

Qualnetics

WE-ADK

Report No. QUME0002

Report Prepared By



www.nwemc.com
1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Last Date of Test: September 08, 2010
Qualnetics
Model: WE-ADK

| Emissions | | | |
|----------------------------------|-----------------|------------------|-----------|
| Test Description | Specification | Test Method | Pass/Fail |
| Occupied Bandwidth | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Output Power | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Band Edge Compliance | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Spurious Conducted Emissions | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Power Spectral Density | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Spurious Radiated Emissions | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| AC Powerline Conducted Emissions | FCC 15.207:2010 | ANSI C63.10:2009 | Pass |

Modifications made to the product

See the Modifications section of this report

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400
Hillsboro, OR 97124

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-1).

Approved By:

Don Fecteau, IS Manager



NVLAP Lab Code: 200630-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

| Revision Number | Description | Date | Page Number |
|-----------------|-------------|------|-------------|
| 00 | None | | |

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.



NVLAP

Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.



NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0
NVLAP LAB CODE 200881-0

Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1*)



CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.



NEMKO

Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).



VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).



BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017). License No.SL2-IN-E-1017.



GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)



VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.



SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



Northwest EMC Locations



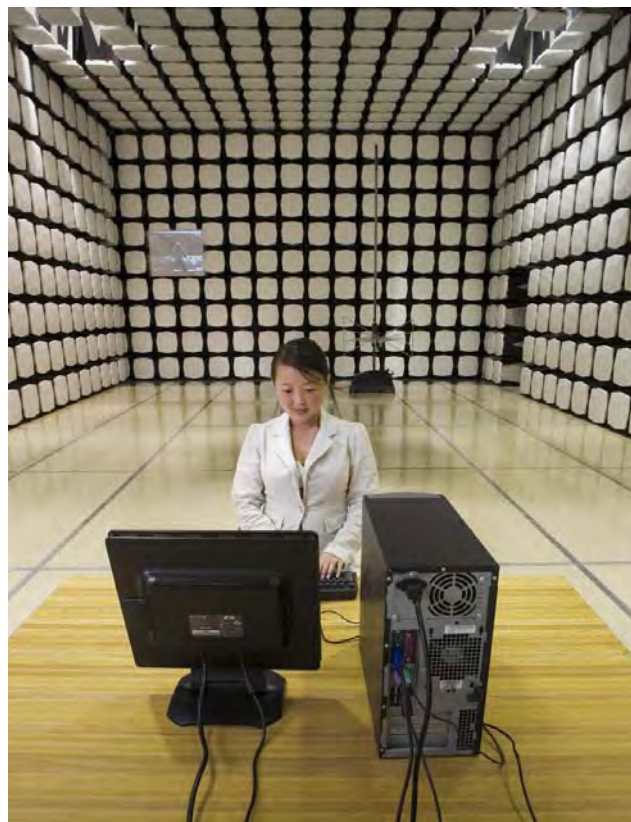
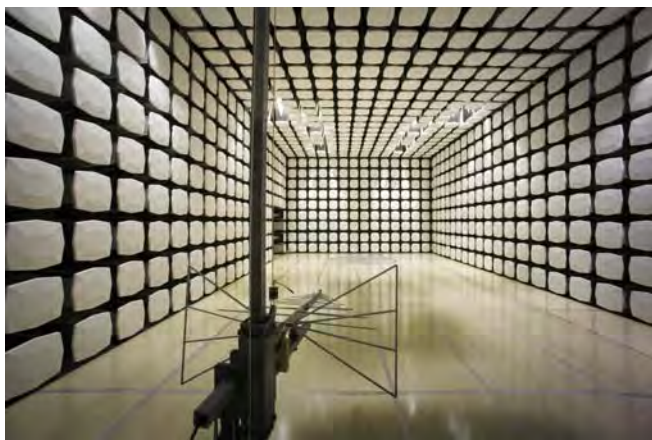
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

Minnesota
Labs MN01-MN08
9349 W Broadway Ave.
Brooklyn Park,
MN 55445
(763) 425-2281

Washington
Labs SU01-SU07
14128 339th Ave. SE
Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796



Party Requesting the Test

| | |
|---------------------------------|----------------------|
| Company Name: | Qualnetics |
| Address: | PO Box 28788 |
| City, State, Zip: | Bellingham, WA 98228 |
| Test Requested By: | Paul Grey |
| Model: | WE-ADK |
| First Date of Test: | September 2, 2010 |
| Last Date of Test: | September 8, 2010 |
| Receipt Date of Samples: | September 2, 2010 |
| Equipment Design Stage: | Preproduction |
| Equipment Condition: | No Damage |

Information Provided by the Party Requesting the Test**Functional Description of the EUT (Equipment Under Test):**

Embedded computer with Bluetooth EDR radio

Testing Objective:

To demonstrate compliance with FCC 15.247 requirements

CONFIGURATION 1 QUME0002

| EUT | | | |
|---|---------------------|--------------------------|----------------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| EUT- Embedded computer with Bluetooth EDR radio | Qualnetics | WE-ADK | 15 |

| Peripherals in test setup boundary | | | |
|---|---------------------|--------------------------|----------------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| Microphone | Unknown | PPO | AKG |
| Microphone | Unknown | PPO | None |
| Microphone | Unknown | Unknown | None |
| Microphone | Unknown | Unknown | None |
| Headset | Altec Lansing | Unknown | None |
| GPS Antenna | Unknown | Unknown | 716272 |

| Cables | | | | | |
|---|---------------|-------------------|----------------|------------------------|------------------------|
| Cable Type | Shield | Length (m) | Ferrite | Connection 1 | Connection 2 |
| Display multi-cable | Yes | 2.0m | No | Touchscreen Display | EUT- Embedded computer |
| Micro-USB | Yes | 1.8m | No | Display multi-cable | EUT- Embedded computer |
| DC Power | PA | 1.0m | PA | AC Power Adapter | EUT- Embedded computer |
| AC Power | Yes | 1.0m | No | AC Power Adapter | AC Mains |
| DC-DC Power | Yes | 1.0m | No | Touchscreen Display | EUT- Embedded computer |
| Serial | Yes | 3.0m | No | EUT- Embedded computer | Unterminated |
| Serial | Yes | 1.8m | No | EUT- Embedded computer | Unterminated |
| Serial | Yes | 0.8m | No | EUT- Embedded computer | Unterminated |
| Serial | Yes | 1.2m | No | EUT- Embedded computer | Unterminated |
| Cat 5 | No | 2.0m | No | EUT- Embedded computer | Unterminated |
| RCA | No | 0.9m | No | EUT- Embedded computer | Unterminated |
| RCA x6 | No | 2.0m | No | EUT- Embedded computer | Unterminated |
| Mic in | PA | 3.0m | PA | EUT- Embedded computer | Microphone |
| Mic in | PA | 3.0m | PA | EUT- Embedded computer | Microphone |
| Mic in | PA | 2.8m | PA | EUT- Embedded computer | Microphone |
| Mic in | PA | 2.8m | PA | EUT- Embedded computer | Microphone |
| FM Antenna | Yes | 3.2m | No | EUT- Embedded computer | Unterminated |
| FM Antenna | Yes | 3.2m | No | EUT- Embedded computer | Unterminated |
| Fiber Optic Multi-cable | No | 1.0m | No | EUT- Embedded computer | Unterminated |
| Audio | No | 0.9m | No | EUT- Embedded computer | Unterminated |
| Audio | No | 0.8m | No | EUT- Embedded computer | Unterminated |
| Audio | No | 0.5m | No | EUT- Embedded computer | Unterminated |
| Audio x2 | No | 2.5m | No | EUT- Embedded computer | Headset |
| GPS Antenna | PA | 3.0m | PA | EUT- Embedded computer | GPS Antenna |
| PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown. | | | | | |

CONFIGURATION 2 QUME0002**EUT**

| Description | Manufacturer | Model/Part Number | Serial Number |
|---|--------------|-------------------|---------------|
| EUT- Embedded computer with Bluetooth EDR radio | Qualnetics | WE-ADK | 15 |

Peripherals in test setup boundary

| Description | Manufacturer | Model/Part Number | Serial Number |
|---------------------|---------------------|-------------------|---------------|
| AC Power Adapter | Qualnetics | 65W-TS02 | unknown |
| Touchscreen Display | Xenarc Technologies | 701TSA | XE701TSA-C |

Cables

| Cable Type | Shield | Length (m) | Ferrite | Connection 1 | Connection 2 |
|---------------------|--------|------------|---------|---------------------|------------------------|
| Display multi-cable | Yes | 2.0m | No | Touchscreen Display | EUT- Embedded computer |
| Micro-USB | Yes | 1.8m | No | Display multi-cable | EUT- Embedded computer |
| DC Power | PA | 1.0m | PA | AC Power Adapter | EUT- Embedded computer |
| AC Power | Yes | 1.0m | No | AC Power Adapter | AC Mains |
| DC-DC Power | Yes | 1.0m | No | Touchscreen Display | EUT- Embedded computer |

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

| Equipment modifications | | | | | |
|-------------------------|----------|----------------------------------|--------------------------------------|---|---|
| Item | Date | Test | Modification | Note | Disposition of EUT |
| 1 | 9/2/2010 | Output Power | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 2 | 9/2/2010 | Band Edge Compliance | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 3 | 9/2/2010 | Occupied Bandwidth | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 4 | 9/2/2010 | Power Spectral Density | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 5 | 9/2/2010 | Spurious Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 6 | 9/7/2010 | Spurious Radiated Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 7 | 9/8/2010 | AC Powerline Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

BLUETOOTH APPROVALS
FCC Procedure Received from Joe Dichoso on 2-15-02

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247 for devices meeting the Bluetooth Specifications in the 2.4 GHz band as of February 2001 operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This exhibit only specifies requirements in Section 15.247, requirements in other rule Sections for intentional radiators such as in Section 15.203 or 15.207 must be also be addressed. A Bluetooth device is a FHSS transmitter in the data mode and applies as a Hybrid spread spectrum device in the acquisition mode.

For each individual device, the following items, 1-7 will vary from one device to another and must be submitted.

- 1) The occupied bandwidth in Section 15.247(a)(1)(ii).
- 2) Conducted output power specified in Section 15.247(b)(1).
- 3) EIRP limit in Section 15.247(b)(3).
- 4) RF safety requirement in Section 15.247(b)(4)
- 5) Spurious emission limits in Section 15.247(c).
- 6) Processing gain and requirements for Hybrids in Section 15.247(f) in the acquisition mode.
- 7) Power spectral density requirement in Section 15.247(f) in the acquisition mode.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. This list can be copied into the filing.

1 Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.

Only a different hopping sequence will be used. For this reason, the RF parameters in one op-mode is sufficient.

2 Frequency range of a Bluetooth device:

The maximum frequency of the device is: **2402 – 2480 MHz**.

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification must **not be** supported by the device.

3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67,
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59,
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75,
09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06,
01, 51, 03, 55, 05, 04

5 Equally average use of frequencies in data mode and short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units, only the offsets are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 μ s. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions, the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence is generated. For transmitting the wanted data, the complete hopping sequence is not used and the connection ends. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 μ s). The hopping sequence will always differ from the first one.

6 Receiver input bandwidth, synchronization and repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz.

In every connection, one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing is according to the packet type of the connection. Also, the slave of the connection uses these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

7 Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is as follows:

Dwell time = time slot length * hop rate / number of hopping channels * 30s

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

Dwell time = 625 μ s * 1600 1/s / 79 * 30s = 0.3797s (in a 30s 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 = $5 * 625 \mu s * 1600 * 1/5 * 1/s / 79 * 30s = 0.3797s$ (in a 30s period)

This is according the Bluetooth Core Specification V 1.0B (+ 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)

8 Channel Separation in hybrid mode

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

The maximum "initial carrier frequency tolerance" which is allowed for Bluetooth is $f_{center} = 75 \text{ kHz}$.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

9 Derivation and examples for a hopping sequence in hybrid mode

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:

****For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.**

****For the page hop sequence, the device address of the paged unit is used as the input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.**

So it is ensured that also in hybrid mode, the frequency is used equally on average.

Example of a hopping sequence in inquiry mode:

48, 50, 09, 13, 52, 54, 41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23

Example of a hopping sequence in paging mode:

08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

10 Receiver input bandwidth and synchronization in hybrid mode:

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code and the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced.

11 Spread rate / data rate of the direct sequence signal

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

12 Spurious emission in hybrid mode

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---------------------------------|------------------|----------|-----|------------|----------|
| Spectrum Analyzer | Agilent | E4440A | AFD | 6/1/2009 | 24 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/6/2010 | 13 |
| 26 GHz DC Block, SMA | Pasternack | PE8210 | AME | 10/19/2009 | 13 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The 20 dB occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting in a no hop mode at its maximum data rate for each of the three different modulations available.

EMC

OCCUPIED BANDWIDTH

| | | | |
|----------------|-----------------|-------------------|-------------|
| EUT: | WE-ADK | Work Order: | QUME0002 |
| Serial Number: | 15 | Date: | 09/02/10 |
| Customer: | Qualnetics | Temperature: | 24°C |
| Attendees: | Collin Topolski | Humidity: | 42% |
| Project: | None | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: | 120VAC/60Hz |
| | | Job Site: | EV06 |

| | |
|---------------------|------------------|
| TEST SPECIFICATIONS | Test Method |
| FCC 15.247:2010 | ANSI C63.10:2009 |

| |
|----------|
| COMMENTS |
| None |

| |
|-------------------------------|
| DEVIATIONS FROM TEST STANDARD |
| None |

| | | |
|-----------------|---|---|
| Configuration # | 2 | Signature  |
|-----------------|---|---|

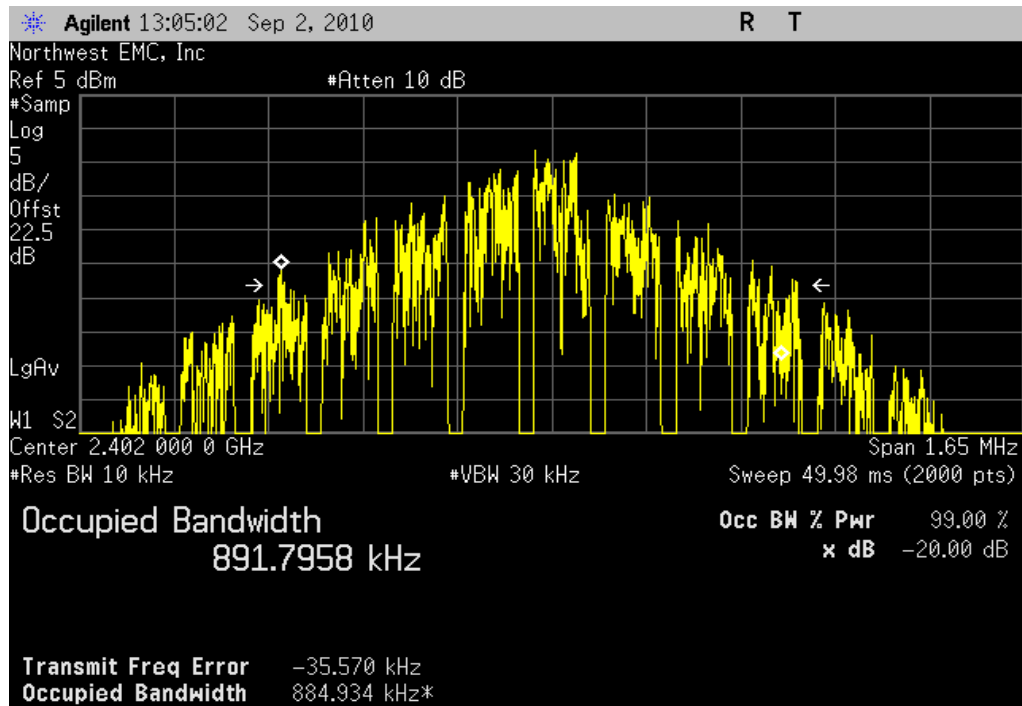
| | | Value | Limit | Results |
|------------------|------------------------|----------|---------|---------|
| GFSK, DH5 | | | | |
| | Low Channel, 2402 MHz | 0.88 MHz | 1.5 MHz | Pass |
| | Mid Channel, 2440 MHz | 0.87 MHz | 1.5 MHz | Pass |
| | High Channel, 2480 MHz | 0.87 MHz | 1.5 MHz | Pass |
| pi/4-DQPSK, 2DH5 | | | | |
| | Low Channel, 2402 MHz | 1.30 MHz | 1.5 MHz | Pass |
| | Mid Channel, 2440 MHz | 1.30 MHz | 1.5 MHz | Pass |
| | High Channel, 2480 MHz | 1.29 MHz | 1.5 MHz | Pass |
| 8-DPSK, 3DH5 | | | | |
| | Low Channel, 2402 MHz | 1.30 MHz | 1.5 MHz | Pass |
| | Mid Channel, 2440 MHz | 1.29 MHz | 1.5 MHz | Pass |
| | High Channel, 2480 MHz | 1.28 MHz | 1.5 MHz | Pass |

