: **Time Occupancy in 5s with 3-DH5 packet; Total bins in 5s = 19**

Conducted Band Edge Measurements

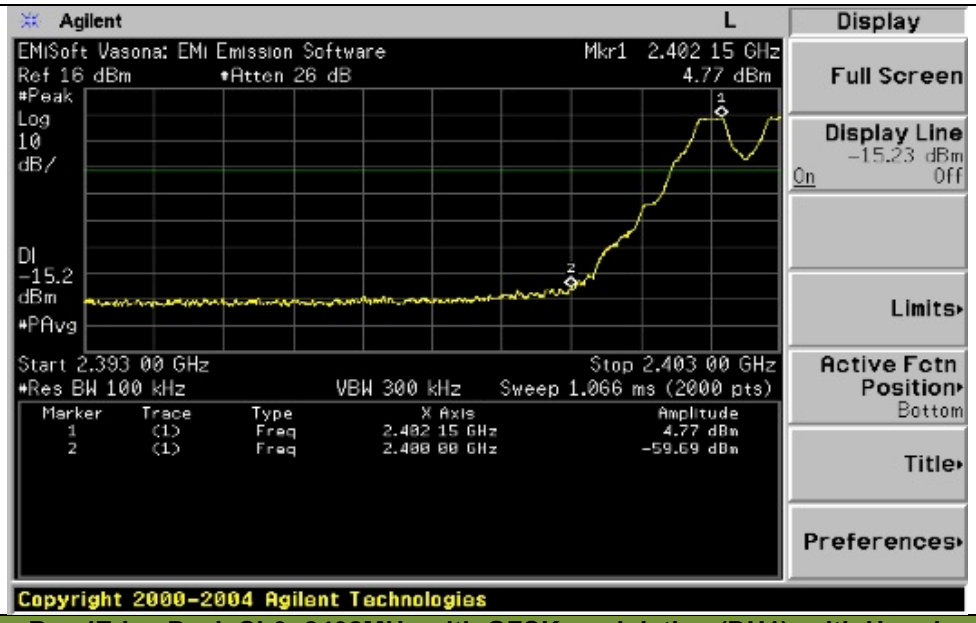
15.247 (d) & RSS-210 A8.5:

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 FCC §15.209(a) & RSS-Gen is not required.

Overall Result: PASS

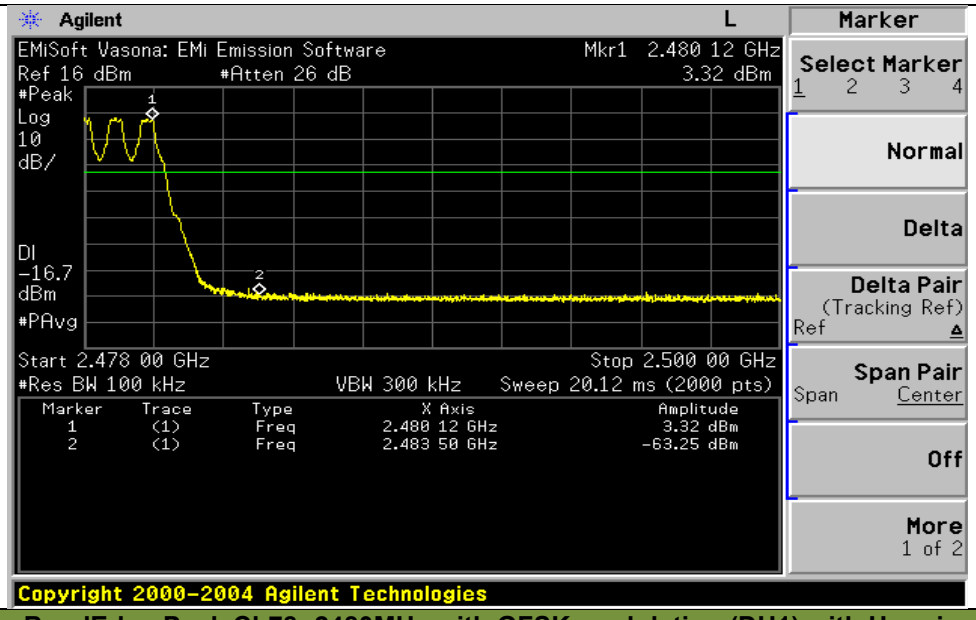
Measurement procedure as per KDB Publication DA 00-705

Graphical Test Results



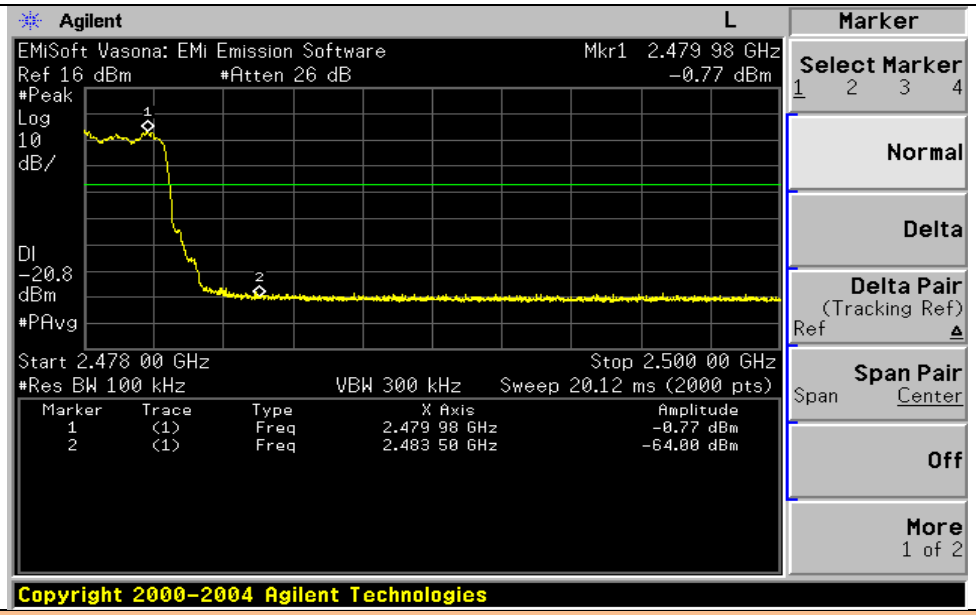
Title: **Lower BandEdge Peak Ch0: 2402MHz with GFSK modulation (DH1) with Hopping Enabled**

Graphical Test Results



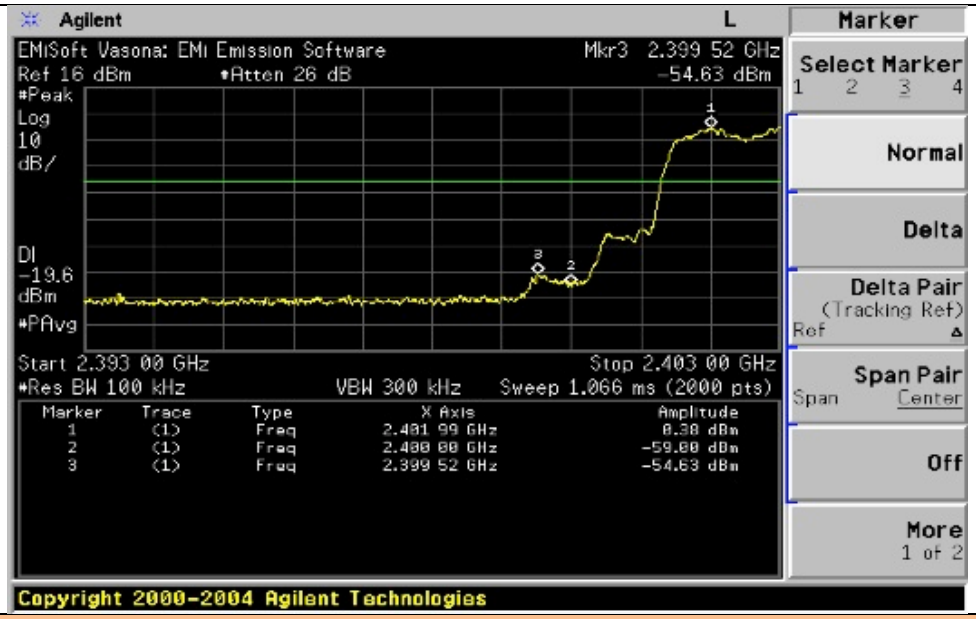
Title: **Upper BandEdge Peak Ch78: 2480MHz with GFSK modulation (DH1) with Hopping Enabled**

Graphical Test Results



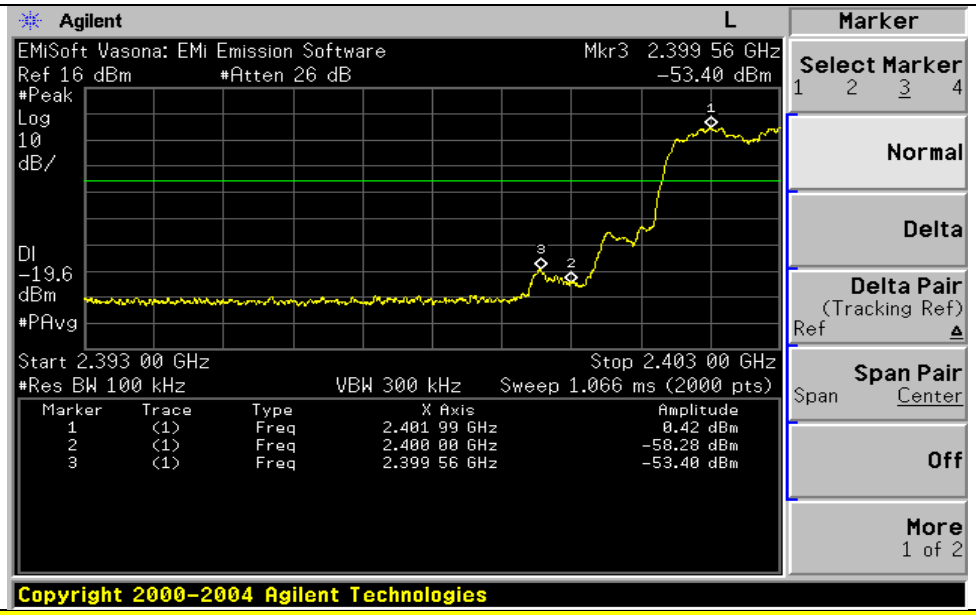
Title: **Upper Band Edge Hopping enabled with π/4DQPSK modulation (2-DH3)**

Graphical Test Results



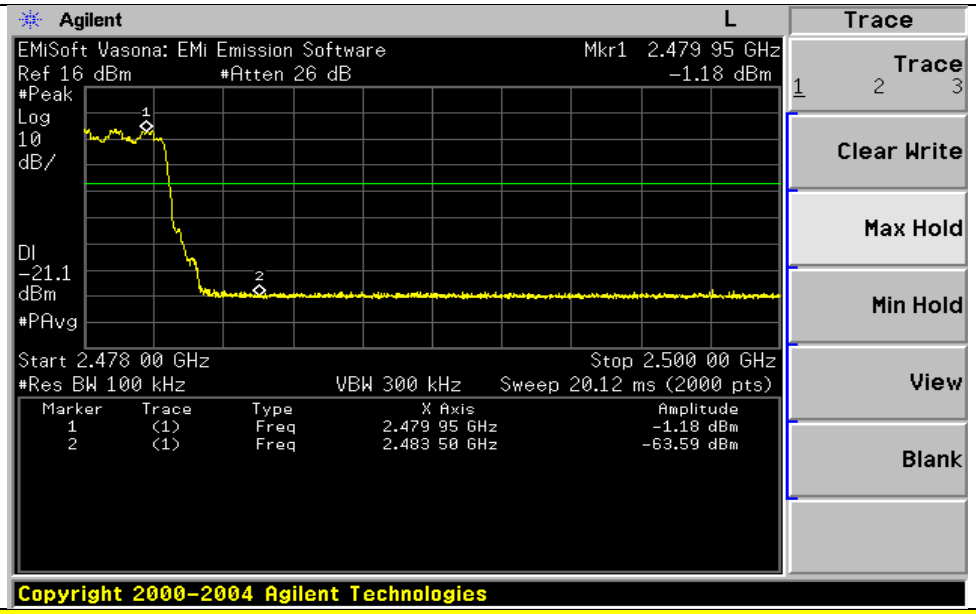
Title: **Lower Band Edge Hopping enabled with π/4DQPSK modulation (2-DH3)**

Graphical Test Results



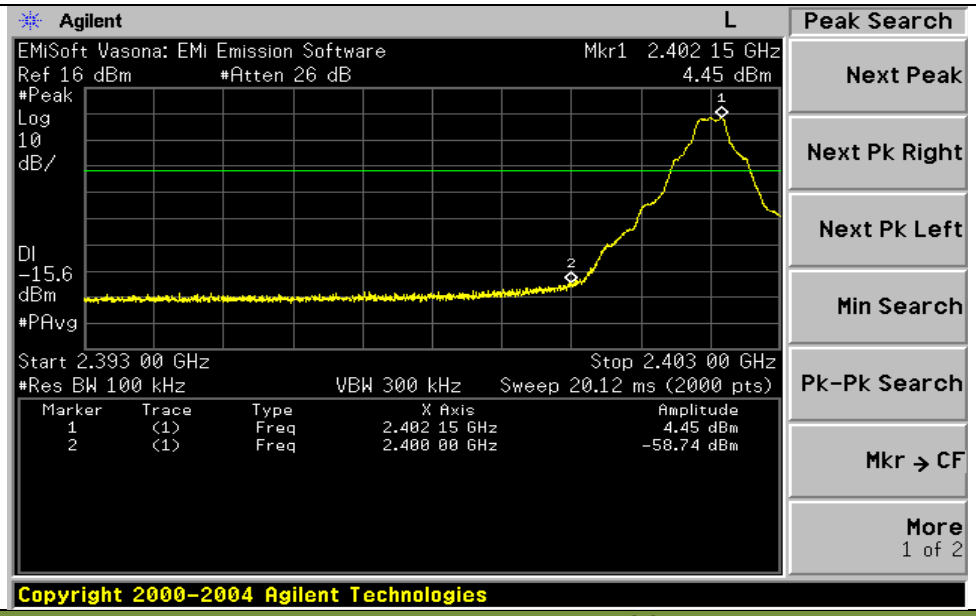
Title: **Lower Band Edge Hopping enabled with 8DPSK modulation (3-DH1)**