GFSK, DH5, Low Channel, 2402 MHz

Result: Pass

Value: 0.88 MHz

Limit: 1.5 MHz

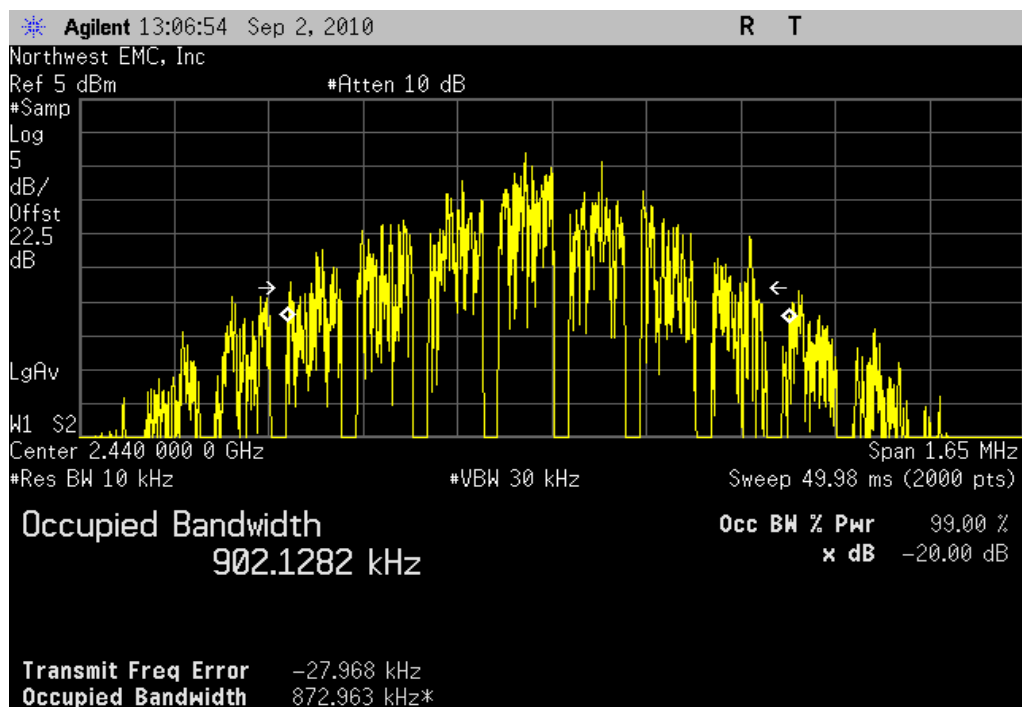


GFSK, DH5, Mid Channel, 2440 MHz

Result: Pass

Value: 0.87 MHz

Limit: 1.5 MHz

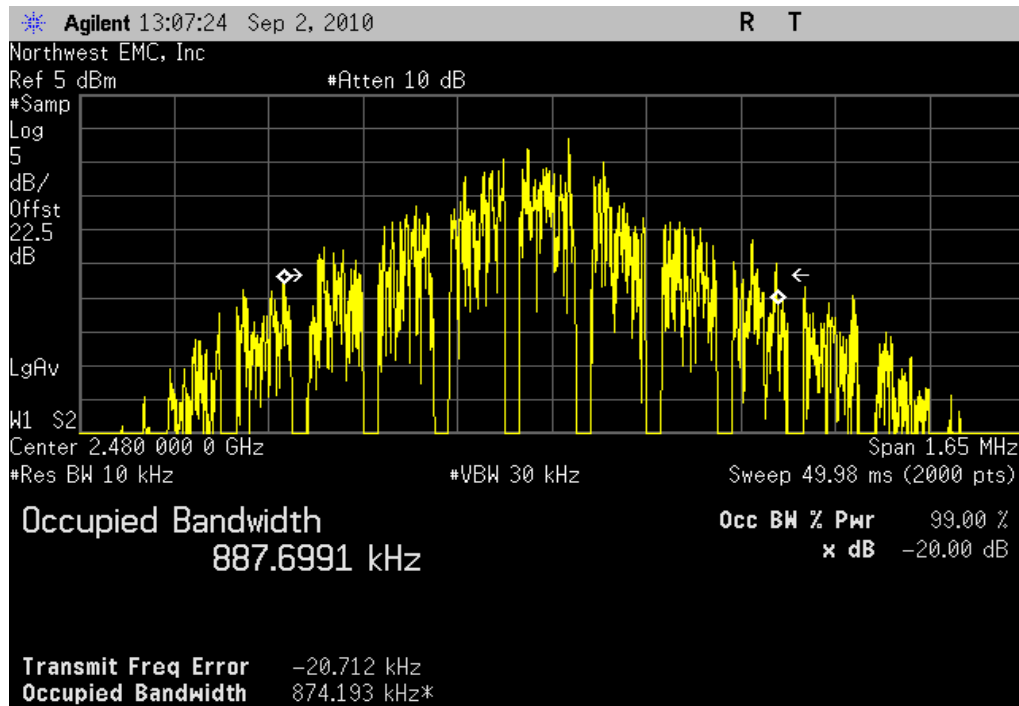


GFSK, DH5, High Channel, 2480 MHz

Result: Pass

Value: 0.87 MHz

Limit: 1.5 MHz

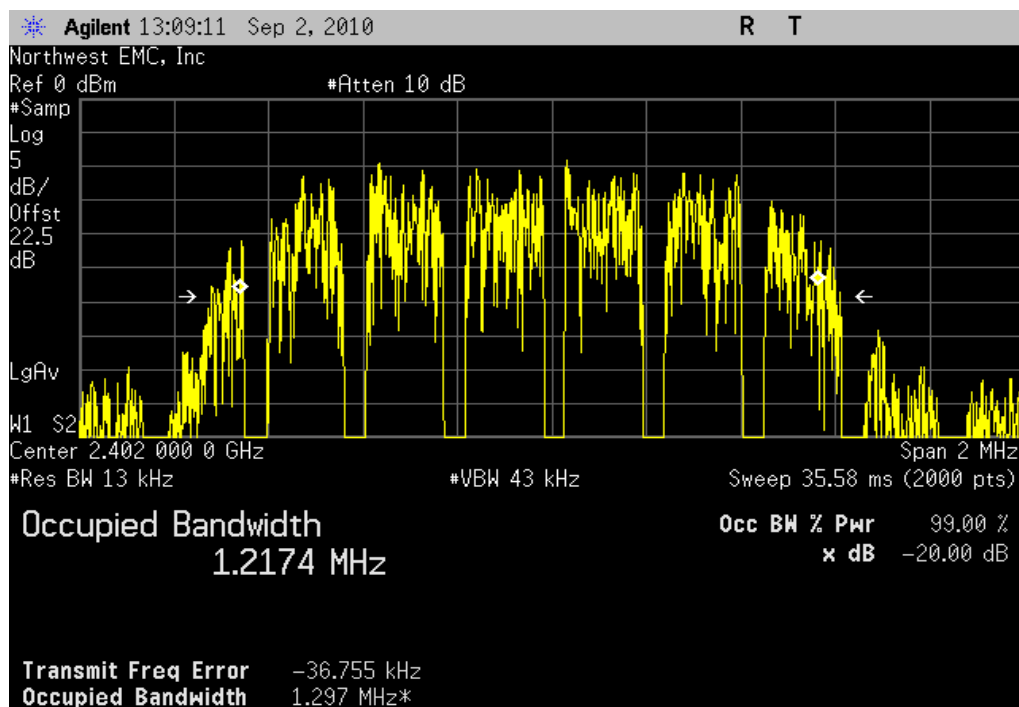


pi/4-DQPSK, 2DH5, Low Channel, 2402 MHz

Result: Pass

Value: 1.30 MHz

Limit: 1.5 MHz

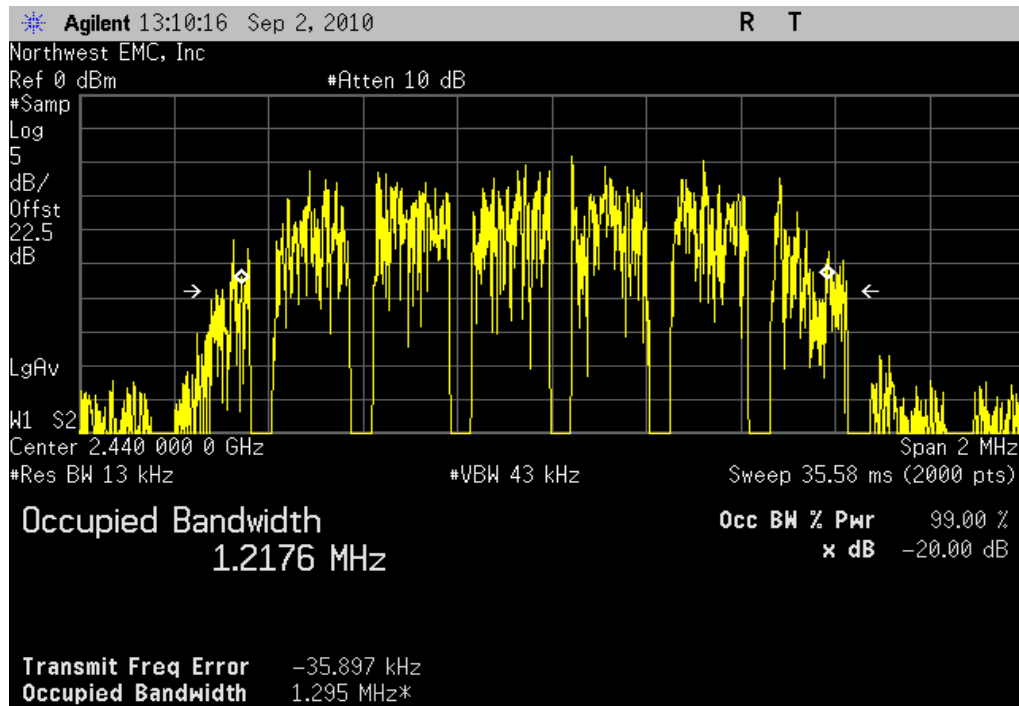


pi/4-DQPSK, 2DH5, Mid Channel, 2440 MHz

Result: Pass

Value: 1.30 MHz

Limit: 1.5 MHz

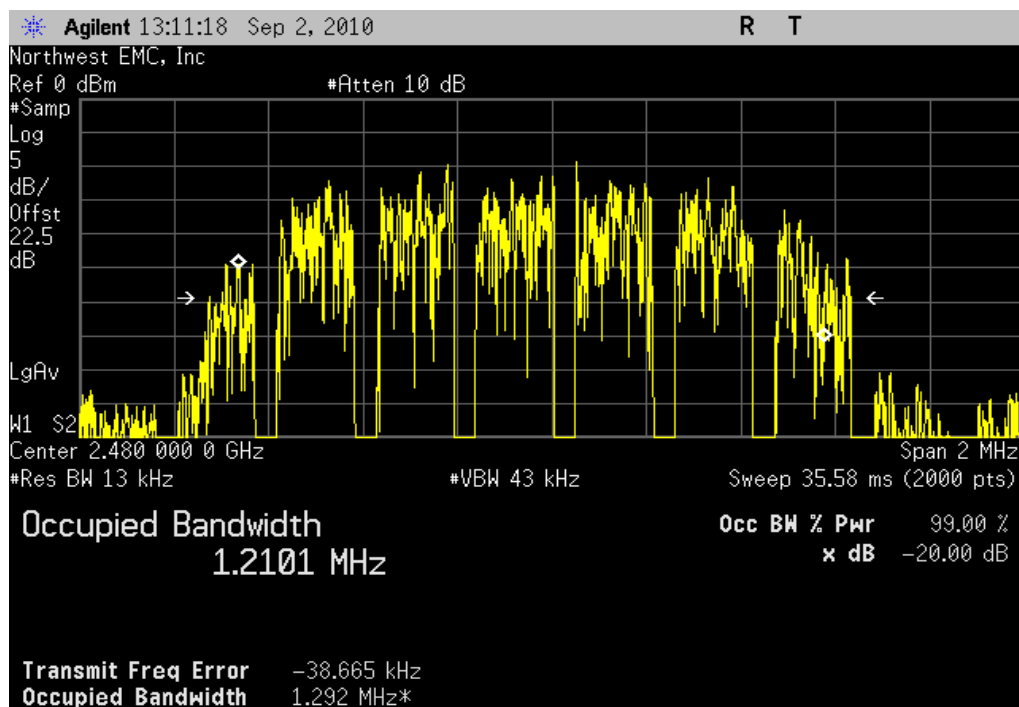


pi/4-DQPSK, 2DH5, High Channel, 2480 MHz

Result: Pass

Value: 1.29 MHz

Limit: 1.5 MHz

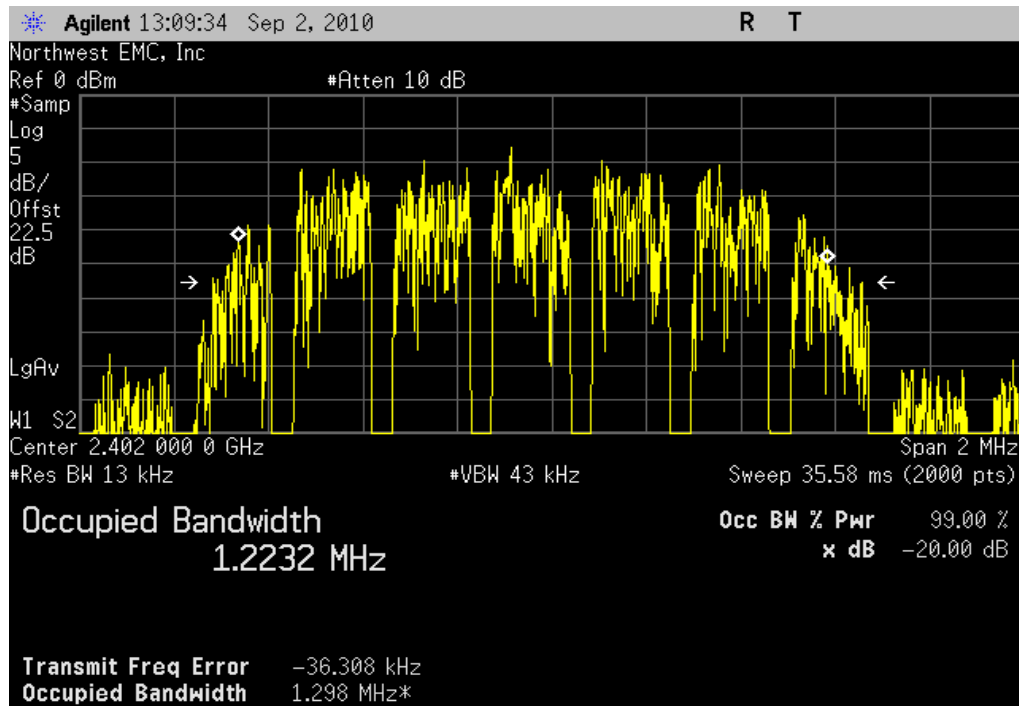


8-DPSK, 3DH5, Low Channel, 2402 MHz

Result: Pass

Value: 1.30 MHz

Limit: 1.5 MHz

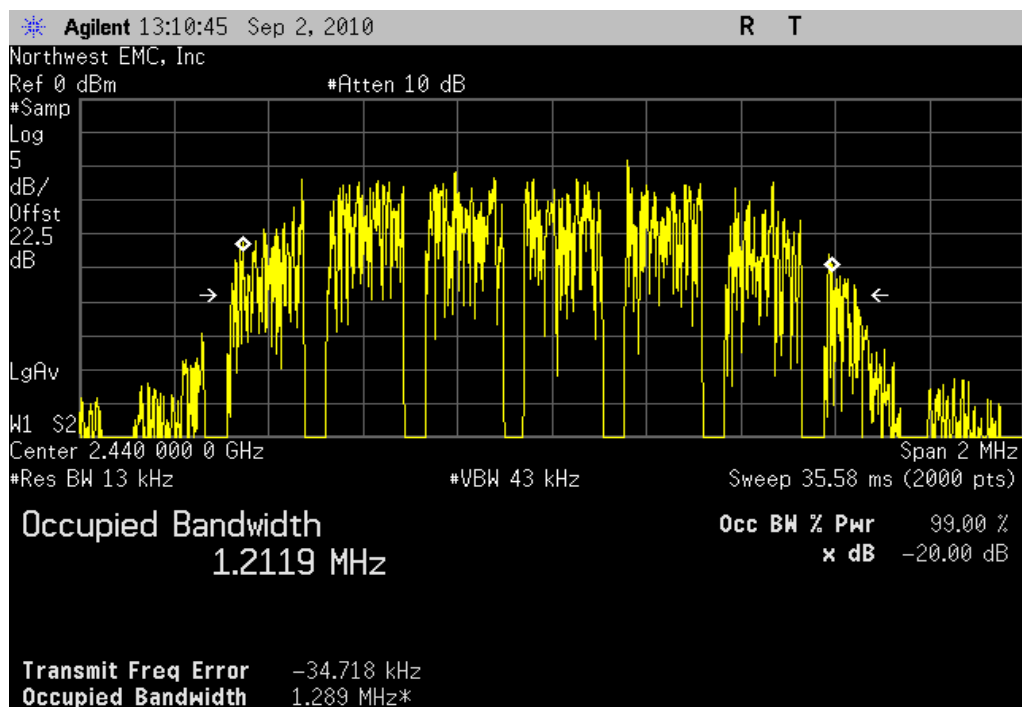


8-DPSK, 3DH5, Mid Channel, 2440 MHz

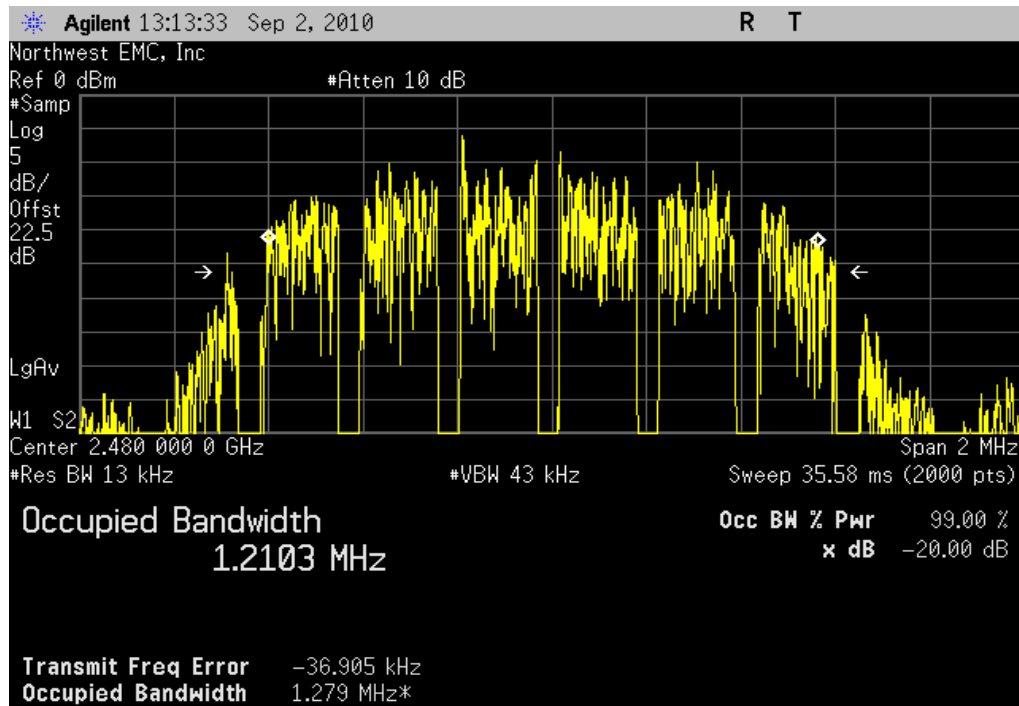
Result: Pass

Value: 1.29 MHz

Limit: 1.5 MHz



8-DPSK, 3DH5, High Channel, 2480 MHz

Result: Pass**Value:** 1.28 MHz**Limit:** 1.5 MHz

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

| TEST EQUIPMENT | | | | | |
|---------------------------------|------------------|-----------|-----|------------|----------|
| Description | Manufacturer | Model | ID | Last Cal. | Interval |
| Spectrum Analyzer | Agilent | E4440A | AFD | 6/1/2009 | 24 |
| 26 GHz DC Block, SMA | Pasternack | PE8210 | AME | 10/19/2009 | 13 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/6/2010 | 13 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |
| Attenuator | Pasternack | PE7005-10 | RBP | 4/1/2010 | 13 |
| Power Meter | Gigatronics | 8651A | SPM | 1/7/2010 | 13 |
| Power Sensor | Gigatronics | 80701A | SPL | 1/7/2010 | 13 |
| Signal Generator | Agilent | E8257D | TGX | 12/10/2008 | 24 |

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.

EMC

OUTPUT POWER

| | | | |
|----------------|-----------------|-------------------|-------------|
| EUT: | WE-ADK | Work Order: | QUME0002 |
| Serial Number: | 15 | Date: | 09/02/10 |
| Customer: | Qualnetics | Temperature: | 24°C |
| Attendees: | Collin Topolski | Humidity: | 42% |
| Project: | None | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: | 120VAC/60Hz |
| | | Job Site: | EV06 |

| | |
|---------------------|------------------|
| TEST SPECIFICATIONS | Test Method |
| FCC 15.247:2010 | ANSI C63.10:2009 |

COMMENTS

0.75 dB added to reference level offset of analyzer to compensate for antenna adapter cable loss.

DEVIATIONS FROM TEST STANDARD

No Deviations

| | | |
|-----------------|---|-----------|
| Configuration # | 2 | Signature |
|-----------------|---|-----------|

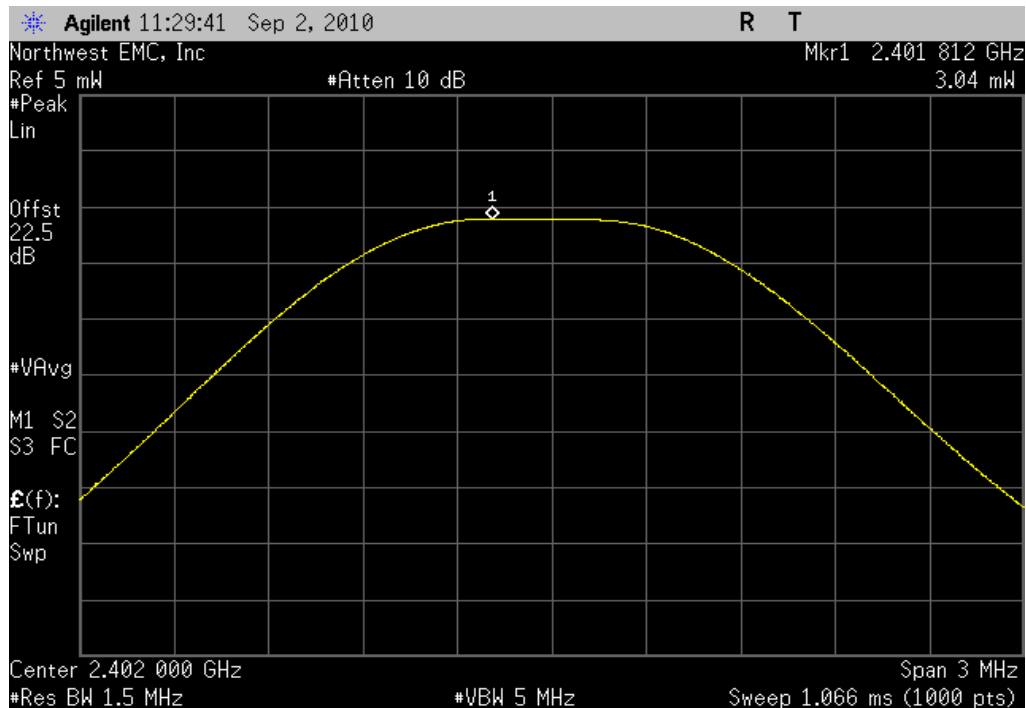
| | | Value | Limit | Results |
|---------------|--------------|--------|--------|---------|
| DH5, GFSK | | | | |
| | Low Channel | 3.0 mW | 125 mW | Pass |
| | Mid Channel | 2.8 mW | 125 mW | Pass |
| | High Channel | 2.8 mW | 125 mW | Pass |
| 2DH5, 4-DQPSK | | | | |
| | Low Channel | 2.4 mW | 125 mW | Pass |
| | Mid Channel | 2.1 mW | 125 mW | Pass |
| | High Channel | 2.0 mW | 125 mW | Pass |
| 3DH5, 8-DPSK | | | | |
| | Low Channel | 2.5 mW | 125 mW | Pass |
| | Mid Channel | 2.2 mW | 125 mW | Pass |
| | High Channel | 2.1 mW | 125 mW | Pass |