Graphical Test Results

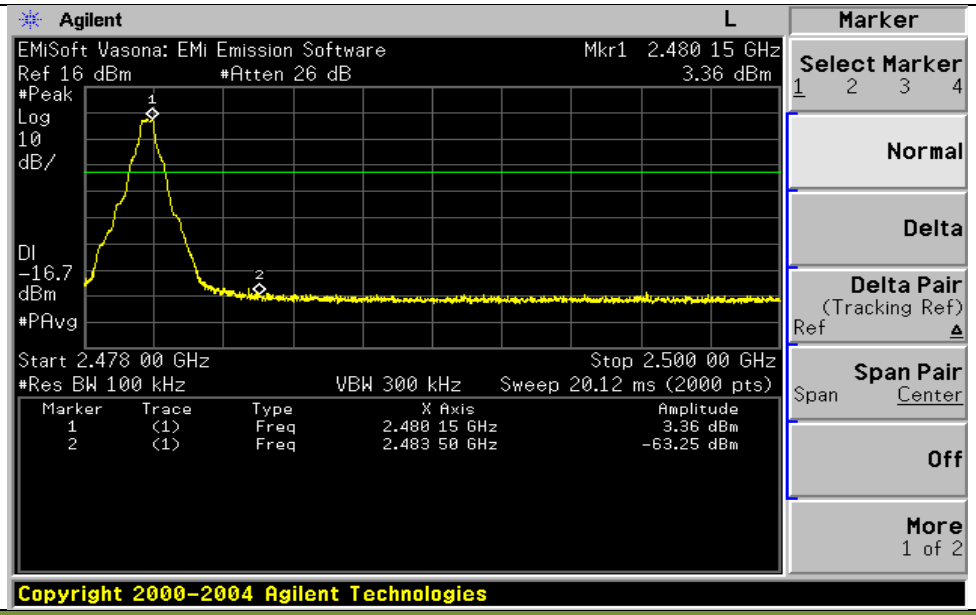


Title: **Upper Band Edge Hopping enabled with 8DPSK modulation (3-DH1)**

Graphical Test Results

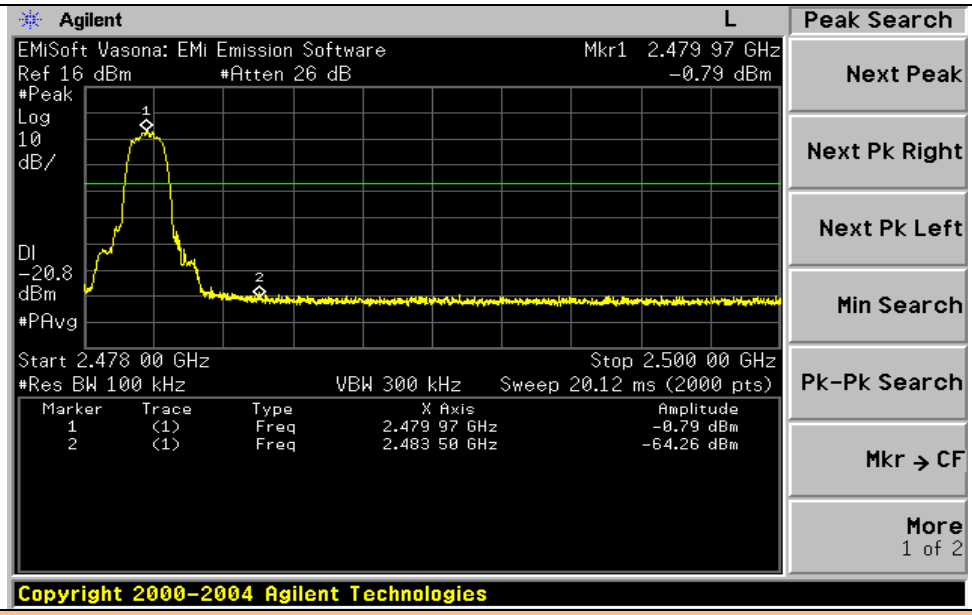


Title: **Lower Band Edge Hopping disabled with GSFK modulation (DH1)**



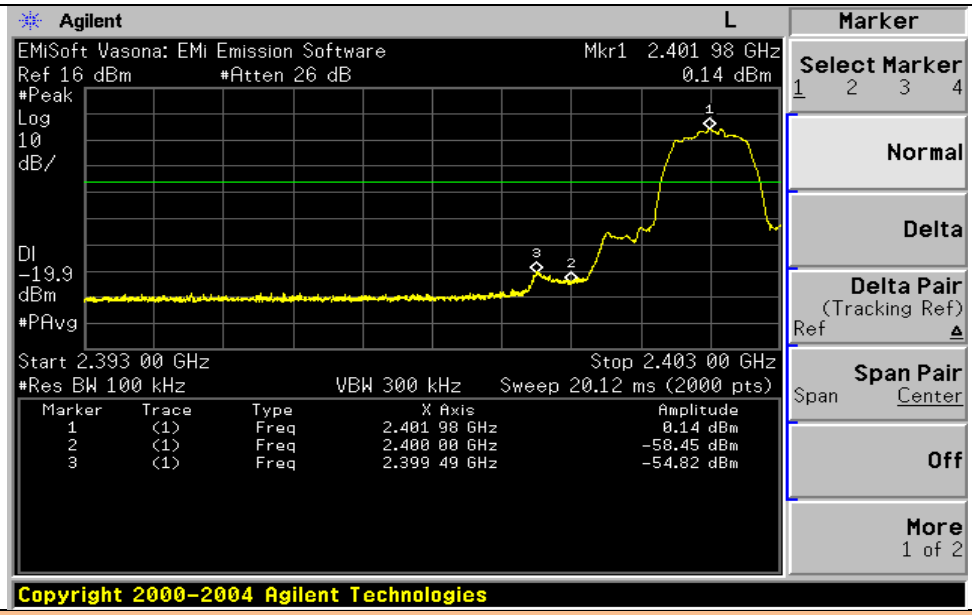
Title: **Upper Band Edge Hopping disabled with GSFK modulation (DH1)**

Graphical Test Results



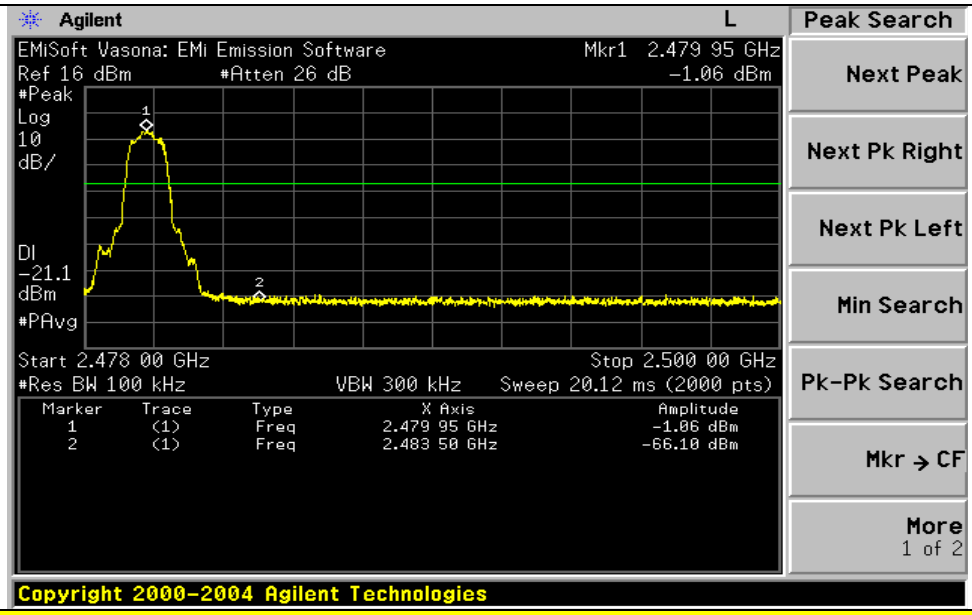
Title: **Upper Band Edge Hopping disabled with π/4DQPSK modulation (2-DH3)**

Graphical Test Results



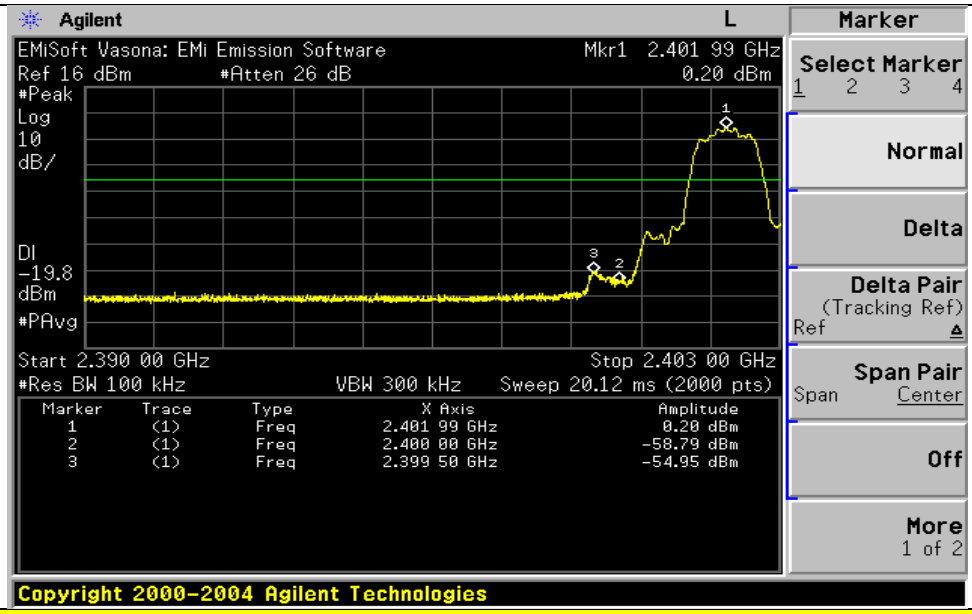
Title: **Lower Band Edge Hopping disabled with π/4DQPSK modulation (2-DH3)**

Graphical Test Results



Title: **Upper Band Edge Hopping disabled with 8-DQPSK modulation (3-DH1)**

Graphical Test Results



Title: **Lower Band Edge Hopping disabled with 8-DQPSK modulation (3-DH1)**

Conducted Spurious Emissions

15.247 (d) & RSS-210 A8.5:

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 FCC §15.209(a) & RSS-Gen is not required.

Test Results

Test Mode: A
Test Channel: 0 (2402 MHz)

Frequency (MHz)	Detector	Level (dBm)	Limit -20dBc (dBm)	Margin (dBm)	Results (Pass/Fail)
4804	PK	-67.80	-15.82	-51.98	Pass
7206	PK	-67.53	-15.82	-51.71	Pass
9608	PK	-70.89	-15.82	-55.07	Pass

Test Mode: A
Test Channel: 39 (2441 MHz)

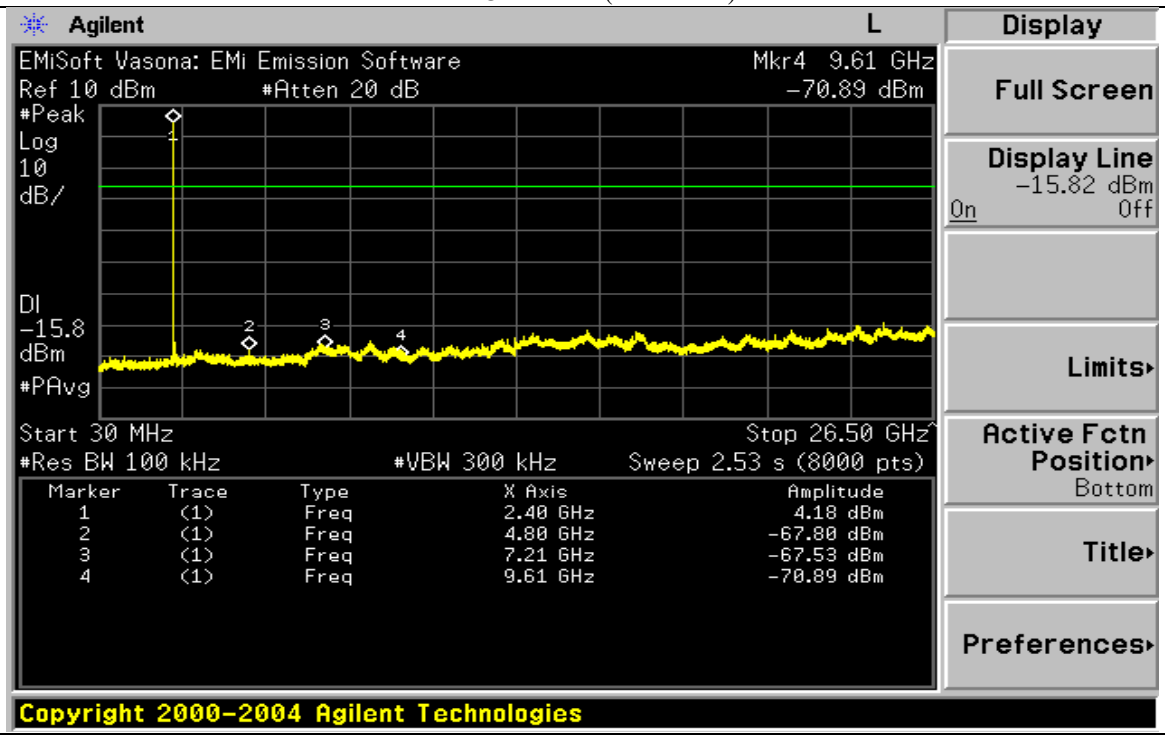
Frequency (MHz)	Detector	Level (dBm)	Limit -20dBc (dBm)	Margin (dBm)	Results (Pass/Fail)
4882	PK	-69.19	-14.89	-54.3	Pass
7323	PK	-69.01	-14.89	-54.12	Pass
9764	PK	-70.92	-14.89	-56.03	Pass

Test Mode: A
Test Channel: 78 (2480 MHz)

Frequency (MHz)	Detector	Level (dBm)	Limit -20dBc (dBm)	Margin (dBm)	Results (Pass/Fail)
4960	PK	-68.09	-17.11	-50.98	Pass
7440	PK	-67.93	-17.11	-50.82	Pass
9920	PK	-71.22	-17.11	-54.11	Pass

Graphical Test Results

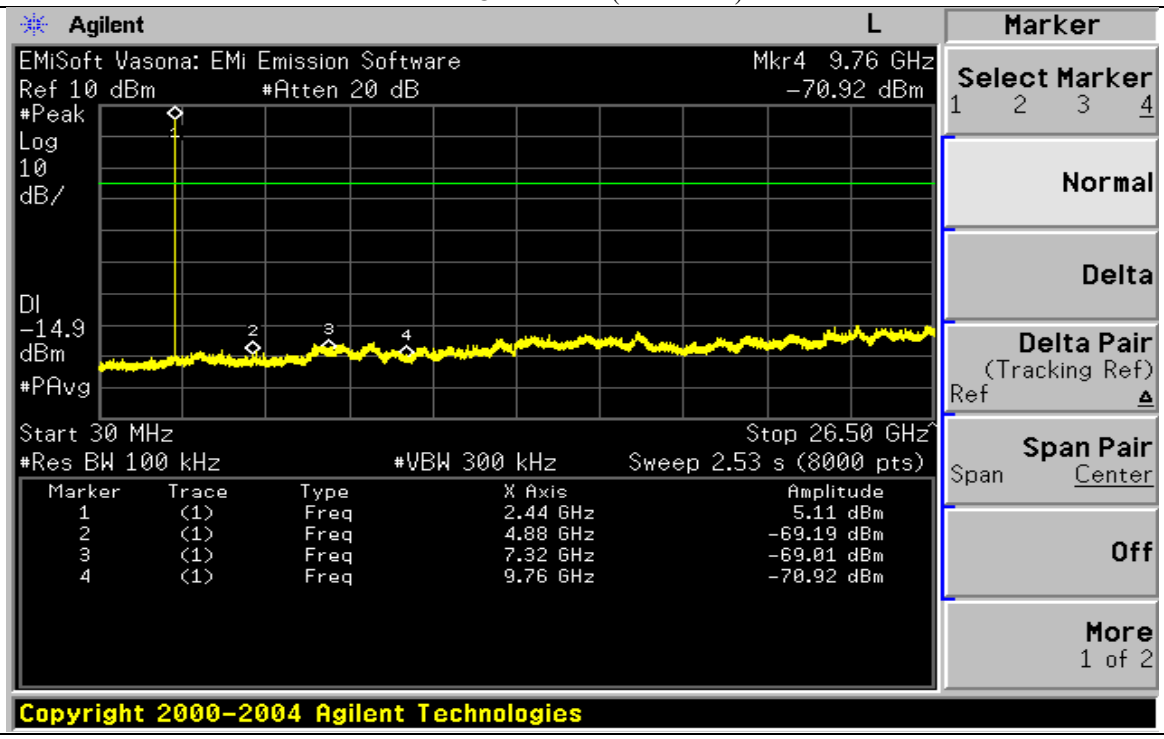
Test Mode: A
Test Channel: 0 (2402 MHz)



Title: **Ch0 = 2402 MHz Conducted EMI (30 MHz – 26 GHz) with GSFK modulation (DH1 packet)**

Graphical Test Results

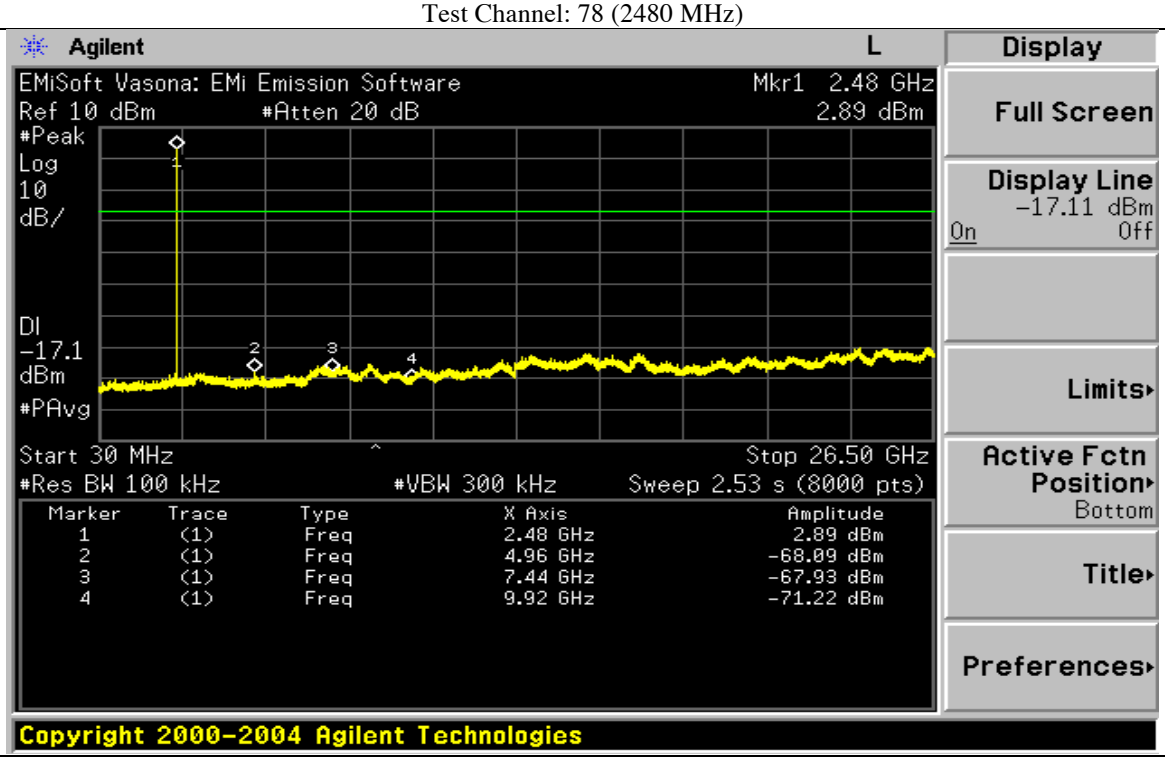
Test Mode: A
Test Channel: 39 (2441 MHz)