DH5, GFSK, Low Channel

Result: Pass

Value: 3.0 mW

Limit: 125 mW

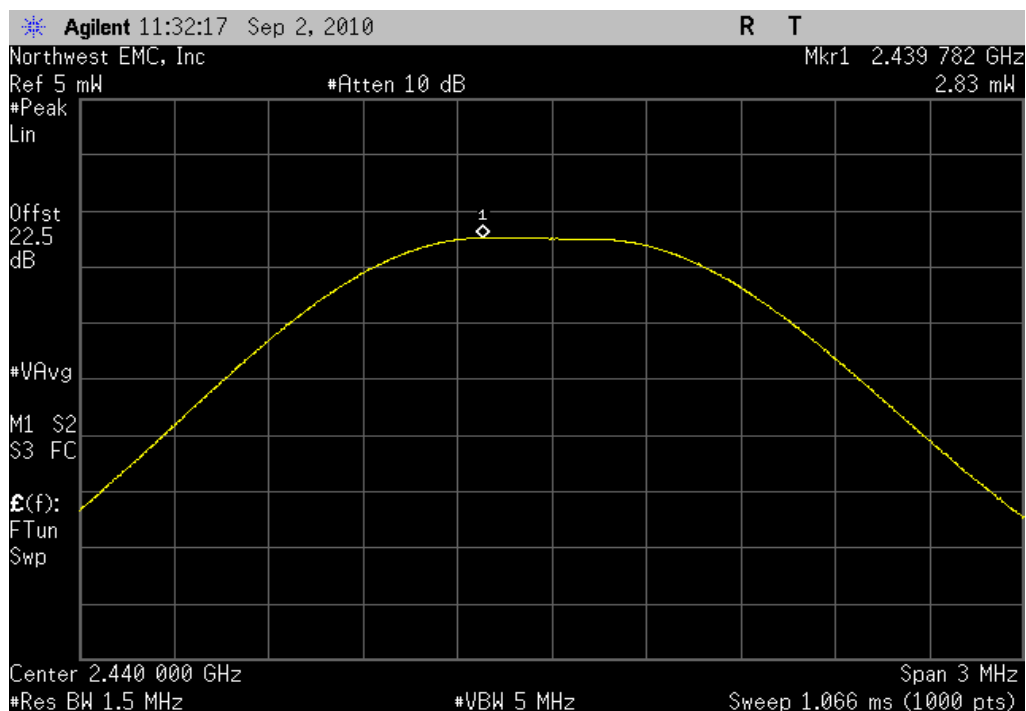


DH5, GFSK, Mid Channel

Result: Pass

Value: 2.8 mW

Limit: 125 mW

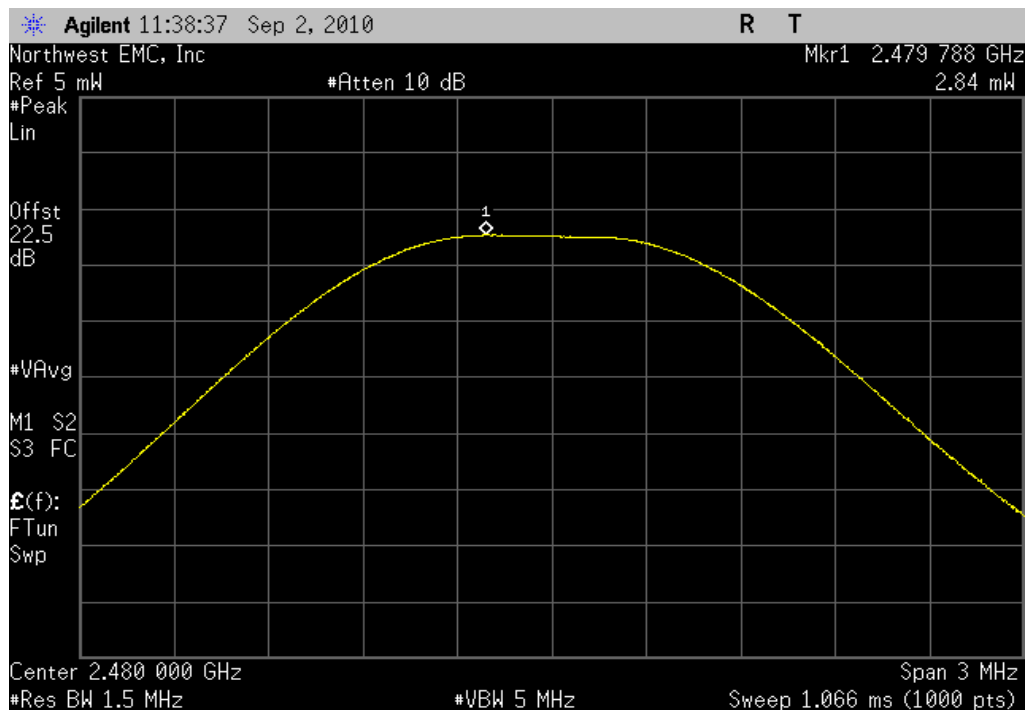


DH5, GFSK, High Channel

Result: Pass

Value: 2.8 mW

Limit: 125 mW

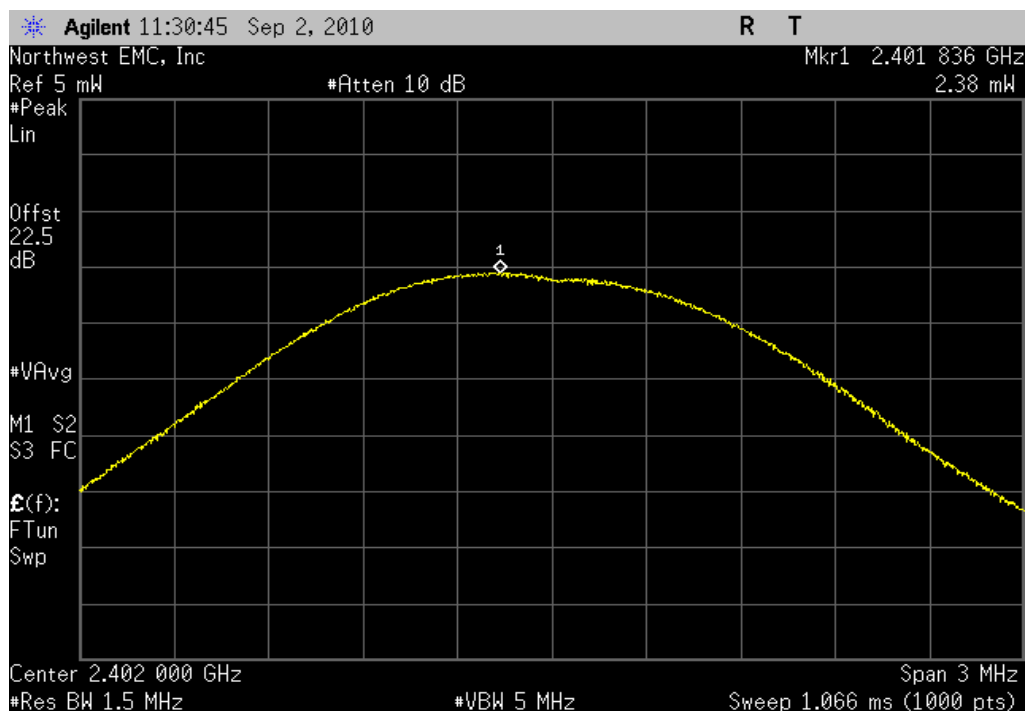


2DH5, 4-DQPSK, Low Channel

Result: Pass

Value: 2.4 mW

Limit: 125 mW

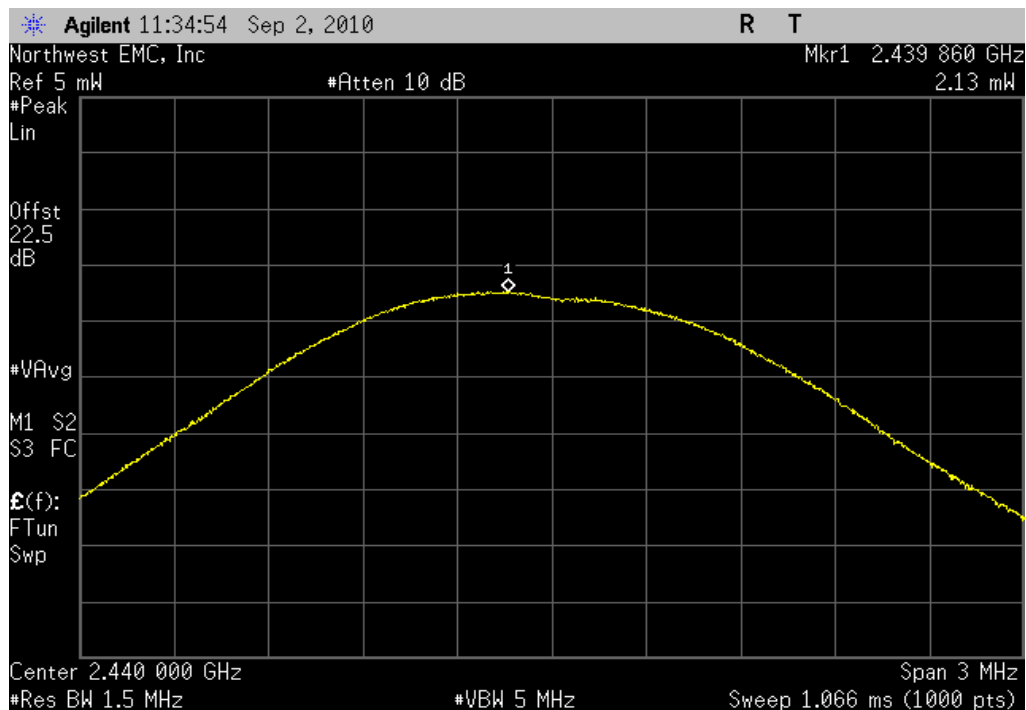


2DH5, 4-DQPSK, Mid Channel

Result: Pass

Value: 2.1 mW

Limit: 125 mW

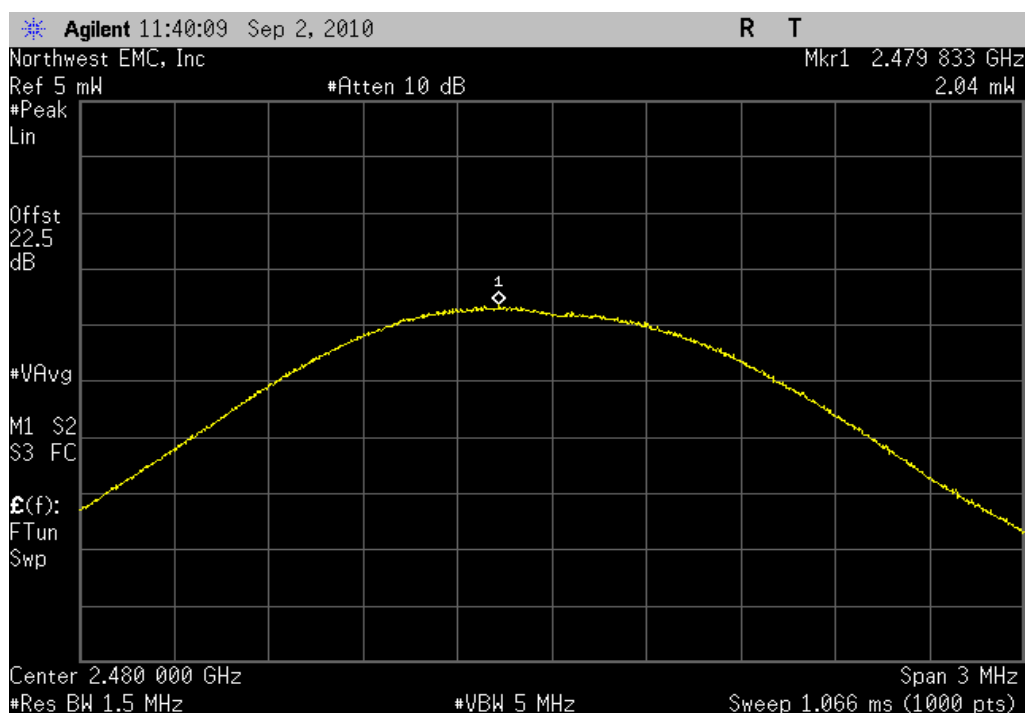


2DH5, 4-DQPSK, High Channel

Result: Pass

Value: 2.0 mW

Limit: 125 mW

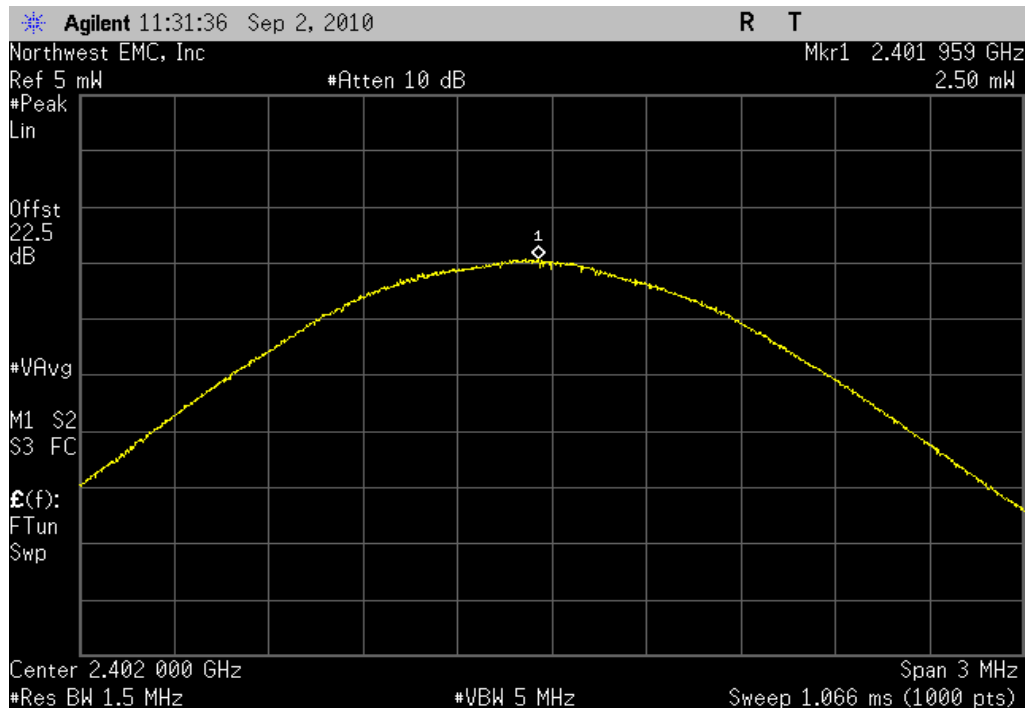


3DH5, 8-DPSK, Low Channel

Result: Pass

Value: 2.5 mW

Limit: 125 mW

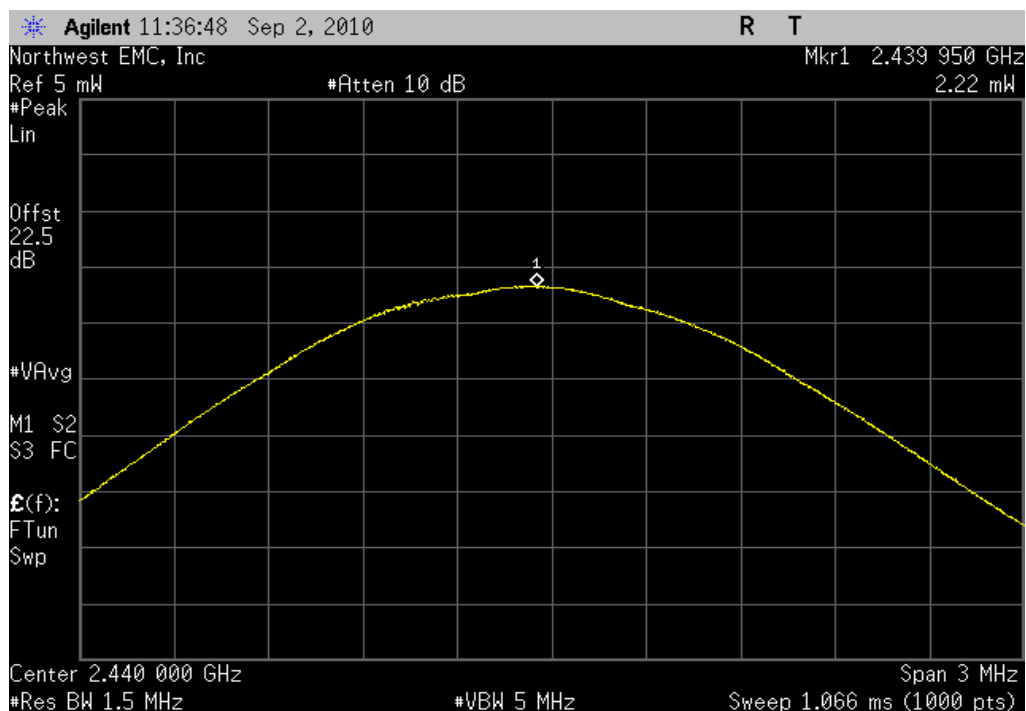


3DH5, 8-DPSK, Mid Channel

Result: Pass

Value: 2.2 mW

Limit: 125 mW

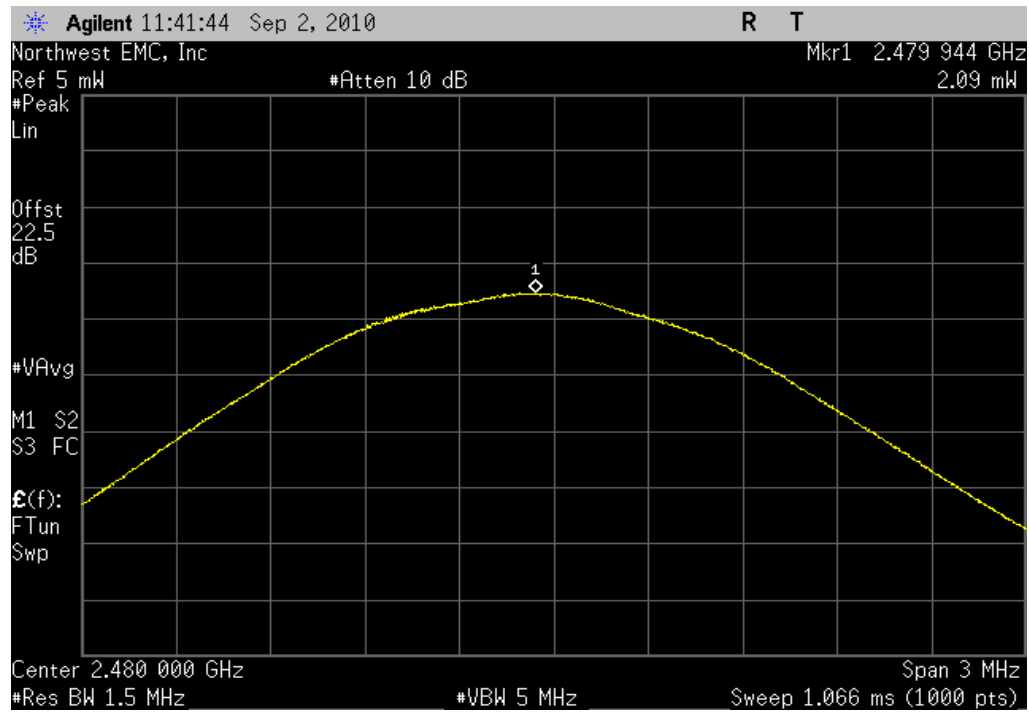


3DH5, 8-DPSK, High Channel

Result: Pass

Value: 2.1 mW

Limit: 125 mW



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

| TEST EQUIPMENT | | | | | |
|---------------------------------|------------------|----------|-----|------------|----------|
| Description | Manufacturer | Model | ID | Last Cal. | Interval |
| Spectrum Analyzer | Agilent | E4440A | AFD | 6/1/2009 | 24 |
| 26 GHz DC Block, SMA | Pasternack | PE8210 | AME | 10/19/2009 | 13 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/6/2010 | 13 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The requirements of FCC 15.247(d) for emissions at least 20dB below the carrier in any 100kHz bandwidth outside the allowable band was measured with the EUT set to low and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 10 MHz below the band edge to 10 MHz above the band edge.

The EUT was transmitting at its maximum data rate using all three types of modulations available in Bluetooth EDR.