Title: **Ch39 = 2441 MHz Conducted EMI (30 MHz – 26 GHz) with GSFK modulation (DH1 packet)**

Graphical Test Results

Test Mode: A
Test Channel: 78 (2480 MHz)



Title: **Ch78 = 2480 MHz Conducted EMI (30 MHz – 26 GHz) with GSFK modulation (DH1 packet)**

AC Conducted Emissions for AC Power Adapter:

15.207 & RSS GEN sec 7.2.4
(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 50 µH/50 ohms 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.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	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.

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

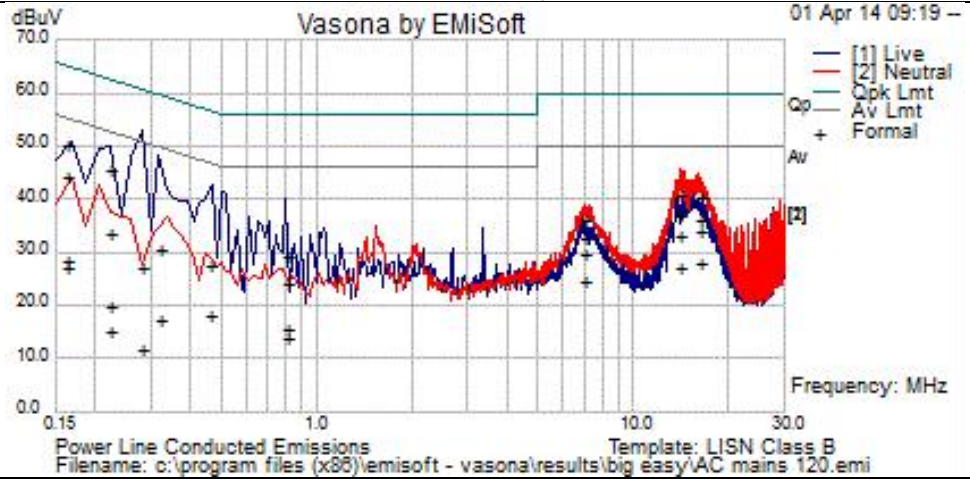
Span:	150kHz – 30Hz
Reference Level:	70 dBuV
Attenuation:	10 dB
Sweep Time:	Auto
Resolution Bandwidth:	9Hz
Video Bandwidth:	30kHz
Detector:	Quasi-Peak

This report represents the worst case data for all supported operating modes and antennas.

Subtest Number: 162052 - 1	**Subtest Date:** 12-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Line Under Test	[A] AC mains
Transducer	LISN
Subtest Result	Pass
Highest Frequency	30.0
Lowest Frequency	0.15
Comments on the above Test Results	AC Mains conducted Emissions

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Conducted Emissions on AC mains

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.164	23	21.3	0	44.4	Qp	N	65.3	-20.9	Pass	
0.164	7	21.3	0	28.3	Av	L	55.3	-26.9	Pass	
0.164	5.9	21.3	0	27.2	Av	N	55.3	-28.1	Pass	
0.164	28.8	21.3	0	50.2	Qp	L	65.3	-15.1	Pass	
0.224	-1.4	20.9	0	19.6	Av	L	52.7	-33.1	Pass	
0.224	-6	20.9	0	15	Av	N	52.7	-37.7	Pass	
0.224	24.5	20.9	0	45.5	Qp	L	62.7	-17.2	Pass	
0.224	12.4	20.9	0	33.4	Qp	N	62.7	-29.3	Pass	
0.280594	6.1	20.6	0.1	26.8	Qp	N	60.8	-34	Pass	
0.280594	-9.1	20.6	0.1	11.6	Av	N	50.8	-39.2	Pass	

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.321	-3.2	20.5	0.1	17.3	Av	N	49.7	-32.4	Pass	
0.321	9.8	20.5	0.1	30.4	Qp	N	59.7	-29.3	Pass	
0.464	-2	20.1	0.1	18.2	Av	N	46.6	-28.4	Pass	
0.464	7.1	20.1	0.1	27.3	Qp	N	56.6	-29.4	Pass	
0.801	8.9	20.1	0.1	29.1	Qp	L	56	-26.9	Pass	
0.801	-4.7	20.1	0.1	15.5	Av	N	46	-30.5	Pass	
0.801	3.8	20.1	0.1	24	Qp	N	56	-32	Pass	
0.801	-6.3	20.1	0.1	13.9	Av	L	46	-32.1	Pass	
7.027	12.6	20.1	0	32.7	Qp	L	60	-27.3	Pass	
7.027	15.9	20.1	0	36	Qp	N	60	-24	Pass	
7.027	9.6	20.1	0	29.8	Av	N	50	-20.2	Pass	
7.027	4.4	20.1	0	24.6	Av	L	50	-25.4	Pass	
14.045	12.5	20.3	0.1	32.9	Av	N	50	-17.1	Pass	
14.045	6.5	20.3	0.1	26.9	Av	L	50	-23.1	Pass	
14.045	20.3	20.3	0.1	40.6	Qp	N	60	-19.4	Pass	
14.045	16.4	20.3	0.1	36.7	Qp	L	60	-23.3	Pass	
16.138	7.4	20.4	0.2	28	Av	L	50	-22	Pass	
16.138	15.5	20.4	0.2	36.1	Qp	L	60	-23.9	Pass	
16.138	13.1	20.4	0.2	33.7	Av	N	50	-16.3	Pass	
16.138	20	20.4	0.2	40.5	Qp	N	60	-19.5	Pass	

Physical Test arrangement Photograph:

See Exhibit Setup photos

Radiated Spurious and Harmonics Emissions (TX)

15.205 / RSS-210 2.7: 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 15.205(c)).

1. Device under test is placed in a Continuous Tx Mode with Hopping Sequence Turned "OFF"
2. For Testing performed above 1GHz a Notch Filer (Micro-Tronics BRM50702) is used. Correction factors are factored into the test results. Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer).

Span:	1GHz – 15 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV/m @3m
2) Peak plot (Vertical and Horizontal), Limit = 74dBuV/m @3m

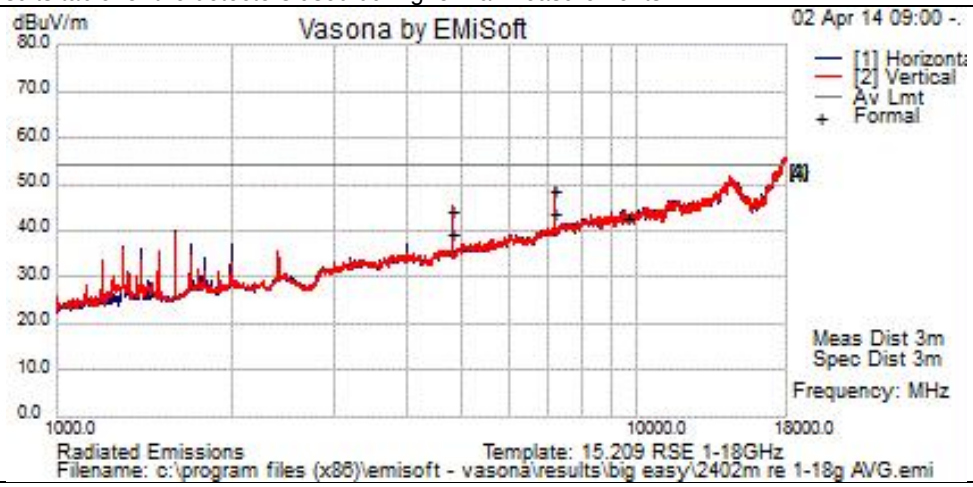
This report represents the worst case data for all supported operating modes and antennas. System was evaluated up to 26GHz but there were no measurable emissions above 15 GHz.