EMC

BAND EDGE COMPLIANCE

| | | | |
|----------------|-----------------|-------------------|-------------|
| EUT: | WE-ADK | Work Order: | QUME0002 |
| Serial Number: | 15 | Date: | 09/02/10 |
| Customer: | Qualnetics | Temperature: | 24°C |
| Attendees: | Collin Topolski | Humidity: | 42% |
| Project: | None | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: | 120VAC/60Hz |
| | | Job Site: | EV06 |

| | |
|---------------------|------------------|
| TEST SPECIFICATIONS | Test Method |
| FCC 15.247:2010 | ANSI C63.10:2009 |

| |
|----------|
| COMMENTS |
| None |

| |
|-------------------------------|
| DEVIATIONS FROM TEST STANDARD |
| No Deviations |

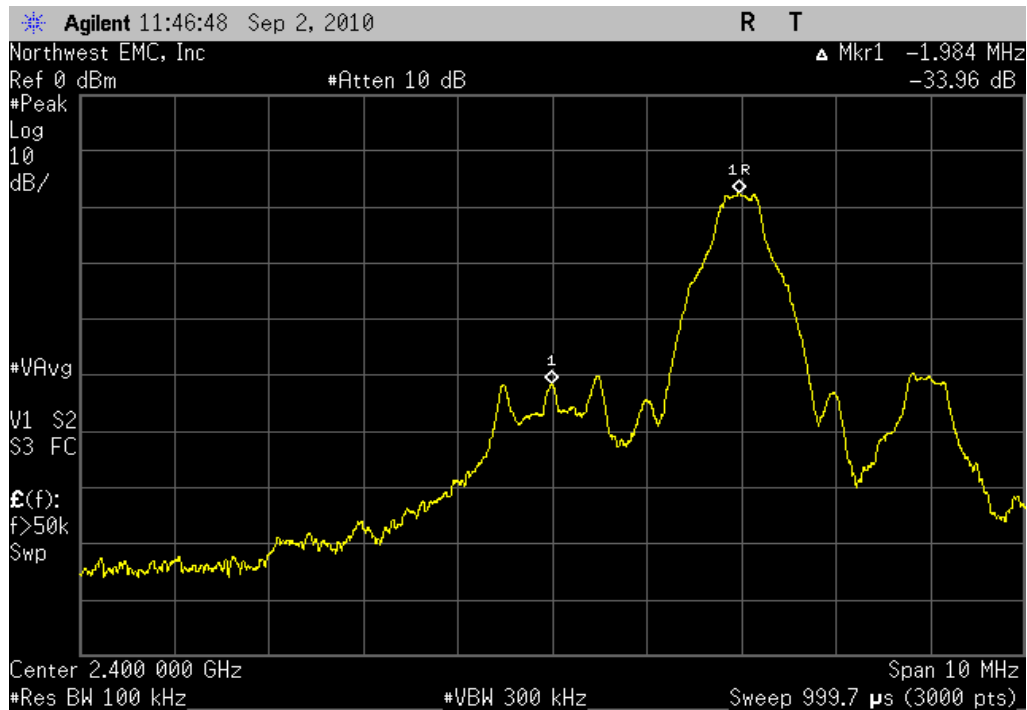
| | | |
|-----------------|---|---|
| Configuration # | 2 | Signature  |
|-----------------|---|---|

| | | Value | Limit | Results |
|------------------|--------------|-----------|-----------|---------|
| GFSK, DH5 | Low Channel | -34.0 dBc | ≤ -20 dBc | Pass |
| | High Channel | -50.5 dBc | ≤ -20 dBc | Pass |
| pi/4-DQPSK, 2DH5 | Low Channel | -39.4 dBc | ≤ -20 dBc | Pass |
| | High Channel | -43.3 dBc | ≤ -20 dBc | Pass |
| 8-DPSK, 3DH5 | Low Channel | -38.9 dBc | ≤ -20 dBc | Pass |
| | High Channel | -46.4 dBc | ≤ -20 dBc | Pass |

GFSK, DH5, Low Channel

Result: Pass

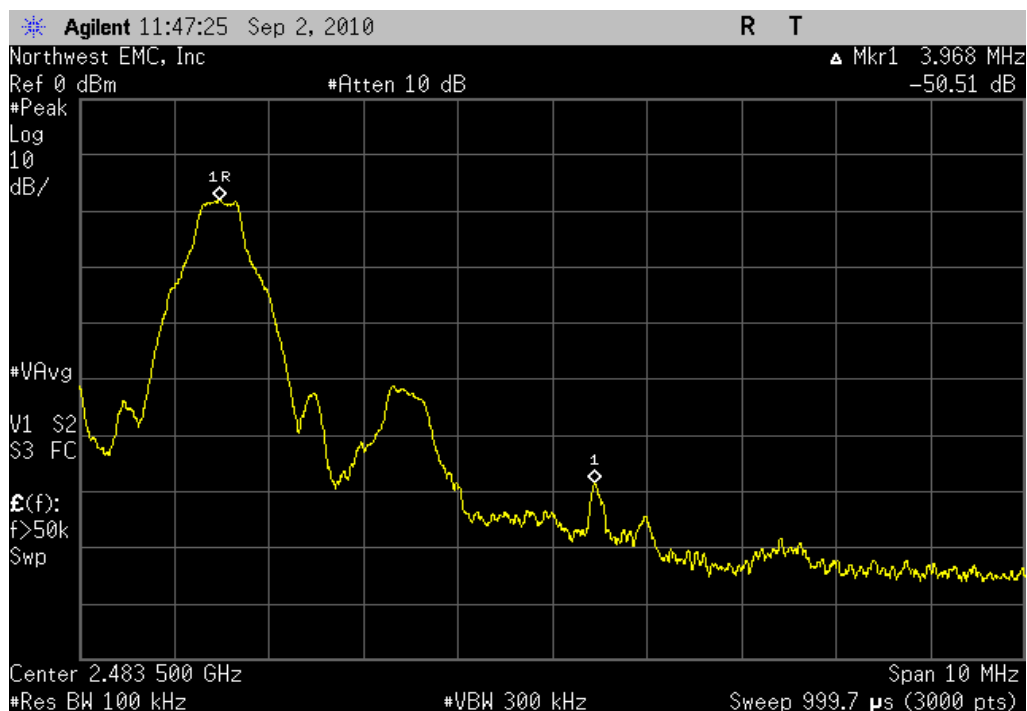
Value: -34.0 dBc

Limit: ≤ -20 dBc

GFSK, DH5, High Channel

Result: Pass

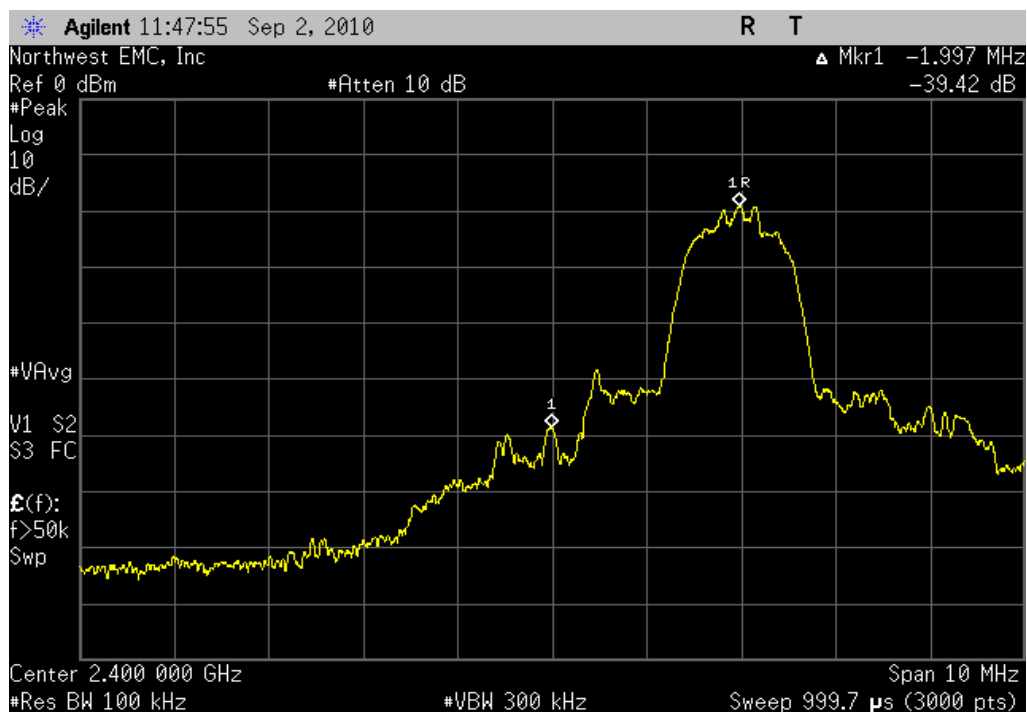
Value: -50.5 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, Low Channel

Result: Pass

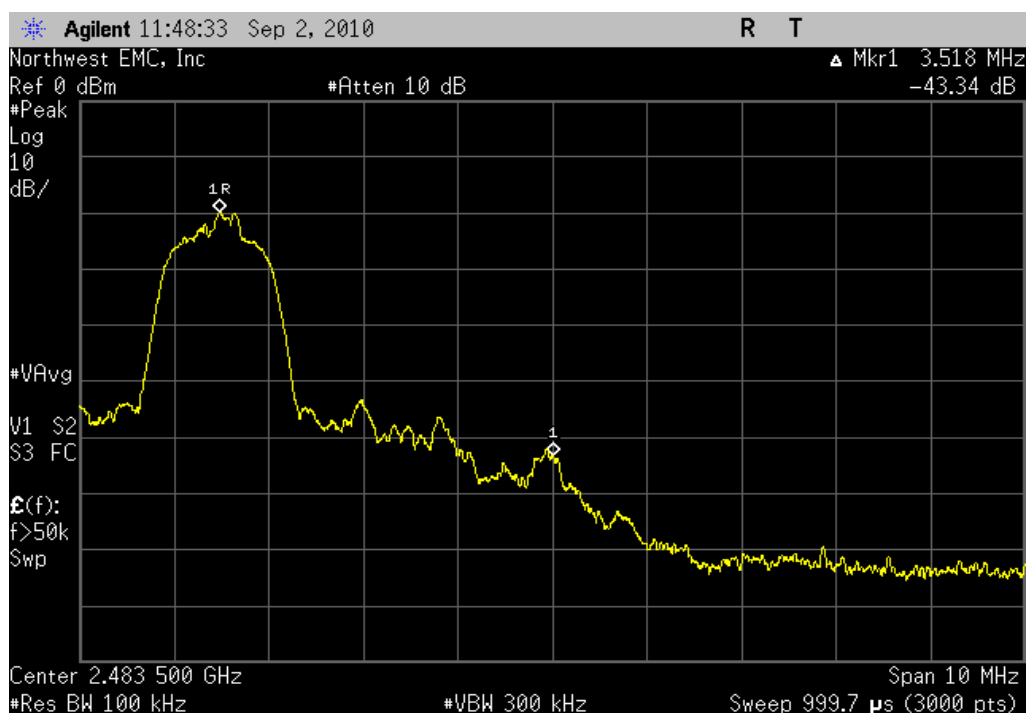
Value: -39.4 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, High Channel

Result: Pass

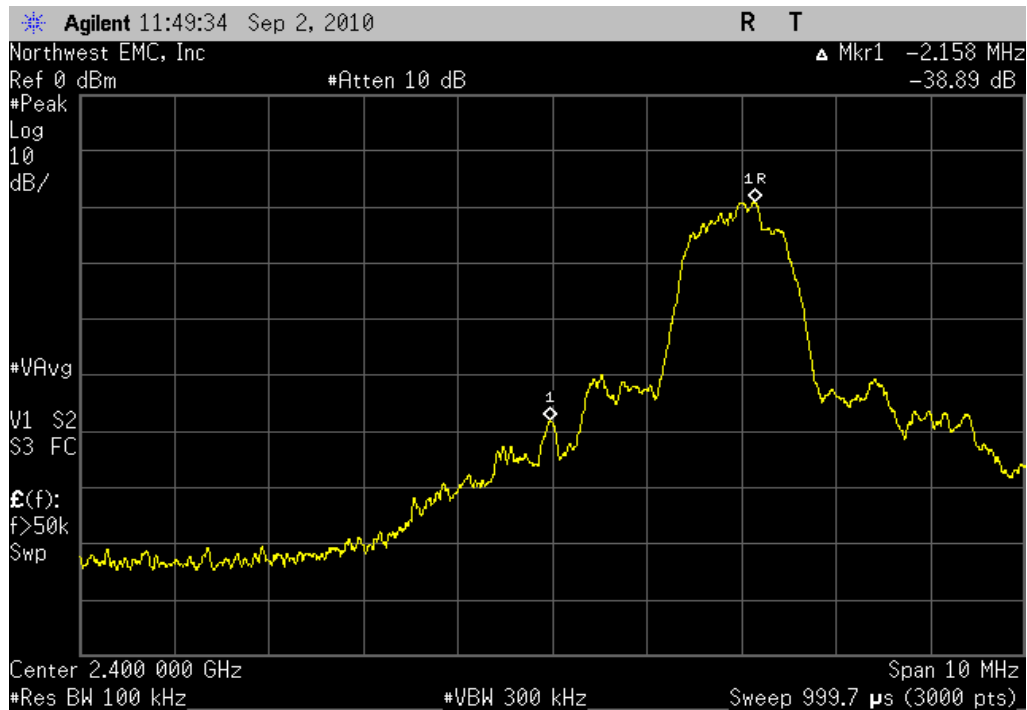
Value: -43.3 dBc

Limit: ≤ -20 dBc

8-DPSK, 3DH5, Low Channel

Result: Pass

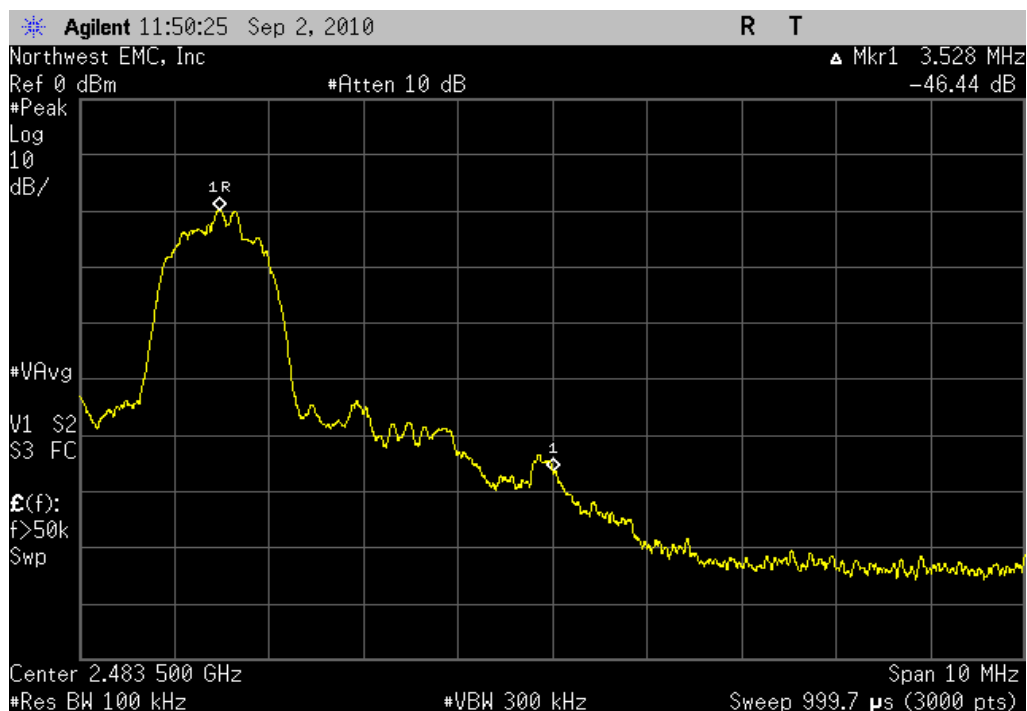
Value: -38.9 dBc

Limit: ≤ -20 dBc

8-DPSK, 3DH5, High Channel

Result: Pass

Value: -46.4 dBc

Limit: ≤ -20 dBc

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---------------------------------|------------------|----------|-----|------------|----------|
| Spectrum Analyzer | Agilent | E4440A | AFD | 6/1/2009 | 24 |
| 26 GHz DC Block, SMA | Pasternack | PE8210 | AME | 10/19/2009 | 13 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/6/2010 | 13 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency.

EMC

SPURIOUS CONDUCTED EMISSIONS

| | |
|----------------------------|-------------------------|
| EUT: WE-ADK | Work Order: QUME0002 |
| Serial Number: 15 | Date: 09/02/10 |
| Customer: Qualnetics | Temperature: 24°C |
| Attendees: Collin Topolski | Humidity: 42% |
| Project: None | Barometric Pres.: 30.15 |
| Tested by: Rod Peloquin | Power: 120VAC/60Hz |
| | Job Site: EV06 |

| | |
|---------------------|------------------|
| TEST SPECIFICATIONS | Test Method |
| FCC 15.247:2010 | ANSI C63.10:2009 |

COMMENTS

0.75 dB added to reference level offset of analyzer to compensate for antenna adapter cable loss.

DEVIATIONS FROM TEST STANDARD

No Deviations

| | | |
|-----------------|---|---|
| Configuration # | 2 | Signature  |
|-----------------|---|---|

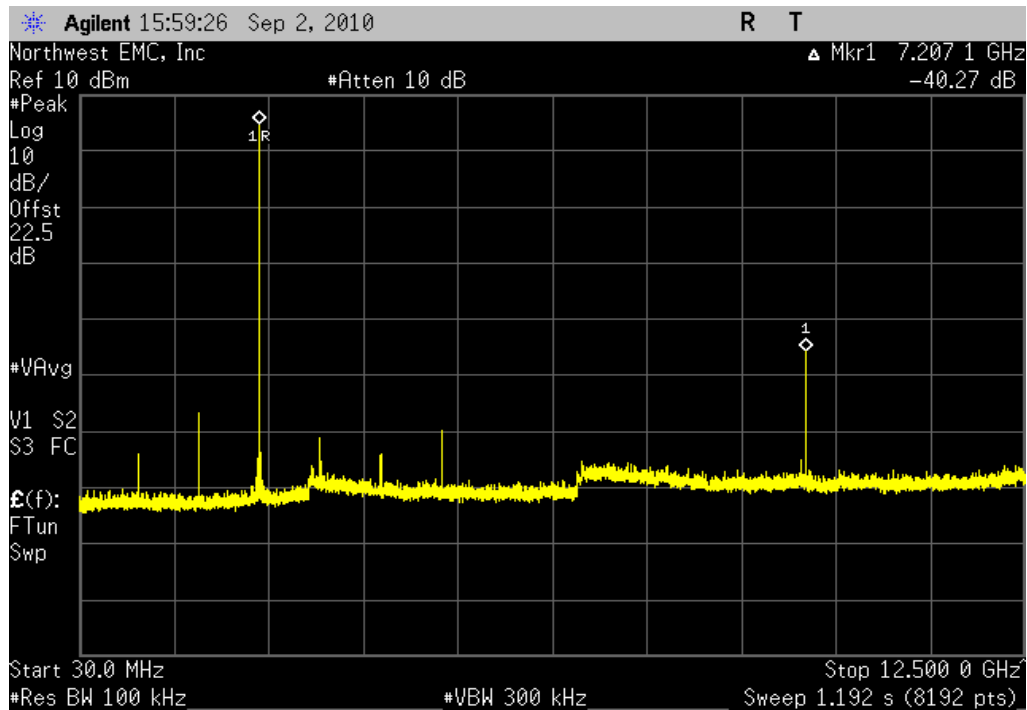
| | | Value | Limit | Results |
|------------------|-----------------|-----------|-----------|---------|
| GFSK, DH5 | | | | |
| | Low Channel | | | |
| | 30MHz - 12.5GHz | -40.3 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -56.9 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | | | |
| | 30MHz - 12.5GHz | -43.6 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -56.7 dBc | ≤ -20 dBc | Pass |
| | High Channel | | | |
| | 30MHz - 12.5GHz | -46.6 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -55.5 dBc | ≤ -20 dBc | Pass |
| pi/4-DQPSK, 2DH5 | | | | |
| | Low Channel | | | |
| | 30MHz - 12.5GHz | -42.3 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -52.3 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | | | |
| | 30MHz - 12.5GHz | -48.9 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -54.2 dBc | ≤ -20 dBc | Pass |
| | High Channel | | | |
| | 30MHz - 12.5GHz | -47.7 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -54.9 dBc | ≤ -20 dBc | Pass |
| 8DPSK, 3DH5 | | | | |
| | Low Channel | | | |
| | 30MHz - 12.5GHz | -39.7 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -52.2 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | | | |
| | 30MHz - 12.5GHz | -47.3 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -54.7 dBc | ≤ -20 dBc | Pass |
| | High Channel | | | |
| | 30MHz - 12.5GHz | -47.2 dBc | ≤ -20 dBc | Pass |
| | 12.5GHz-25GHz | -54.3 dBc | ≤ -20 dBc | Pass |