Note: A Notch Filter was used during formal testing from 1 – 18GHz to help prevent the front end of the analyzer from over loading. The Notch filters used are designed to suppress Tx fundamental frequency but do not effect harmonics of the fundamental frequency from being measured

Subtest Number: 164233 - 1	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	2402Mhz RE 1-18GHz Average plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**2402MHz RE 1-18GHz Average plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **2402Mhz RE 1-18GHz Average plot**

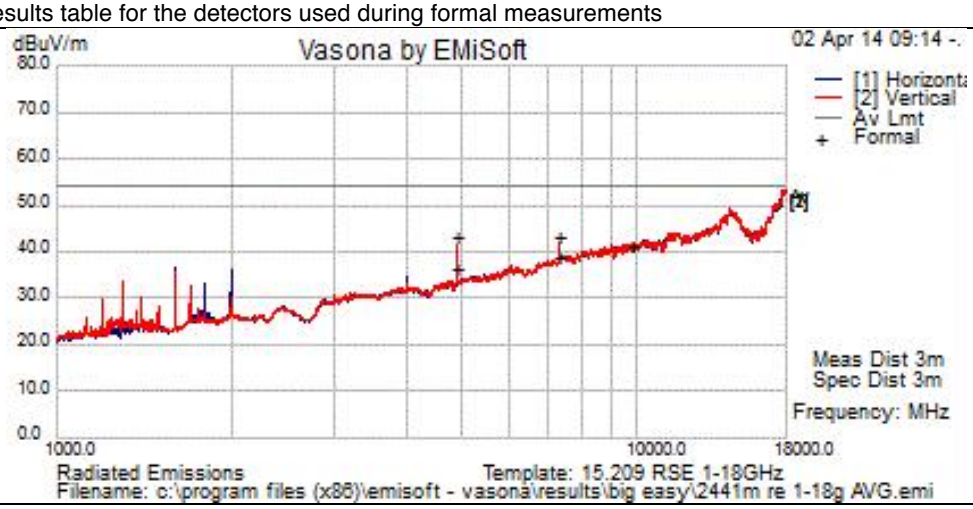
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4804	40.4	8.1	-4.3	44.3	Av	V	111	180	54	-9.7	Pass	
7206	37.8	10.2	0.7	48.7	Av	V	111	180	54	-5.3	Pass	
9608	27.3	11.7	3.5	42.5	Av	V	111	180	54	-11.5	Pass	noise floor
4804	35.3	8.1	-4.3	39.2	Av	H	118	230	54	-14.8	Pass	
7206	32.7	10.2	0.7	43.6	Av	H	118	230	54	-10.4	Pass	
9608	27.4	11.7	3.5	42.6	Av	H	118	230	54	-11.4	Pass	noise floor

Subtest Number: 164233 - 2	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	2441Mhz RE 1-18GHz Average plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**2441Mhz RE 1-18GHz Average plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **2441Mhz RE 1-18GHz Average plot**

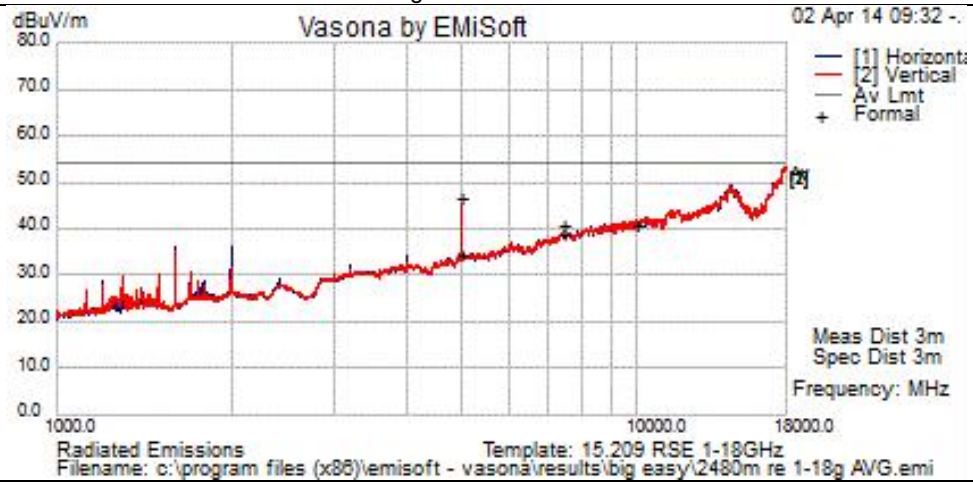
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4882.023	38.8	8.2	-4.1	43	Av	V	117	193	54	-11	Pass	
7323.211	31.4	10.3	1.4	43.1	Av	V	117	193	54	-10.9	Pass	
9764	25	11.8	4.2	41.1	Av	V	117	193	54	-12.9	Pass	
4882.033	32.2	8.2	-4.1	36.3	Av	H	119	230	54	-17.7	Pass	
7323.215	27	10.3	1.4	38.7	Av	H	119	230	54	-15.3	Pass	
9764	25.1	11.8	4.2	41.2	Av	H	119	230	54	-12.8	Pass	

Subtest Number: 164233 - 3	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	2480Mhz RE 1-18GHz Average plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**2480Mhz RE 1-18GHz Average plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **2480Mhz RE 1-18GHz Average plot**

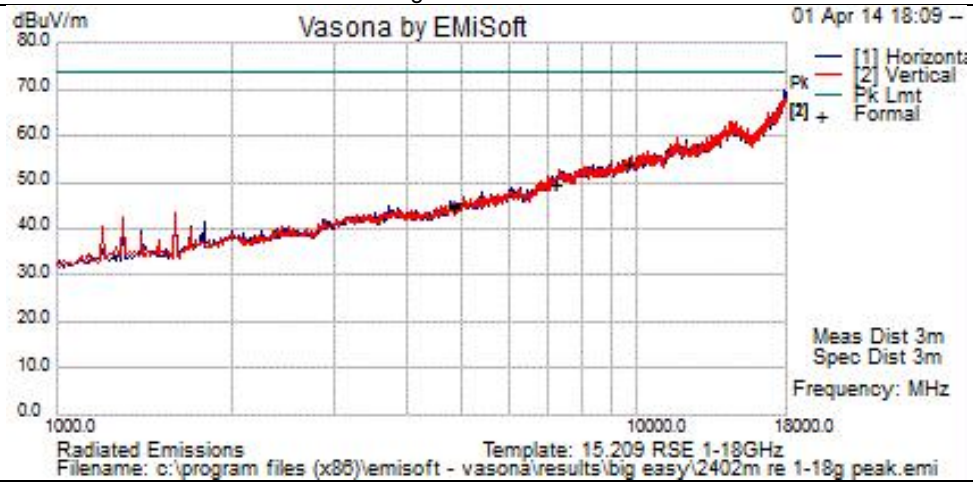
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4960	42.4	8.3	-4	46.7	Av	V	115	184	54	-7.3	Pass	
7440.156	28.5	10.3	1.8	40.6	Av	V	115	184	54	-13.4	Pass	
9920	24.4	12	4.5	40.9	Av	V	115	184	54	-13.1	Pass	
4960	29.9	8.3	-4	34.2	Av	H	100	226	54	-19.8	Pass	
7440	26.5	10.3	1.8	38.6	Av	H	100	226	54	-15.4	Pass	
9920	24.4	12	4.5	40.9	Av	H	100	226	54	-13.1	Pass	

Subtest Number: 164233 - 4	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	2402Mhz RE 1-18GHz Peak plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**2402Mhz RE 1-18GHz Peak plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **2402Mhz RE 1-18GHz Peak plot**