SPURIOUS CONDUCTED EMISSIONS

GFSK, DH5, Low Channel, 30MHz - 12.5GHz

Result: Pass

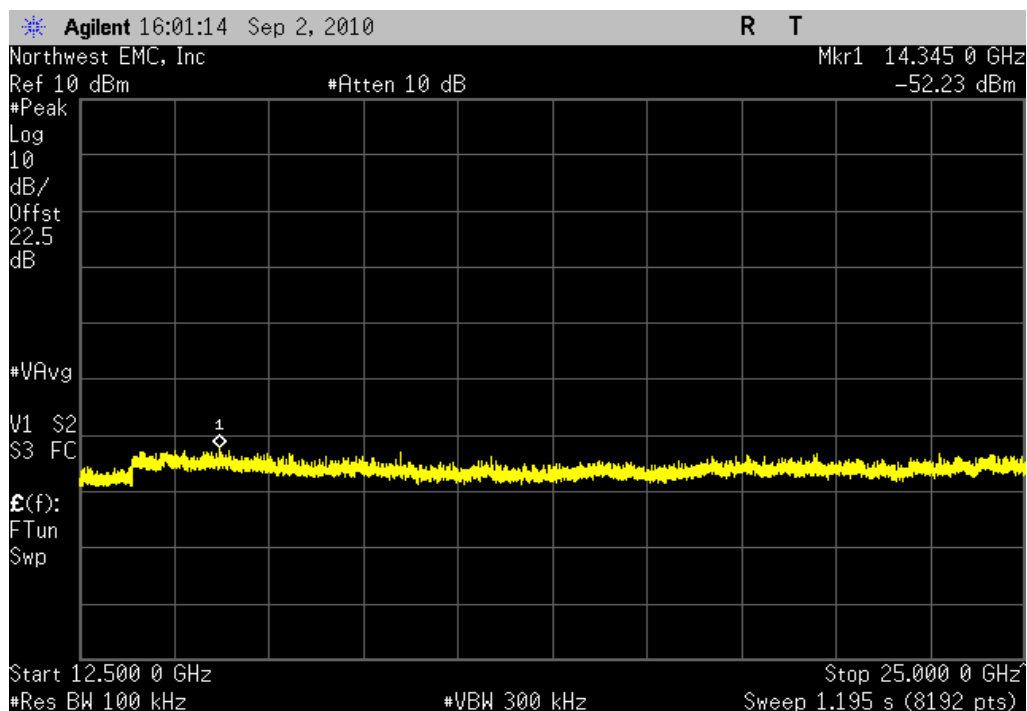
Value: -40.3 dBc

Limit: ≤ -20 dBc

GFSK, DH5, Low Channel, 12.5GHz-25GHz

Result: Pass

Value: -56.9 dBc

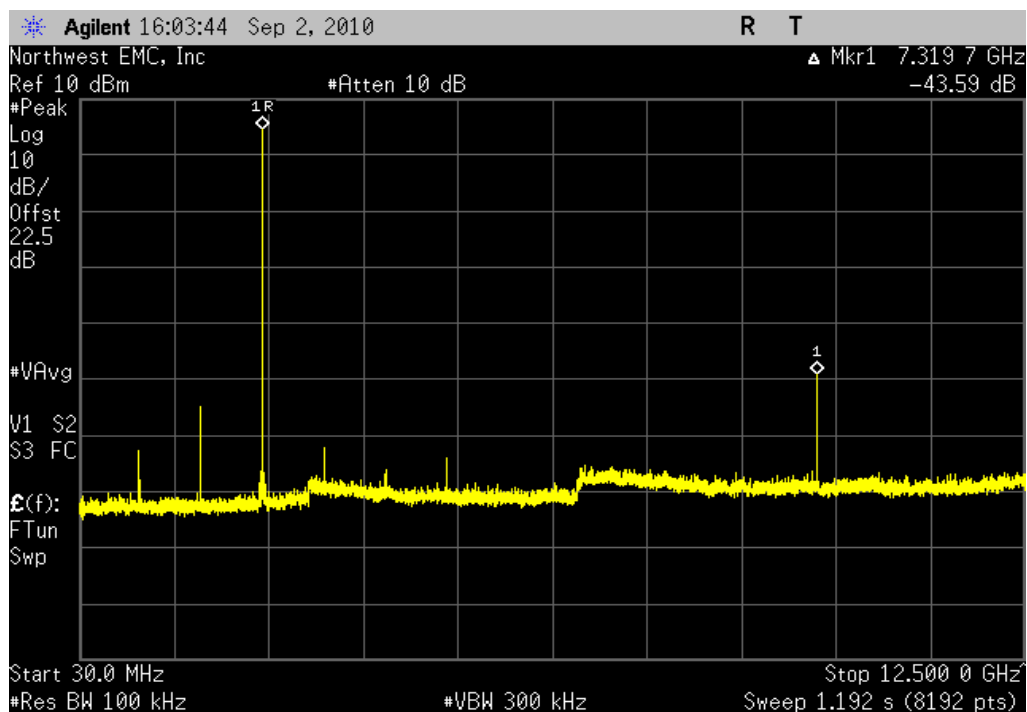
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

GFSK, DH5, Mid Channel, 30MHz - 12.5GHz

Result: Pass

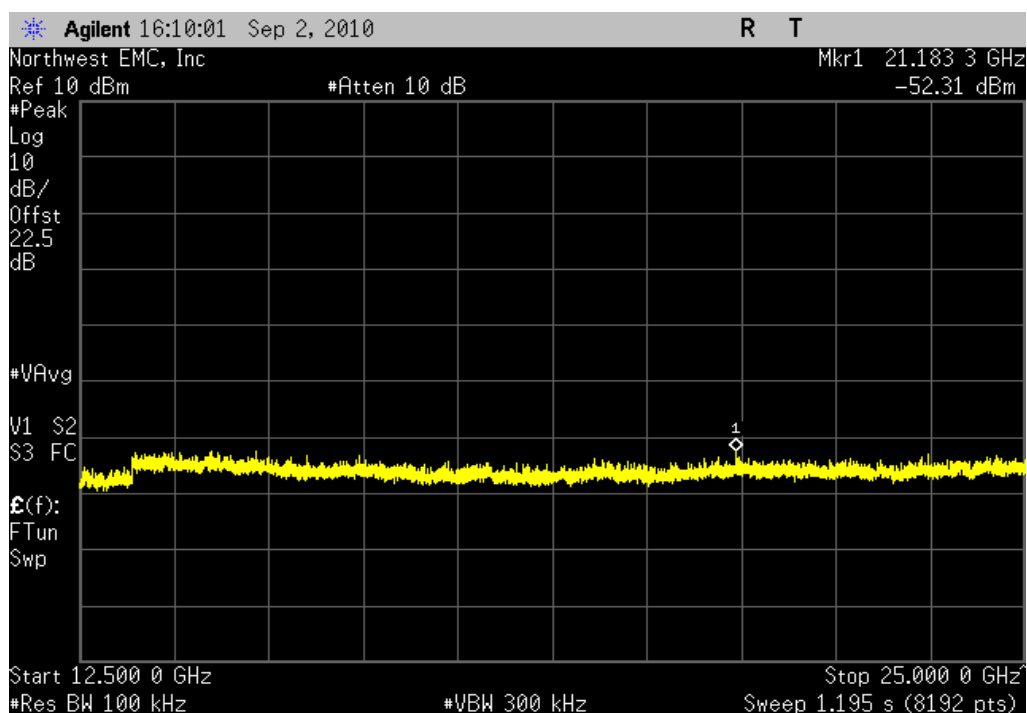
Value: -43.6 dBc

Limit: ≤ -20 dBc

GFSK, DH5, Mid Channel, 12.5GHz-25GHz

Result: Pass

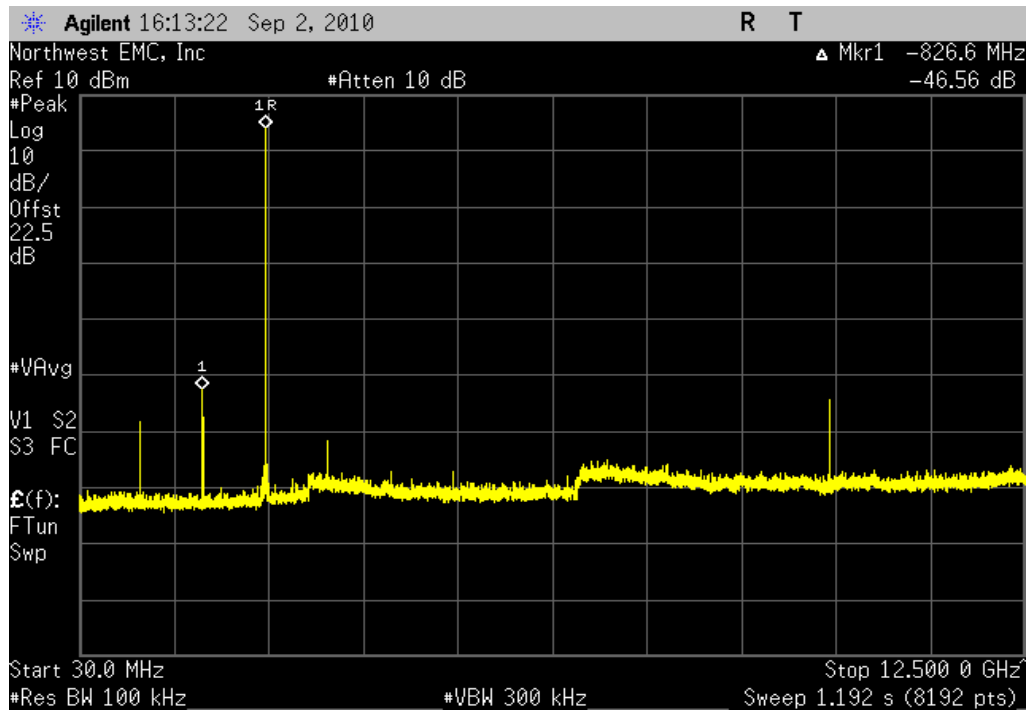
Value: -56.7 dBc

Limit: ≤ -20 dBc

GFSK, DH5, High Channel, 30MHz - 12.5GHz

Result: Pass

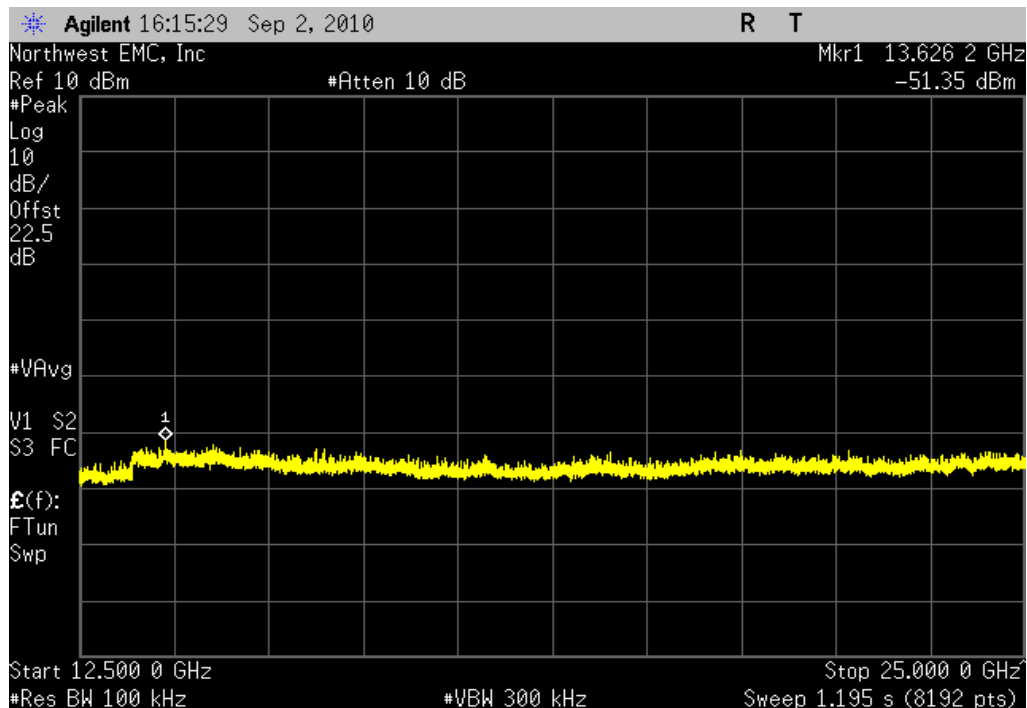
Value: -46.6 dBc

Limit: ≤ -20 dBc

GFSK, DH5, High Channel, 12.5GHz-25GHz

Result: Pass

Value: -55.5 dBc

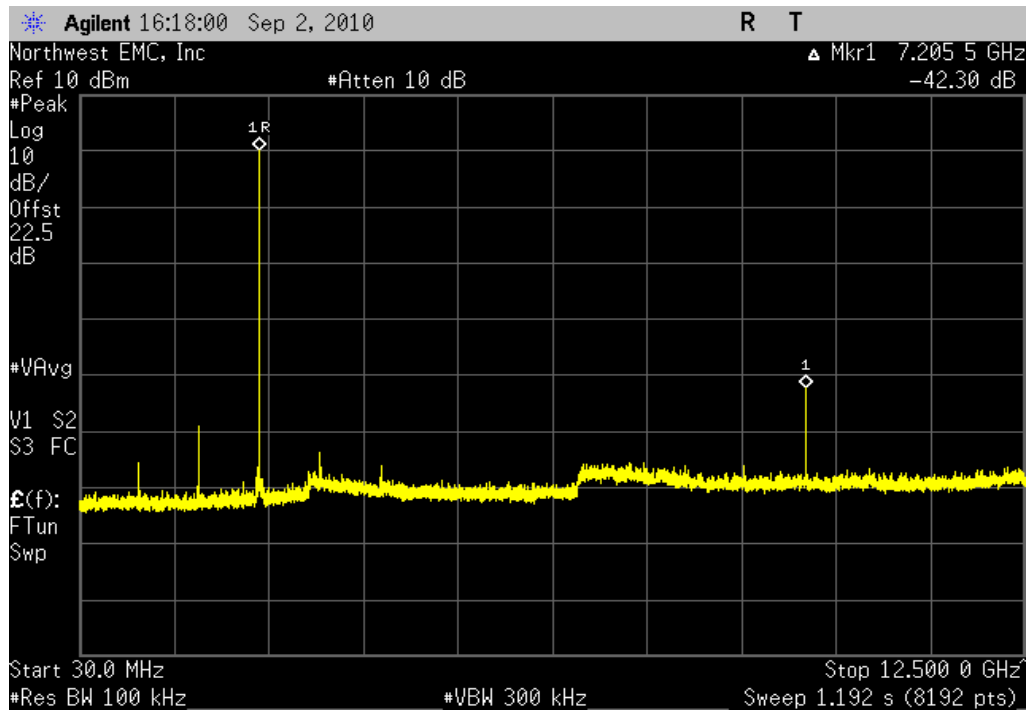
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

pi/4-DQPSK, 2DH5, Low Channel, 30MHz - 12.5GHz

Result: Pass

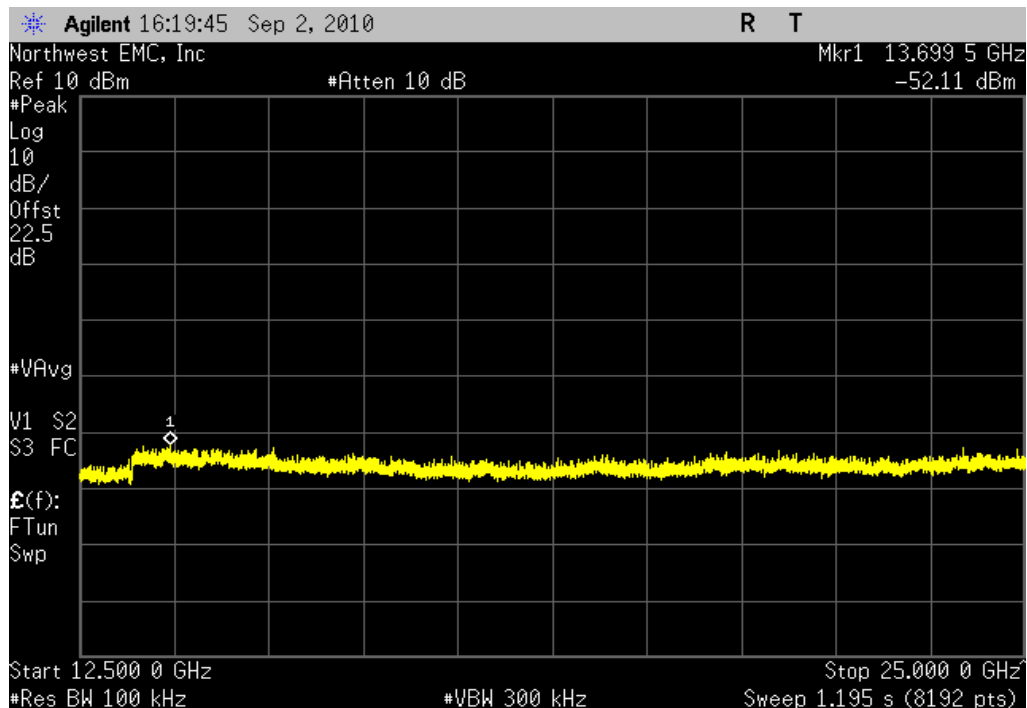
Value: -42.3 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, Low Channel, 12.5GHz-25GHz

Result: Pass

Value: -52.3 dBc

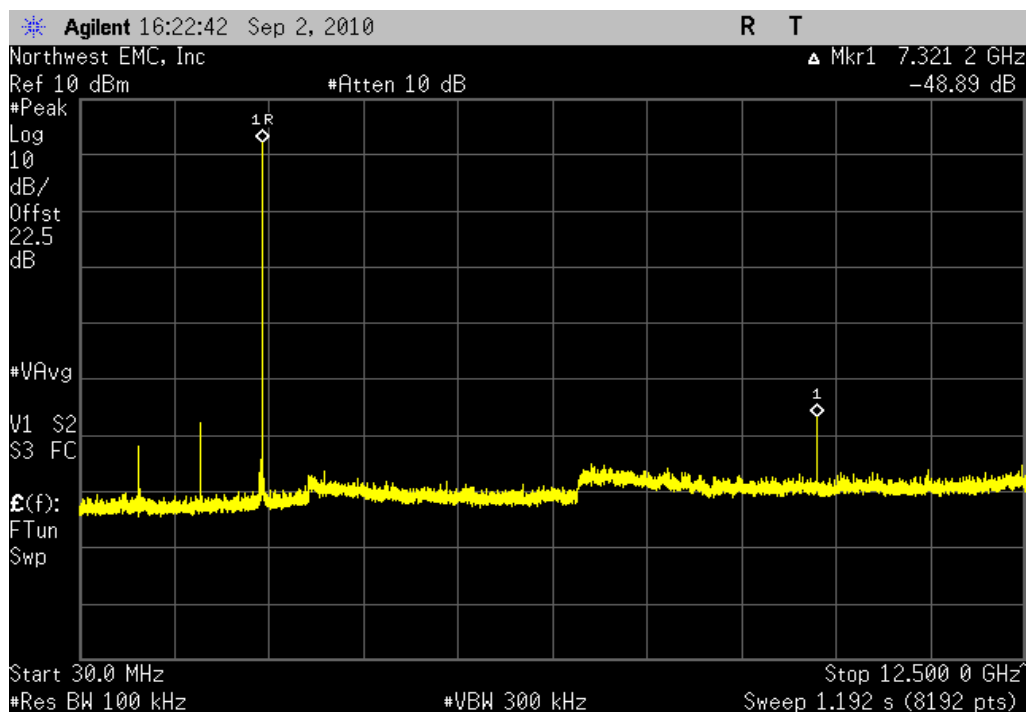
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

pi/4-DQPSK, 2DH5, Mid Channel, 30MHz - 12.5GHz

Result: Pass

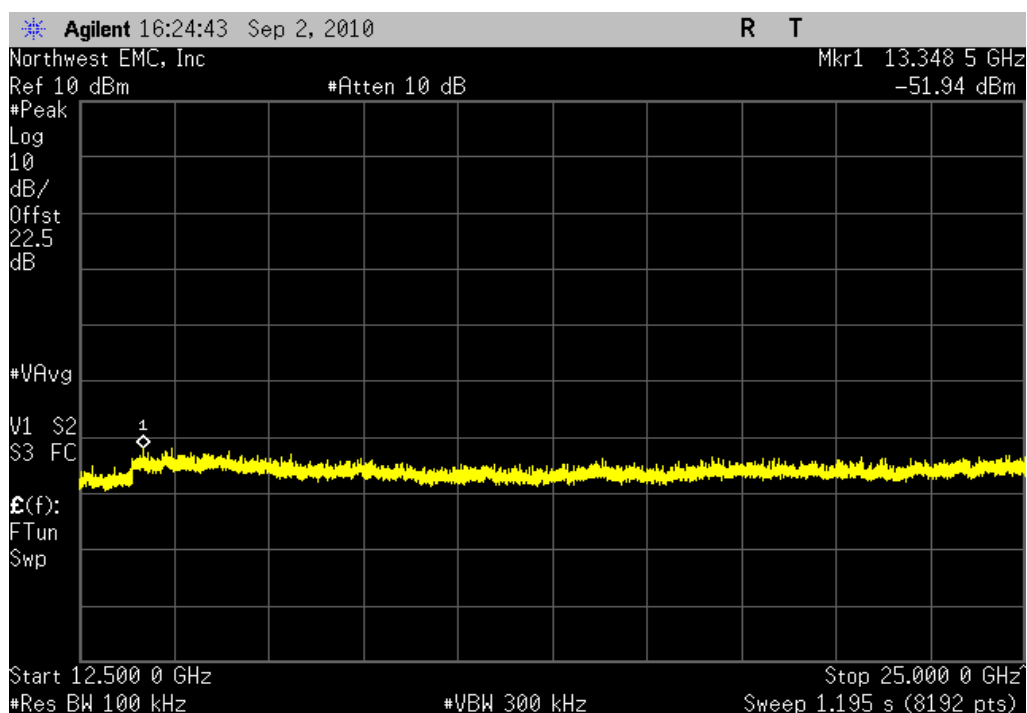
Value: -48.9 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, Mid Channel, 12.5GHz-25GHz

Result: Pass

Value: -54.2 dBc

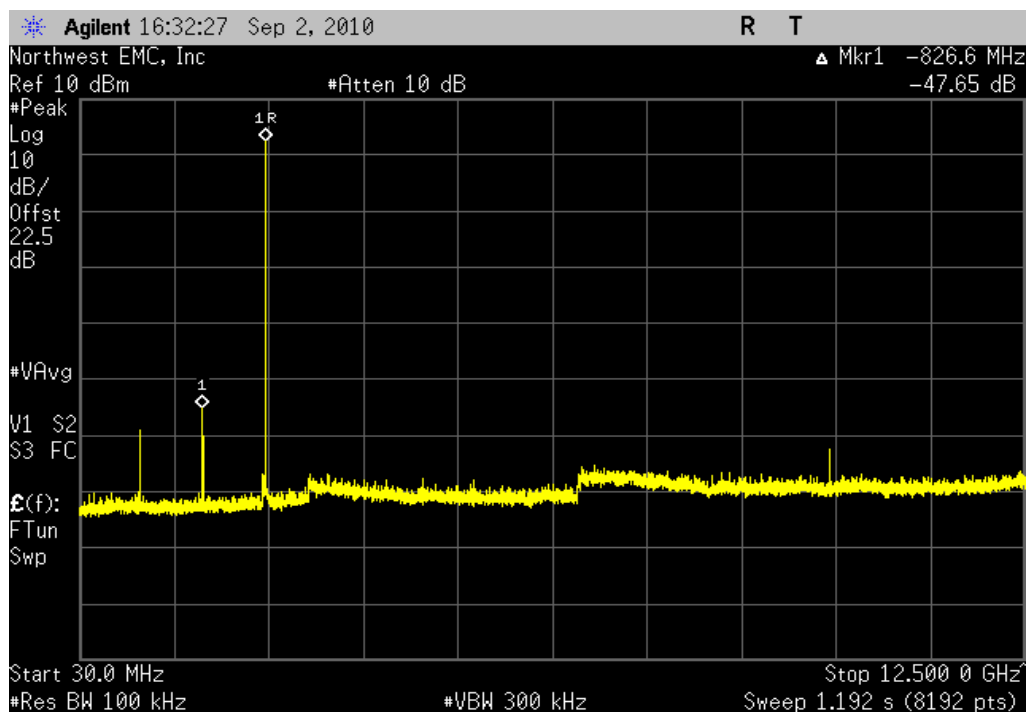
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

pi/4-DQPSK, 2DH5, High Channel, 30MHz - 12.5GHz

Result: Pass

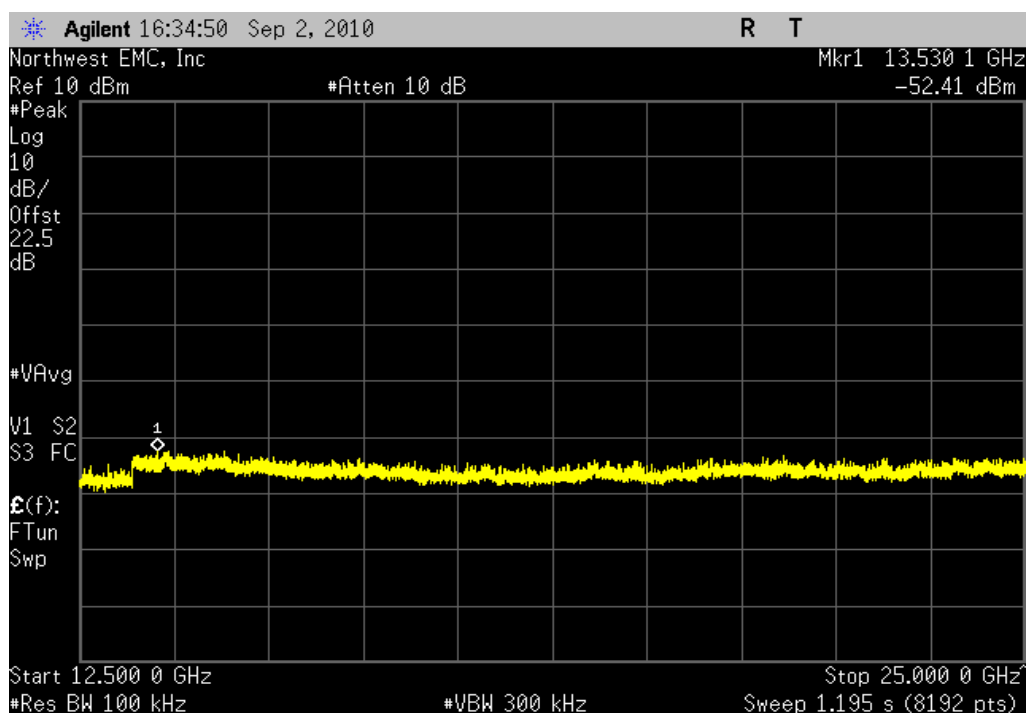
Value: -47.7 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, High Channel, 12.5GHz-25GHz

Result: Pass

Value: -54.9 dBc

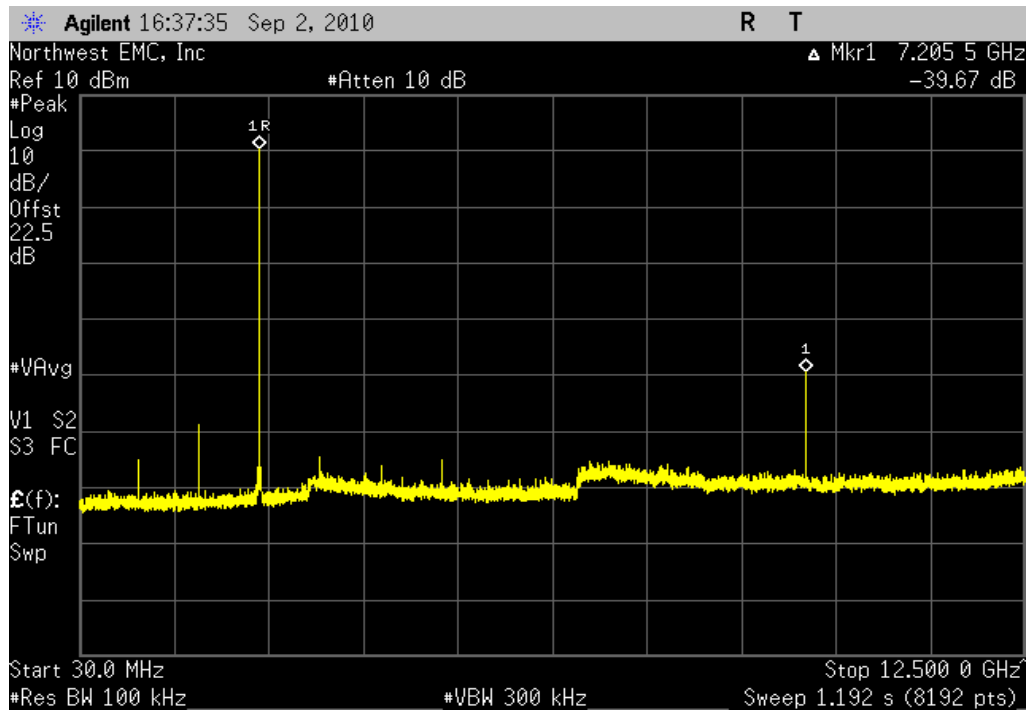
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

8DPSK, 3DH5, Low Channel, 30MHz - 12.5GHz

Result: Pass

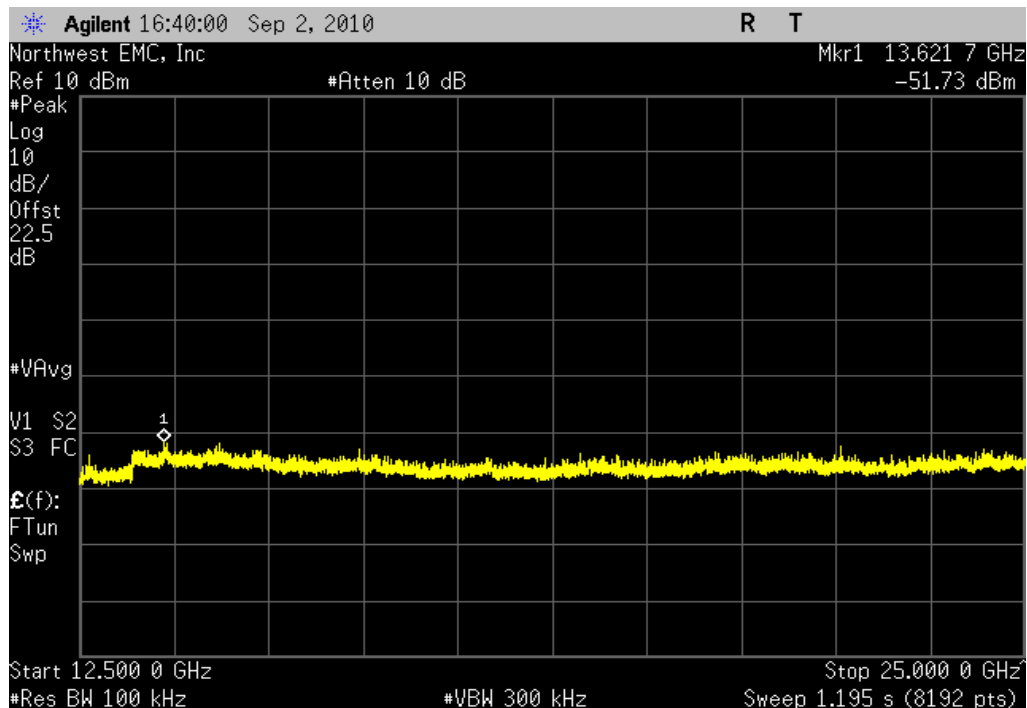
Value: -39.7 dBc

Limit: ≤ -20 dBc

8DPSK, 3DH5, Low Channel, 12.5GHz-25GHz

Result: Pass

Value: -52.2 dBc

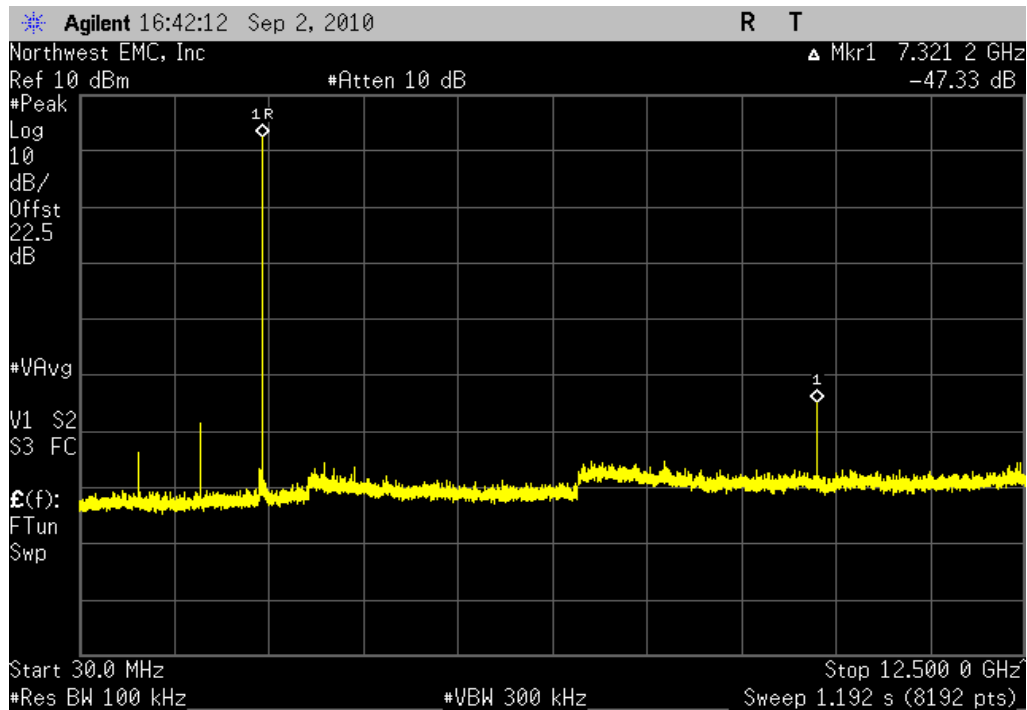
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

8DPSK, 3DH5, Mid Channel, 30MHz - 12.5GHz

Result: Pass

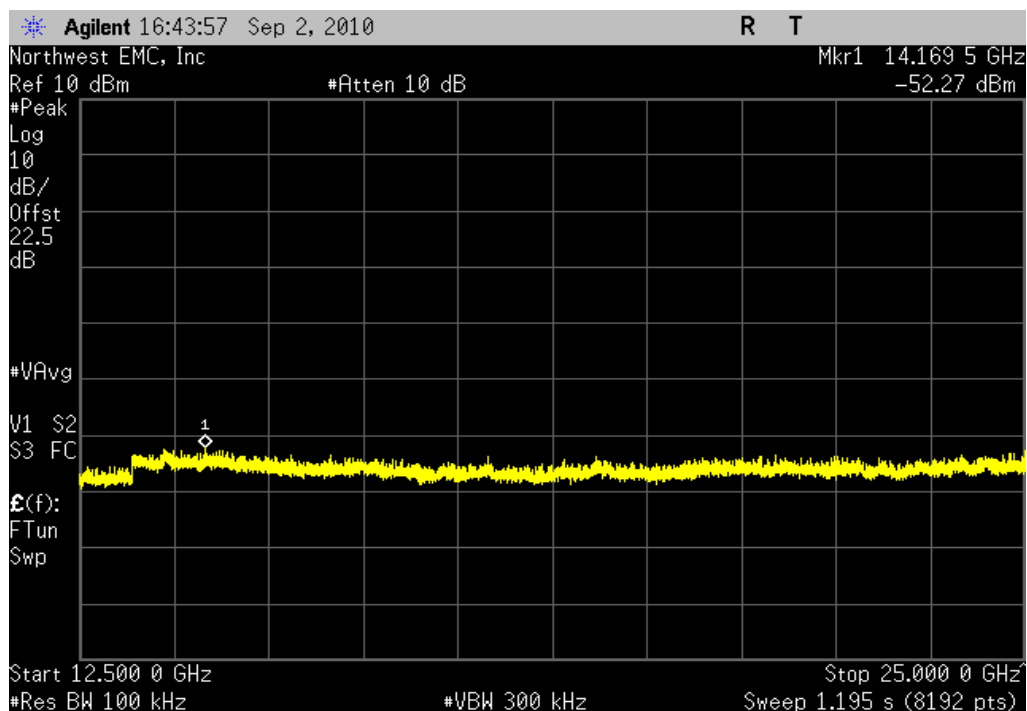
Value: -47.3 dBc

Limit: ≤ -20 dBc

8DPSK, 3DH5, Mid Channel, 12.5GHz-25GHz

Result: Pass

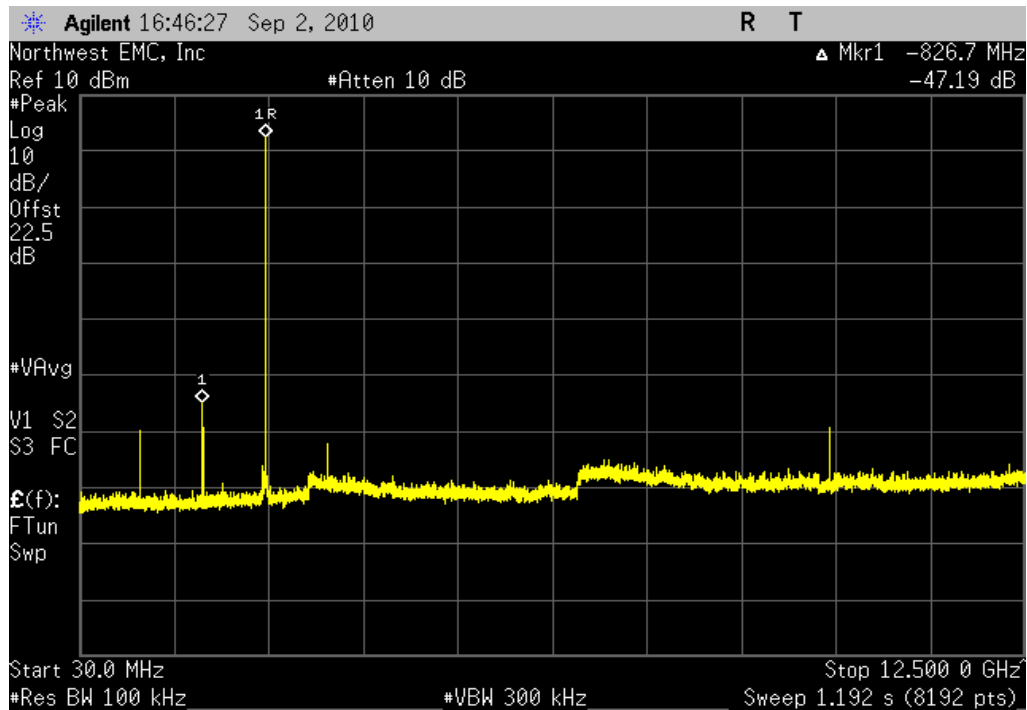
Value: -54.7 dBc

Limit: ≤ -20 dBc

8DPSK, 3DH5, High Channel, 30MHz - 12.5GHz

Result: Pass

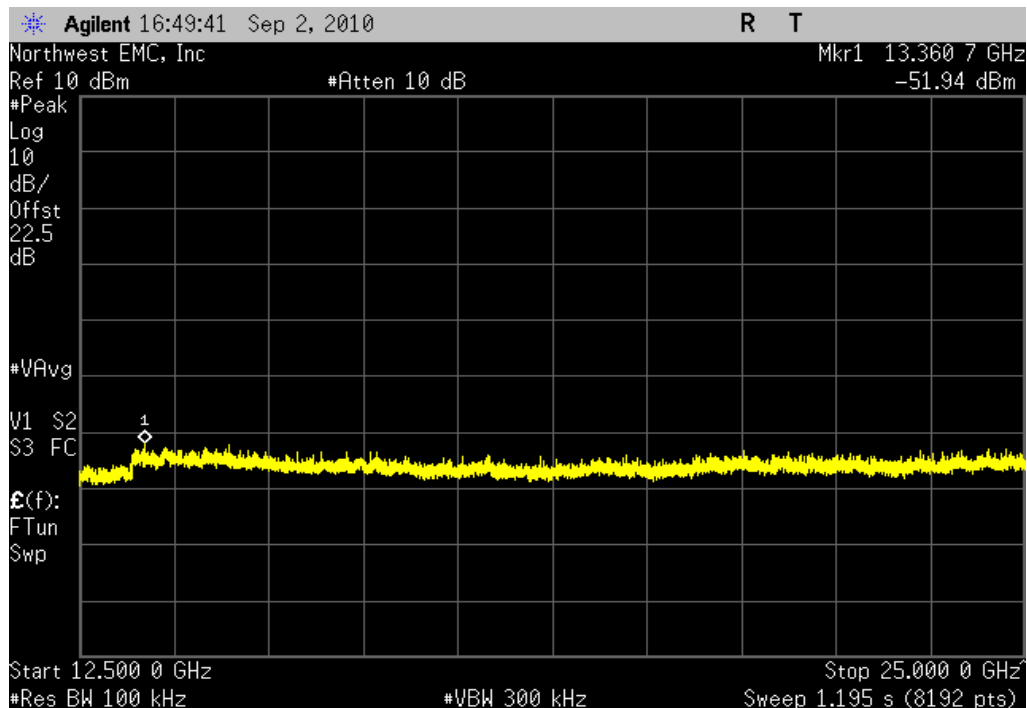
Value: -47.2 dBc

Limit: ≤ -20 dBc

8DPSK, 3DH5, High Channel, 12.5GHz-25GHz

Result: Pass

Value: -54.3 dBc

Limit: ≤ -20 dBc

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

| TEST EQUIPMENT | | | | | |
|---------------------------------|------------------|-----------|-----|------------|----------|
| Description | Manufacturer | Model | ID | Last Cal. | Interval |
| Spectrum Analyzer | Agilent | E4440A | AFD | 6/1/2009 | 24 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/6/2010 | 13 |
| 26 GHz DC Block, SMA | Pasternack | PE8210 | AME | 10/19/2009 | 13 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |
| Power Meter | Gigatronics | 8651A | SPM | 1/7/2010 | 13 |
| Power Sensor | Gigatronics | 80701A | SPL | 1/7/2010 | 13 |
| Attenuator | Pasternack | PE7005-10 | RBP | 4/1/2010 | 13 |
| Signal Generator | Agilent | E8257D | TGX | 12/10/2008 | 24 |

MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

The power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate for each modulation type available. While the average output power was measured as defined in section ANSI C63.10:2009, Section 6.11.2.3 was followed.

The spectrum analyzer was set as follows:

The emission peak was located and zoomed in on within the passband.

a) RBW = 3 kHz

b) VBW = 10 kHz

c) Span = 300 kHz

d) Sweep time = 100s

e) Trace set to MAX

f) The 1 hz Marker Noise function on the analyzer was used. The data was corrected to 3 kHz by adding 34.8 dB to the reading.