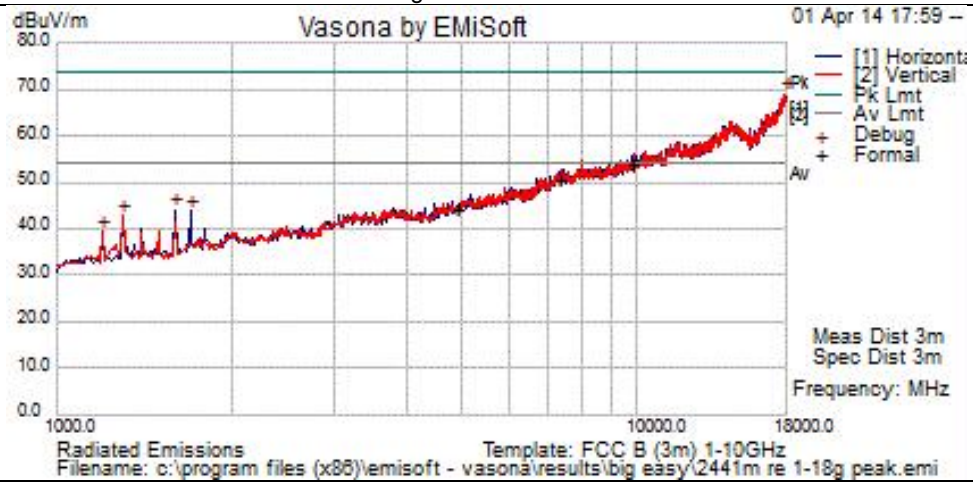
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4804	40.9	8.1	-4.3	44.8	Pk	V	111	180	74	-29.2	Pass	
7206	38.6	10.2	0.7	49.5	Pk	V	111	180	74	-24.5	Pass	
9608	38.7	11.7	3.5	53.9	Pk	V	111	180	74	-20.1	Pass	
4804	41.3	8.1	-4.3	45.2	Pk	H	118	230	74	-28.8	Pass	
7206	38.6	10.2	0.7	49.5	Pk	H	118	230	74	-24.5	Pass	
9608	38.5	11.7	3.5	53.7	Pk	H	118	230	74	-20.3	Pass	

Subtest Number: 164233 - 5	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	2441Mhz RE 1-18GHz Peak plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**2441Mhz RE 1-18GHz Peak plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **2441Mhz RE 1-18GHz Peak plot**

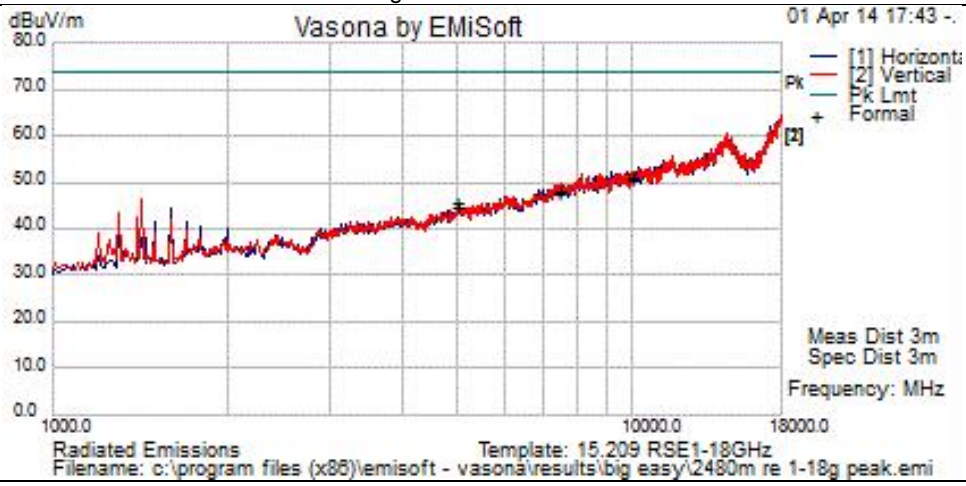
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4882	39.8	8.2	-4.1	43.9	Pk	V	110	181	74	-30.1	Pass	noise floor
7323	38.8	10.3	1.4	50.5	Pk	V	110	181	74	-23.5	Pass	noise floor
9764	37.9	11.8	4.2	54	Pk	V	110	181	74	-20	Pass	noise floor
4882	40.1	8.2	-4.1	44.2	Pk	H	115	230	74	-29.8	Pass	noise floor
7323	38.9	10.3	1.4	50.6	Pk	H	115	230	74	-23.4	Pass	noise floor
9764	38	11.8	4.2	54.1	Pk	H	115	230	74	-19.9	Pass	noise floor

Subtest Number: 164233 - 6	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 10m Anechoic
Subtest Results	
Subtest Title	2480Mhz RE 1-18GHz Peak plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**2480Mhz RE 1-18GHz Peak plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **2480Mhz RE 1-18GHz Peak plot**

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
4960	40.4	8.3	-4	44.7	Pk	V	115	185	74	-29.3	Pass	noise floor reading
7440	35.6	10.3	1.8	47.7	Pk	V	115	185	74	-26.3	Pass	noise floor reading
9920	34.2	12	4.5	50.7	Pk	V	115	185	74	-23.3	Pass	noise floor reading
4960	41.2	8.3	-4	45.5	Pk	H	119	231	74	-28.5	Pass	noise floor reading
7440	35.9	10.3	1.8	48	Pk	H	119	231	74	-26	Pass	noise floor reading
9920	34.4	12	4.5	50.9	Pk	H	119	231	74	-23.1	Pass	noise floor reading

Receiver Spurious Emissions

RSS-Gen section 4.10 & 6.1

The receiver shall be operated in the normal receive mode near the mid-point of the band in which the receiver is designed to operate.

For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator frequency, intermediate or carrier frequency), Or 30 MHz, whichever is higher, to at least 3 times the highest tuneable or local oscillator frequency whichever is higher, without exceeding 40 GHz.

For emissions below 1000 MHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector function properly adjusted for factors such as pulse desensitization as required, with an equal or greater measurement bandwidth relative to the applicable CISPR quasi-peak bandwidth.

Above 1000 MHz, measurements shall be performed using an average detector with a minimum resolution bandwidth of 1 MHz.

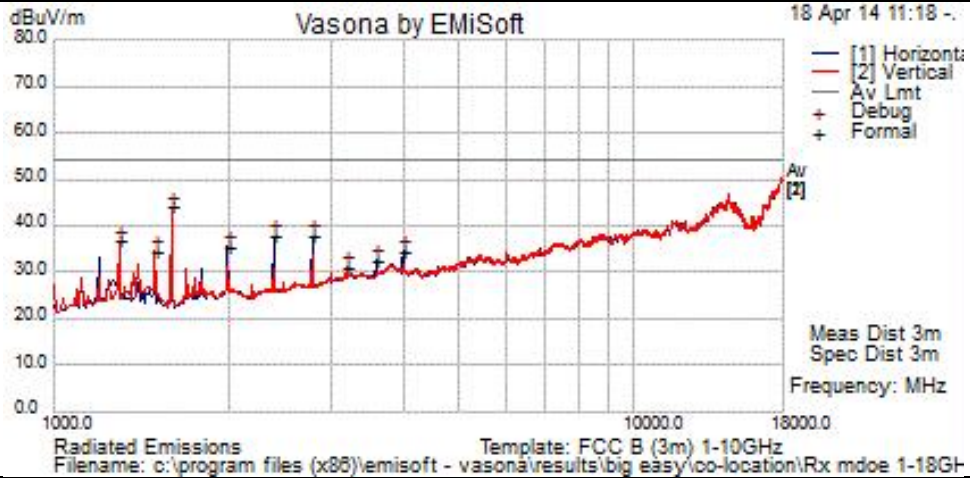
Spurious emissions from receivers shall not exceed the radiated limits shown in the table 2 in section 6.1 of RSS-Gen.