EMC

POWER SPECTRAL DENSITY

| | | | |
|----------------|-----------------|-------------------|-------------|
| EUT: | WE-ADK | Work Order: | QUME0002 |
| Serial Number: | 15 | Date: | 09/02/10 |
| Customer: | Qualnetics | Temperature: | 24°C |
| Attendees: | Collin Topolski | Humidity: | 42% |
| Project: | None | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: | 120VAC/60Hz |
| | | Job Site: | EV06 |

| | |
|---------------------|------------------|
| TEST SPECIFICATIONS | Test Method |
| FCC 15.247:2010 | ANSI C63.10:2009 |

COMMENTS

0.75 dB added to reference level offset of analyzer to compensate for antenna adapter cable loss.

DEVIATIONS FROM TEST STANDARD

No Deviations

| | | |
|-----------------|---|---|
| Configuration # | 2 | Signature  |
|-----------------|---|---|

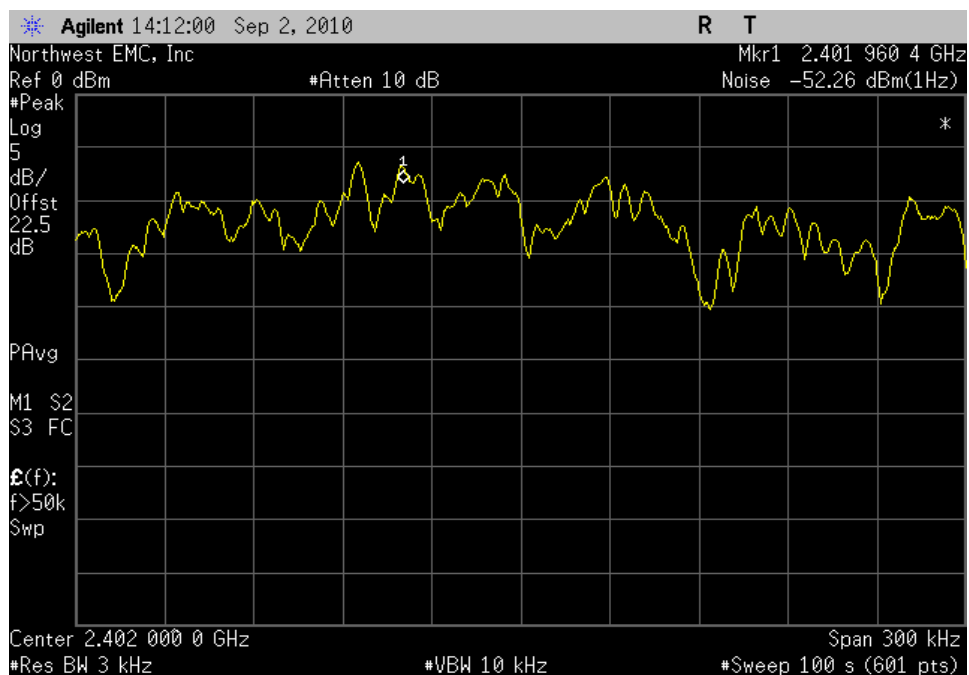
| | | Value | Limit | Results |
|-------------------|------------------------|-------------------|---------------|---------|
| DH5, GFSK | | | | |
| | Low Channel, 2402 MHz | -17.5 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | Mid Channel, 2440 MHz | -17.5 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | High Channel, 2480 MHz | -17.7 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| 2-DH5, Pi/4-DQPSK | | | | |
| | Low Channel, 2402 MHz | -20.2 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | Mid Channel, 2440 MHz | -20.7 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | High Channel, 2480 MHz | -21.0 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| 3-DH5, 8-DPSK | | | | |
| | Low Channel, 2402 MHz | -20.4 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | Mid Channel, 2440 MHz | -20.7 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | High Channel, 2480 MHz | -21.0 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |

DH5, GFSK, Low Channel, 2402 MHz

Result: Pass

Value: -17.5 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

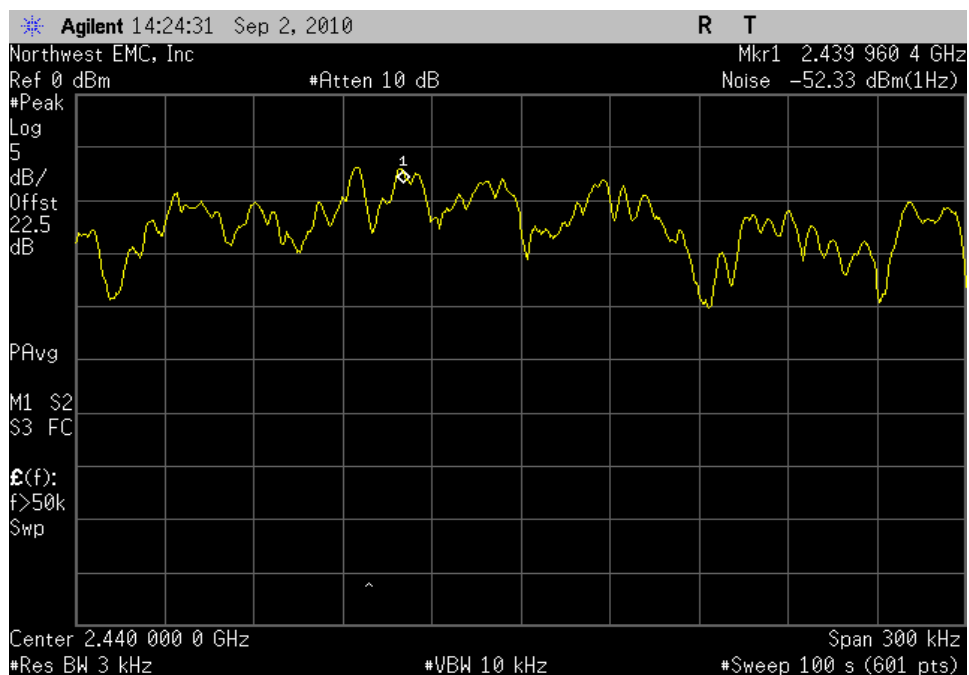


DH5, GFSK, Mid Channel, 2440 MHz

Result: Pass

Value: -17.5 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

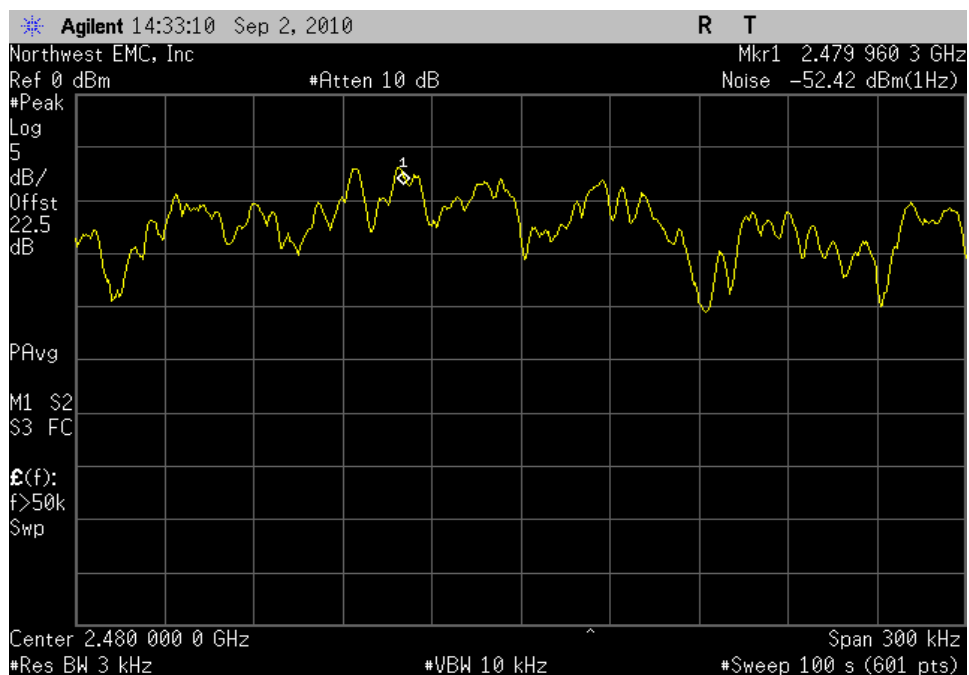


DH5, GFSK, High Channel, 2480 MHz

Result: Pass

Value: -17.7 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

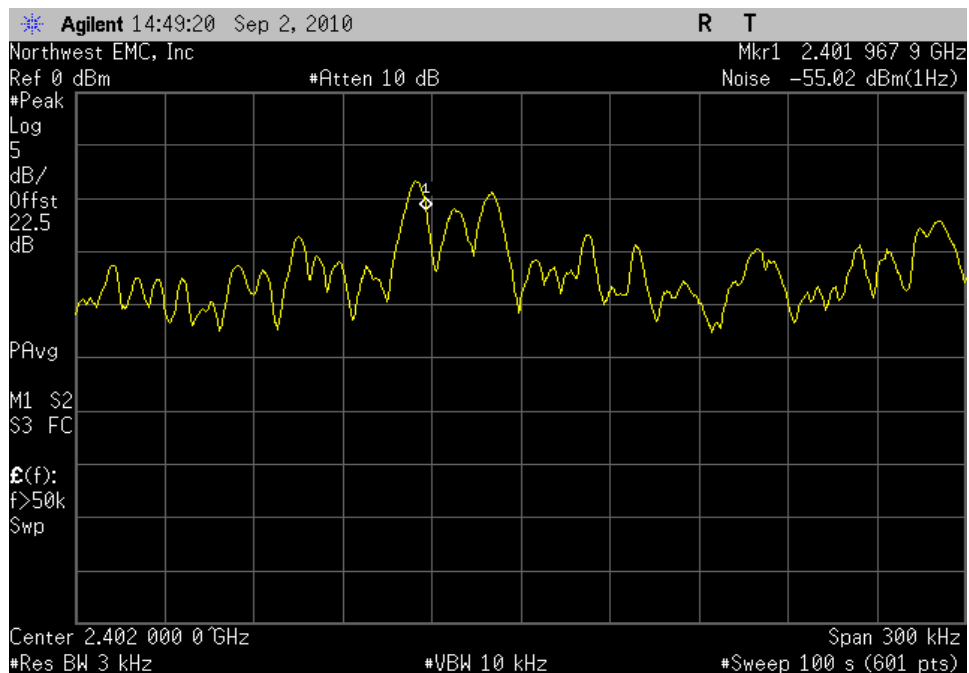


2-DH5, Pi/4-DQPSK, Low Channel, 2402 MHz

Result: Pass

Value: -20.2 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

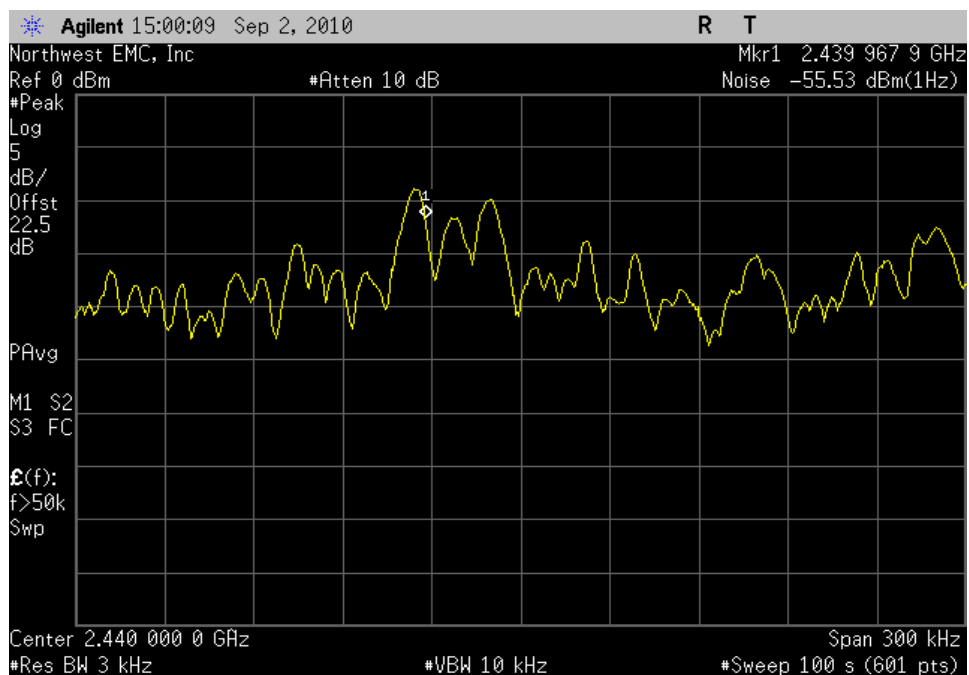


2-DH5, Pi/4-DQPSK, Mid Channel, 2440 MHz

Result: Pass

Value: -20.7 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

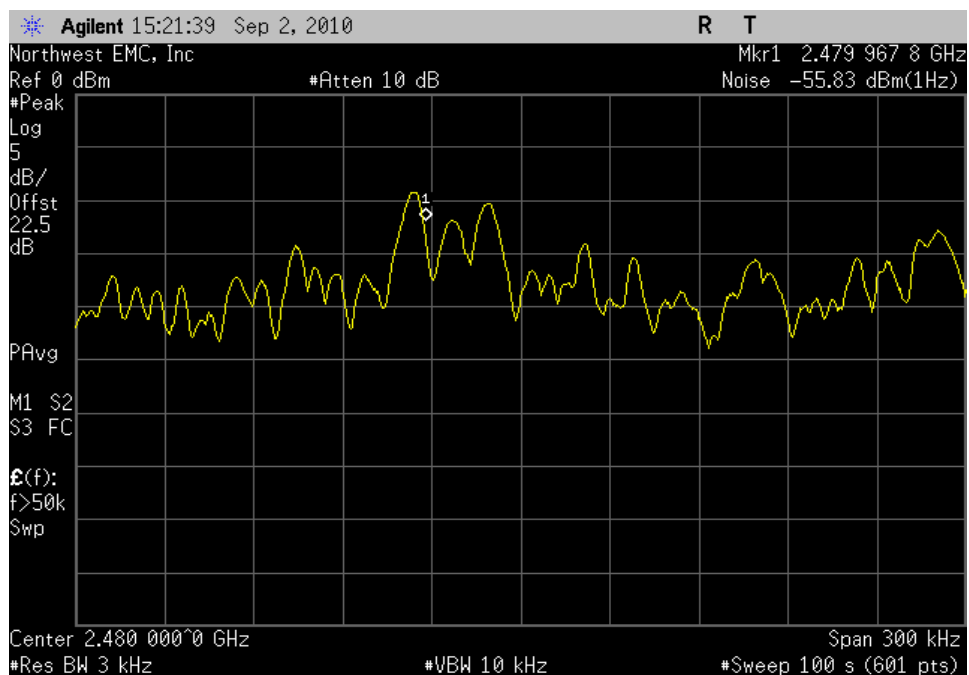


2-DH5, Pi/4-DQPSK, High Channel, 2480 MHz

Result: Pass

Value: -21.0 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

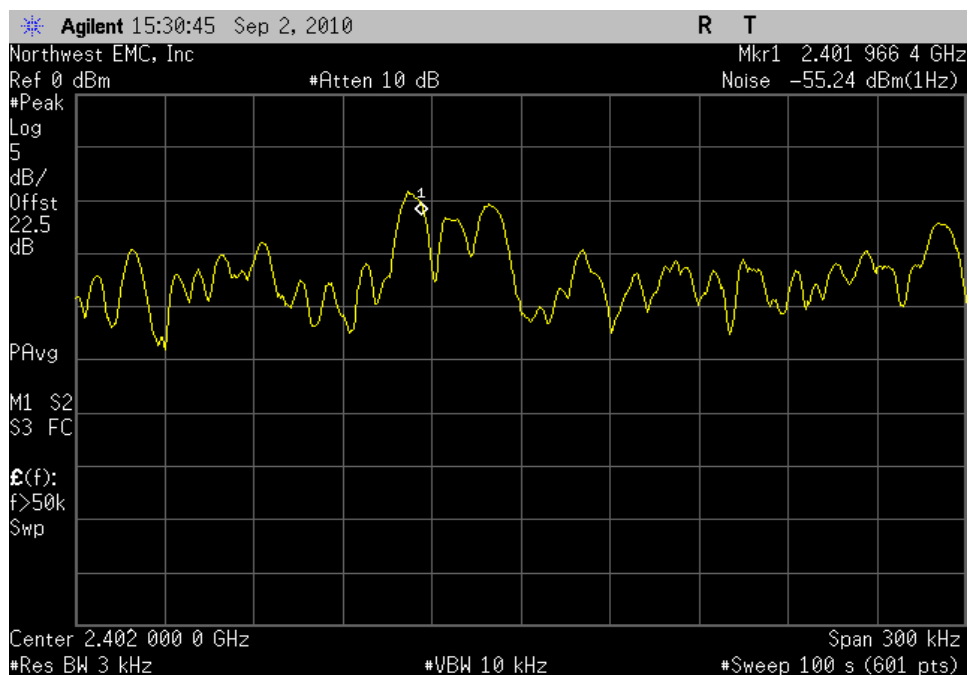


3-DH5, 8-DPSK, Low Channel, 2402 MHz

Result: Pass

Value: -20.4 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

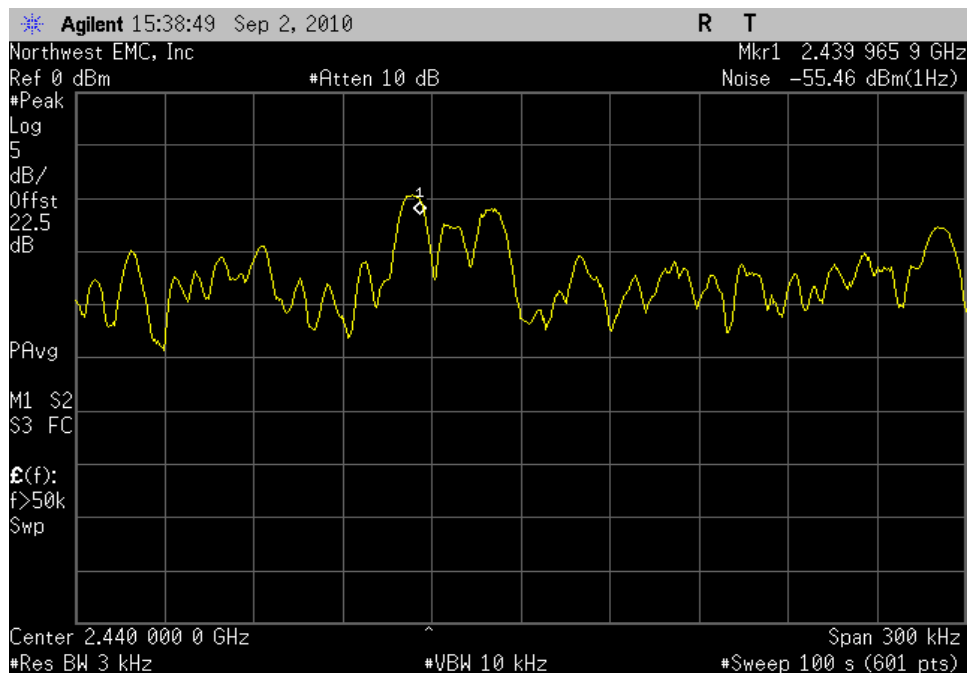


3-DH5, 8-DPSK, Mid Channel, 2440 MHz

Result: Pass

Value: -20.7 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

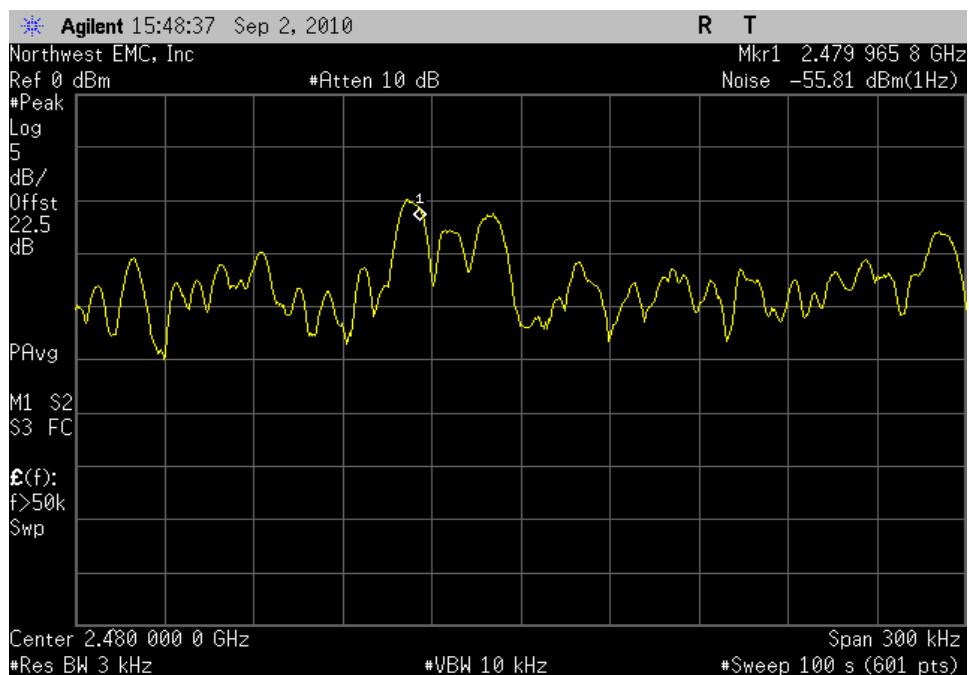


3-DH5, 8-DPSK, High Channel, 2480 MHz

Result: Pass

Value: -21.0 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

GFSK, DH5

4/Pi-DQPSK, 2DH5

8-DPSK, 3DH5

CHANNELS USED FOR FINAL DATA

Low channel, 2402 MHz

Mid channel, 2440 MHz

High channel, 2480 MHz

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency

30 MHz

Stop Frequency

25 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|--------------------|---------------|----------------------------|-----|-----------|----------|
| Spectrum Analyzer | Agilent | E4446A | AAQ | 1/6/2010 | 12 |
| High Pass Filter | Micro-Tronics | HPM50111 | HFO | 7/9/2010 | 13 |
| Pre-Amplifier | Miteq | AM-1616-1000 | AOL | 7/9/2010 | 13 |
| Antenna, Biconilog | EMCO | 3141 | AXE | 1/14/2010 | 13 |
| EV01 Cables | N/A | Bilog Cables | EVA | 7/9/2010 | 13 |
| Pre-Amplifier | Miteq | AMF-4D-010100-24-10P | APW | 7/9/2010 | 13 |
| Antenna, Horn | EMCO | 3115 | AHC | 7/8/2010 | 24 |
| EV01 Cables | N/A | Double Ridge Horn Cables | EVB | 7/9/2010 | 13 |
| Pre-Amplifier | Miteq | AMF-6F-08001200-30-10P | AVC | 8/25/2010 | 13 |
| Antenna, Horn | ETS | 3160-08 | AHV | NCR | 0 |
| Pre-Amplifier | Miteq | AMF-6F-12001800-30-10P | AVD | 8/25/2010 | 13 |
| Antenna, Horn | ETS | 3160-07 | AHU | NCR | 0 |
| EV01 Cables | N/A | Standard Gain Horns Cables | EVF | 8/25/2010 | 13 |
| Pre-Amplifier | Miteq | AMF-6F-18002650-25-10P | AVU | 5/19/2009 | 16 |
| Antenna, Horn | ETS Lindgren | 3160-09 | AIV | NCR | 0 |
| Pre-Amplifier | Miteq | AM-1616-1000 | AVY | 7/19/2010 | 13 |