Note: No Spurious Emissions seen above 15GHz

Subtest Number: 164252 - 1	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	Bluetooth Rx mode 2441
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**Bluetooth Rx mode 2441 Average Plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **Bluetooth Rx mode 2441 Average plot**

Test Results Table

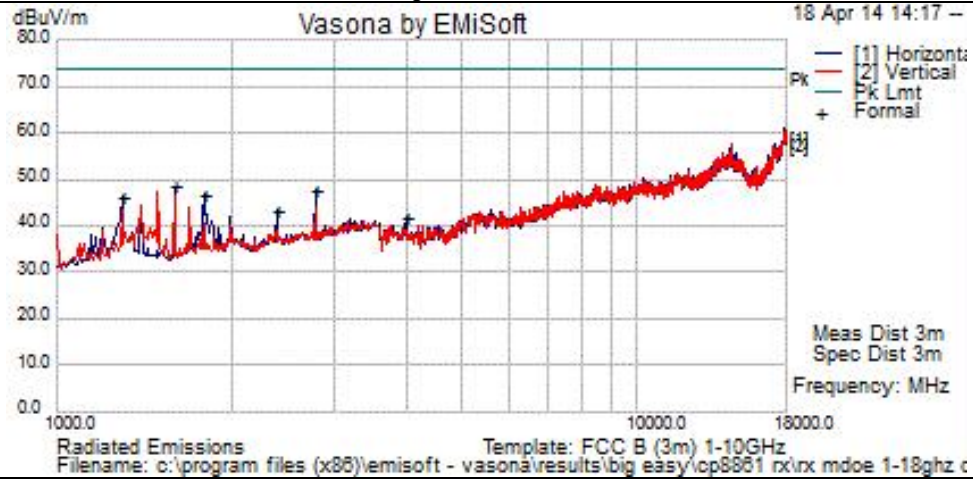
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1297.5	41.4	3.9	-8.8	36.6	Av	V	100	270	54	-17.4	Pass	
1493	38	4.2	-7.7	34.5	Av	H	100	0	54	-19.5	Pass	
1595	47.6	4.4	-8	43.9	Av	V	100	0	54	-10.1	Pass	
1994.5	35.8	4.9	-5.3	35.4	Av	H	100	270	54	-18.6	Pass	
2394	38.5	5.4	-6.1	37.7	Av	H	100	90	54	-16.3	Pass	
2793.5	37.7	5.8	-5.8	37.6	Av	H	100	360	54	-16.4	Pass	
3191.813	28.9	6.2	-4.4	30.8	Av	V	101	360	54	-23.2	Pass	
3597.281	30.7	6.7	-4.8	32.6	Av	H	101	360	54	-21.4	Pass	
3999.447	31	7.1	-3.8	34.4	Av	H	101	360	54	-19.6	Pass	

Note: No Spurious Emissions seen above 18GHz

Subtest Number: 164252 - 12	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	Bluetooth Rx mode 2441 Peak plot
Subtest Result	Pass
Highest Frequency	18000.0
Lowest Frequency	1000.0
Comments on the above Test Results	**Bluetooth Rx mode 2441 Peak plot**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **Bluetooth Rx mode 2441MHz Peak plot**

Test Results Table

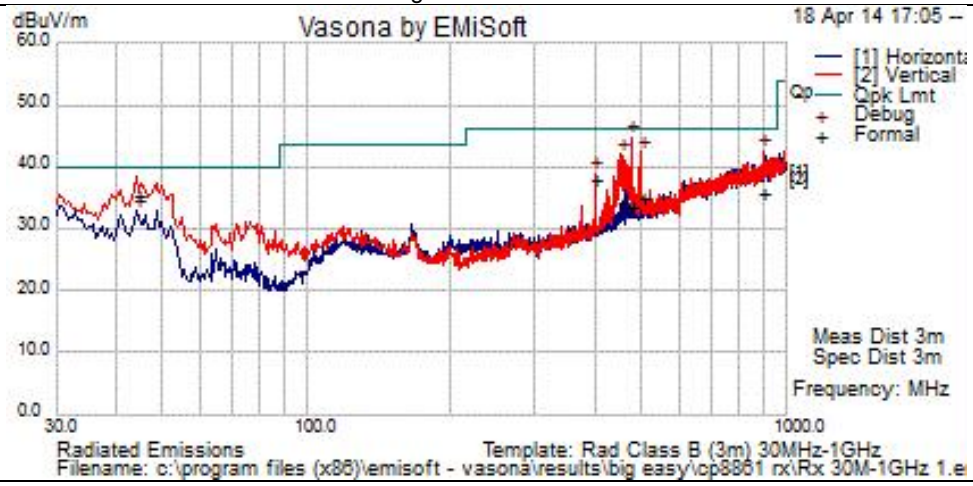
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1297.5	51.1	3.9	-8.8	46.3	Pk	V	170	250	74	-27.7	Pass	
1595	52.1	4.3	-8	48.4	Pk	V	125	50	74	-25.6	Pass	
2394	44	5.3	-6.1	43.3	Pk	H	160	20	74	-30.7	Pass	
2793.5	47.8	5.8	-5.8	47.7	Pk	H	140	95	74	-26.3	Pass	
1799.302	49.3	4.6	-7.2	46.7	Pk	H	102	360	74	-27.3	Pass	
4000.005	38.4	7.1	-3.7	41.7	Pk	H	120	222	74	-32.3	Pass	

Note: No Spurious Emissions seen above 18GHz

Subtest Number: 164252 - 13	**Subtest Date:** 18-Apr-2014
Engineer	Jose Aguirre
Lab Information	Building P, 5m Anechoic
Subtest Results	
Subtest Title	Radiated Emissions 30MHz to 1GHz
Subtest Result	Pass
Highest Frequency	1000.0
Lowest Frequency	30.0
Comments on the above Test Results	**Radiated Emissions 30MHz to 1GHz**

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: **Receiver Spurious Emissions 30MHz to 1GHz**

Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
474.99	13.3	2.3	17.7	33.3	Qp	V	108	4	46	-12.7	Pass	
894.755	10.2	3.2	22.3	35.7	Qp	V	191	99	46	-10.3	Pass	
499.983	14.9	2.4	17.8	35.1	Qp	V	120	6	46	-10.9	Pass	
452.92	15.1	2.3	16.9	34.3	Qp	V	118	70	46	-11.7	Pass	
400.033	19.9	2.2	15.7	37.8	Qp	V	116	116	46	-8.2	Pass	
44.261	23.7	0.7	10.8	35.2	Qp	V	117	337	40	-4.8	Pass	

Physical Test arrangement Photos:

See Exhibit setup photos

Appendix B: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz ($1x10^3$)
EN	European Norm	MHz	MegaHertz ($1x10^6$)
IEC	International Electro technical Commission	GHz	Gigahertz ($1x10^9$)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt ($1x10^3$)
L1	Line 1	μV	Microvolt ($1x10^{-6}$)
L2	Line2	A	Amp
L3	Line 3	μA	Micro Amp ($1x10^{-6}$)
DC	Direct Current	mS	Milli Second ($1x10^{-3}$)
RAW	Uncorrected measurement value, as indicated by the measuring device	μS	Micro Second ($1x10^{-6}$)
RF	Radio Frequency	μS	Micro Second ($1x10^{-6}$)
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current

Appendix C: Test Equipment Used to perform the test

CIS004882	EMC Test Systems	3115	Double Ridged Guide Horn Antenna	28-JUN-13	28-JUN-14
CIS005691	Miteq	NSP1800-25-S1	Broadband Preamplifier (1-18GHz)	27-JAN-14	27-JAN-15
CIS008448	Cisco	NSA 5m Chamber	NSA 5m Chamber	03-OCT-13	03-OCT-14
CIS021117	Micro-Coax	UFB311A-0-2484-520520	RF Coaxial Cable, to 18GHz, 248.4 in	23-AUG-13	23-AUG-14
CIS025658	Micro-Coax	UFB311A-1-0840-504504	RF Coaxial Cable, to 18GHz, 84 in	14-FEB-14	14-FEB-15
CIS025662	Micro-Coax	UFB311A-1-0840-504504	RF Coaxial Cable, to 18GHz, 84 in	27-FEB-14	27-FEB-15
CIS030654	Sunol Sciences	JB1	Combination Antenna, 30MHz-2GHz	31-OCT-13	31-OCT-14
CIS040641	Rohde & Schwarz	ESU26	EMI Test Receiver	24-JUN-13	24-JUN-14
CIS041935	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	01-APR-14	01-APR-15
CIS047284	Huber + Suhner	Sucoflex 102E	40GHz Cable K Connector	30-MAY-13	30-MAY-14
CIS047286	Huber + Suhner	Sucoflex 102E	40GHz Cable K Connector	30-MAY-13	30-MAY-14
CIS049443	Micro-Tronics	BRM50702-02	Notch Filter, SB:2.4-2.5GHz, to 18GHz	20-MAR-14	20-MAR-15
CIS049447	Micro-Tronics	BRC50705-02	Band Reject Filter	20-MAR-14	20-MAR-15
CIS049563	Huber + Suhner	Sucoflex 106A	N Type Cable 18GHz	23-AUG-13	23-AUG-14

Appendix D: Test Procedures

Measurements were made in accordance with

- FCC docket #:DA 00-0705,
- ET docket 96-8, measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.
- ANSI C63.10
- ANSI C63.4