MEASUREMENT BANDWIDTHS

| | Frequency Range | Peak Data | Quasi-Peak Data | Average Data |
|--|-----------------|-----------|-----------------|--------------|
| | (MHz) | (kHz) | (kHz) | (kHz) |
| | 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| | 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| | 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| | Above 1000 | 1000.0 | N/A | 1000.0 |

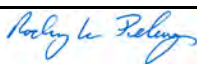
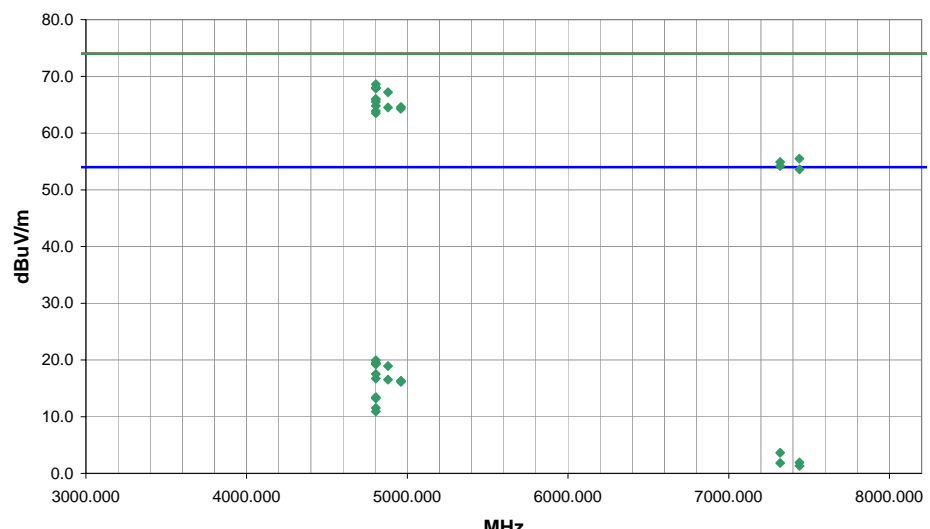
Measurements were made using the bandwidths and detectors specified. No video filter was used.

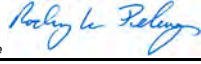
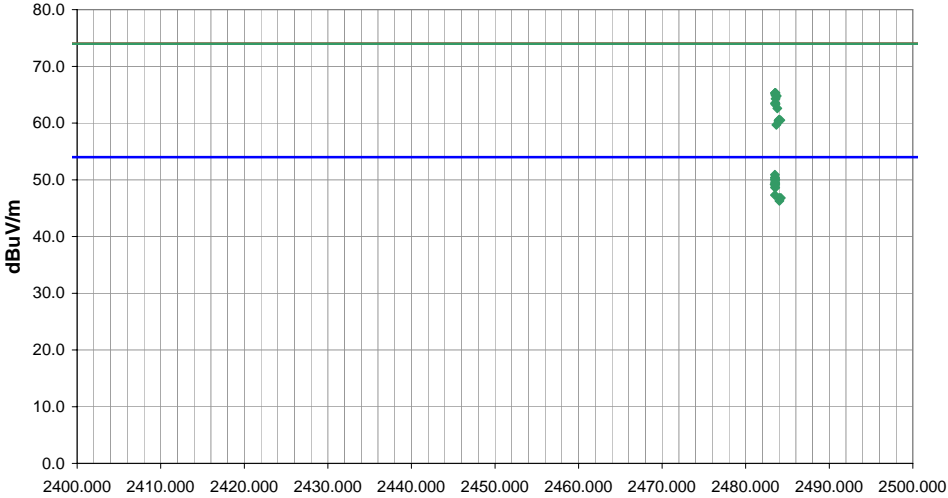
MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

| EMC | | | | | | | | | | SPURIOUS RADIATED EMISSIONS DATA SHEET | | | | | | | | | | PSA 2008.07.21 EMI 2008.1.9 | |
|---|------------------|-------------|-------------------|--|------------------------------|---------------------------|----------|----------|--------------------------|--|--------------------|------------------------|-----------------------------------|--|---|--|--|--|--|--------------------------------|--|
| EUT: WE-ADK | | | | | | | | | | Work Order: QUME0002 | | | | | | | | | | | |
| Serial Number: 18 | | | | | | | | | | Date: 09/07/10 | | | | | | | | | | | |
| Customer: Qualnetics | | | | | | | | | | Temperature: 23 | | | | | | | | | | | |
| Attendees: None | | | | | | | | | | Humidity: 43% | | | | | | | | | | | |
| Project: None | | | | | | | | | | Barometric Pres.: 29.93 | | | | | | | | | | | |
| Tested by: Rod Peloquin | | | | | Power: 120VAC/60Hz | | | | | Job Site: EV01 | | | | | | | | | | | |
| TEST SPECIFICATIONS | | | | | | | | | | Test Method | | | | | | | | | | | |
| FCC 15.247:2010 | | | | | | | | | | ANSI C63.10:2009 | | | | | | | | | | | |
| TEST PARAMETERS | | | | | | | | | | | | | | | | | | | | | |
| Antenna Height(s) (m) | | | | | 1 - 4 | | | | | Test Distance (m) | | | | | 3 | | | | | | |
| COMMENTS | | | | | | | | | | | | | | | | | | | | | |
| All ports populated | | | | | | | | | | | | | | | | | | | | | |
| EUT OPERATING MODES | | | | | | | | | | | | | | | | | | | | | |
| Transmitting | | | | | | | | | | | | | | | | | | | | | |
| DEVIATIONS FROM TEST STANDARD | | | | | | | | | | | | | | | | | | | | | |
| No deviations. | | | | | | | | | | | | | | | | | | | | | |
| Run # | | 1 | |  | | | | | | | | | | | | | | | | | |
| Configuration # | | 1 | | | | | | | | | | | | | | | | | | | |
| Results | | Pass | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | |
| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Azimuth (degrees) | Height (meters) | Duty Cycle Correction Factor | External Attenuation (dB) | Polarity | Detector | Distance Adjustment (dB) | Adjusted dBuV/m | Spec. Limit dBuV/m | Compared to Spec. (dB) | Comments | | | | | | | | |
| 4803.937 | 59.2 | 9.4 | 108.0 | 1.0 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 68.6 | 74.0 | -5.4 | Low channel, DH5, EUT on side | | | | | | | | |
| 4803.717 | 58.6 | 9.4 | 357.0 | 1.1 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 68.0 | 74.0 | -6.0 | Low channel, DH5, EUT horizontal | | | | | | | | |
| 4803.603 | 58.5 | 9.4 | 101.0 | 1.3 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 67.9 | 74.0 | -6.1 | Low channel, DH5, EUT on end | | | | | | | | |
| 4803.660 | 58.5 | 9.4 | 149.0 | 1.3 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 67.9 | 74.0 | -6.1 | Low channel, DH5, EUT on end | | | | | | | | |
| 4879.787 | 57.5 | 9.7 | 145.0 | 1.0 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 67.2 | 74.0 | -6.8 | Mid channel, DH5, EUT horizontal | | | | | | | | |
| 4803.990 | 56.6 | 9.4 | 111.0 | 1.0 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 66.0 | 74.0 | -8.0 | Low channel, 3DH5, EUT on side | | | | | | | | |
| 4803.673 | 56.5 | 9.4 | 120.0 | 1.0 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 65.9 | 74.0 | -8.1 | Low channel, DH5, EUT on side | | | | | | | | |
| 4803.770 | 56.1 | 9.4 | 115.0 | 1.0 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 65.5 | 74.0 | -8.5 | Low channel, 2DH5, EUT on side | | | | | | | | |
| 4803.673 | 55.4 | 9.4 | 49.0 | 1.1 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 64.8 | 74.0 | -9.2 | Low channel, DH5, EUT horizontal | | | | | | | | |
| 4960.243 | 54.5 | 10.1 | 176.0 | 1.0 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 64.6 | 74.0 | -9.4 | High channel, DH5, EUT horizontal | | | | | | | | |
| 4879.617 | 54.8 | 9.7 | 46.0 | 1.0 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 64.5 | 74.0 | -9.5 | Mid channel, DH5, EUT horizontal | | | | | | | | |
| 4959.787 | 54.2 | 10.1 | 158.0 | 1.0 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 64.3 | 74.0 | -9.7 | High channel, DH5, EUT horizontal | | | | | | | | |
| 4803.653 | 54.5 | 9.4 | 357.0 | 1.0 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 63.9 | 74.0 | -10.1 | Low channel, 2DH5, EUT horizontal | | | | | | | | |
| 4804.040 | 54.1 | 9.4 | 354.0 | 1.0 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 63.5 | 74.0 | -10.5 | Low channel, 3DH5, EUT horizontal | | | | | | | | |
| 7439.153 | 39.4 | 16.1 | 102.0 | 1.1 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 55.5 | 74.0 | -18.5 | High channel, DH5, EUT on side | | | | | | | | |
| 7319.823 | 39.2 | 15.7 | 159.0 | 1.0 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 54.9 | 74.0 | -19.1 | Mid channel, DH5, EUT horizontal | | | | | | | | |
| 7319.470 | 38.5 | 15.7 | 154.0 | 1.0 | 0.0 | 0.0 | H-Horn | PK | 0.0 | 54.2 | 74.0 | -19.8 | Mid channel, DH5, EUT on side | | | | | | | | |
| 7439.903 | 37.5 | 16.1 | 105.0 | 1.8 | 0.0 | 0.0 | V-Horn | PK | 0.0 | 53.6 | 74.0 | -20.4 | High channel, DH5, EUT horizontal | | | | | | | | |
| 4804.000 | 50.7 | 9.4 | 108.0 | 1.0 | 40.2 | 0.0 | H-Horn | AV | 0.0 | 19.9 | 54.0 | -34.1 | Low channel, DH5, EUT on side | | | | | | | | |
| 4804.010 | 50.3 | 9.4 | 149.0 | 1.3 | 40.2 | 0.0 | H-Horn | AV | 0.0 | 19.5 | 54.0 | -34.5 | Low channel, DH5, EUT on end | | | | | | | | |

| NORTHWEST EMC | | | | | | | | | | SPURIOUS RADIATED EMISSIONS DATA SHEET | | | | | | | | | | PSA 2008.07.21 EMI 2008.1.9 | |
|---|------------------|-------------|-------------------|---|--------------------|---------------------------|----------|----------|--------------------------|--|--------------------|------------------------|------------------------------------|--|---|--|--|--|--|--------------------------------|--|
| EUT: WE-ADK | | | | | | | | | | Work Order: QUME0002 | | | | | | | | | | | |
| Serial Number: 18 | | | | | | | | | | Date: 09/07/10 | | | | | | | | | | | |
| Customer: Qualnetics | | | | | | | | | | Temperature: 23 | | | | | | | | | | | |
| Attendees: None | | | | | | | | | | Humidity: 43% | | | | | | | | | | | |
| Project: None | | | | | | | | | | Barometric Pres.: 29.93 | | | | | | | | | | | |
| Tested by: Rod Peloquin | | | | | Power: 120VAC/60Hz | | | | | Job Site: EV01 | | | | | | | | | | | |
| TEST SPECIFICATIONS | | | | | | | | | | Test Method | | | | | | | | | | | |
| FCC 15.247:2010 | | | | | | | | | | ANSI C63.10:2009 | | | | | | | | | | | |
| TEST PARAMETERS | | | | | | | | | | | | | | | | | | | | | |
| Antenna Height(s) (m) | | | | | 1 - 4 | | | | | Test Distance (m) | | | | | 3 | | | | | | |
| COMMENTS | | | | | | | | | | | | | | | | | | | | | |
| All ports populated | | | | | | | | | | | | | | | | | | | | | |
| EUT OPERATING MODES | | | | | | | | | | | | | | | | | | | | | |
| Transmitting | | | | | | | | | | | | | | | | | | | | | |
| DEVIATIONS FROM TEST STANDARD | | | | | | | | | | | | | | | | | | | | | |
| No deviations. | | | | | | | | | | | | | | | | | | | | | |
| Run # | | 2 | |  Signature | | | | | | | | | | | | | | | | | |
| Configuration # | | 1 | | | | | | | | | | | | | | | | | | | |
| Results | | Pass | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | |
| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Azimuth (degrees) | Height (meters) | Distance (meters) | External Attenuation (dB) | Polarity | Detector | Distance Adjustment (dB) | Adjusted dBuV/m | Spec. Limit dBuV/m | Compared to Spec. (dB) | Comments | | | | | | | | |
| 2483.500 | 28.6 | 2.3 | 94.0 | 1.8 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 50.9 | 54.0 | -3.1 | High channel, 2DH5, EUT on side | | | | | | | | |
| 2483.500 | 28.1 | 2.3 | 179.0 | 1.5 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 50.4 | 54.0 | -3.6 | High channel, 2DH5, EUT horizontal | | | | | | | | |
| 2483.520 | 28.0 | 2.3 | 146.0 | 1.2 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 50.3 | 54.0 | -3.7 | High channel, 2DH5, EUT on side | | | | | | | | |
| 2483.522 | 27.7 | 2.3 | 92.0 | 1.8 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 50.0 | 54.0 | -4.0 | High channel, 3DH5, EUT on side | | | | | | | | |
| 2483.527 | 27.7 | 2.3 | 144.0 | 1.3 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 50.0 | 54.0 | -4.0 | High channel, 3DH5, EUT on side | | | | | | | | |
| 2483.542 | 27.7 | 2.3 | 178.0 | 1.5 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 50.0 | 54.0 | -4.0 | High channel, 3DH5, EUT horizontal | | | | | | | | |
| 2483.513 | 27.3 | 2.3 | 90.0 | 1.0 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 49.6 | 54.0 | -4.4 | High channel, 2DH5, EUT horizontal | | | | | | | | |
| 2483.525 | 27.1 | 2.3 | 7.0 | 1.2 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 49.4 | 54.0 | -4.6 | High channel, 2DH5, EUT on end | | | | | | | | |
| 2483.452 | 26.9 | 2.3 | 202.0 | 1.0 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 49.2 | 54.0 | -4.8 | High channel, 3DH5, EUT horizontal | | | | | | | | |
| 2483.537 | 26.8 | 2.3 | 34.0 | 1.5 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 49.1 | 54.0 | -4.9 | High channel, 3DH5, EUT on end | | | | | | | | |
| 2483.517 | 26.4 | 2.3 | 167.0 | 1.5 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 48.7 | 54.0 | -5.3 | High channel, 3DH5, EUT on end | | | | | | | | |
| 2483.528 | 26.3 | 2.3 | 169.0 | 1.0 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 48.6 | 54.0 | -5.4 | High channel, 2DH5, EUT on end | | | | | | | | |
| 2483.502 | 25.0 | 2.3 | 90.0 | 1.8 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 47.3 | 54.0 | -6.7 | High channel, DH5, EUT on side | | | | | | | | |
| 2484.015 | 24.5 | 2.3 | 178.0 | 1.0 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 46.8 | 54.0 | -7.2 | High channel, DH5, EUT horizontal | | | | | | | | |
| 2484.212 | 24.5 | 2.3 | 147.0 | 1.2 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 46.8 | 54.0 | -7.2 | High channel, DH5, EUT on side | | | | | | | | |
| 2484.040 | 24.0 | 2.3 | 277.0 | 1.0 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 46.3 | 54.0 | -7.7 | High channel, DH5, EUT horizontal | | | | | | | | |
| 2483.523 | 43.0 | 2.3 | 92.0 | 1.8 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 65.3 | 74.0 | -8.7 | High channel, 3DH5, EUT on side | | | | | | | | |
| 2483.523 | 43.0 | 2.3 | 93.0 | 1.8 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 65.3 | 74.0 | -8.7 | High channel, 2DH5, EUT on side | | | | | | | | |
| 2483.565 | 43.0 | 2.3 | 178.0 | 1.5 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 65.3 | 74.0 | -8.7 | High channel, 3DH5, EUT horizontal | | | | | | | | |
| 2483.542 | 42.7 | 2.3 | 147.0 | 1.3 | 3.0 | 20.0 | V-Horn | PK | 0.0 | 65.0 | 74.0 | -9.0 | High channel, 3DH5, EUT on side | | | | | | | | |

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

| |
|--------------------------------------|
| Transmitting, GFSK DH5, high channel |
| Transmitting, GFSK DH5, mid channel |
| Transmitting, GFSK DH5, low channel |

POWER SETTINGS INVESTIGATED

| |
|-------------|
| 120VAC/60Hz |
|-------------|

CONFIGURATIONS INVESTIGATED

| |
|--------------|
| QUME0002 - 1 |
|--------------|

SAMPLE CALCULATIONS

| |
|---|
| Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator |
|---|

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|------------------|-----------------|------------------|-----|-----------|----------|
| Receiver | Rohde & Schwarz | ESCI | ARE | 4/29/2010 | 12 mo |
| High Pass Filter | TTE | H97-100K-50-720B | HFX | 2/16/2010 | 13 mo |
| Attenuator | Coaxicom | 66702 2910-20 | ATO | 8/6/2010 | 13 mo |
| EV07 Cables | N/A | Conducted Cables | EVG | 6/21/2010 | 13 mo |
| LISN | Solar | 9252-50-R-24-BNC | LIN | 5/27/2010 | 12 mo |

MEASUREMENT BANDWIDTHS

| | Frequency Range | Peak Data | Quasi-Peak Data | Average Data |
|--|-----------------|-----------|-----------------|--------------|
| | (MHz) | (kHz) | (kHz) | (kHz) |
| | 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| | 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| | 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| | Above 1000 | 1000.0 | N/A | 1000.0 |

Measurements were made using the bandwidths and detectors specified. No video filter was used.

MEASUREMENT UNCERTAINTY

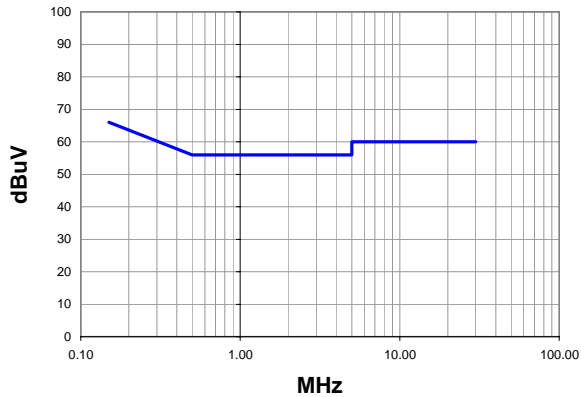
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

TEST DESCRIPTION

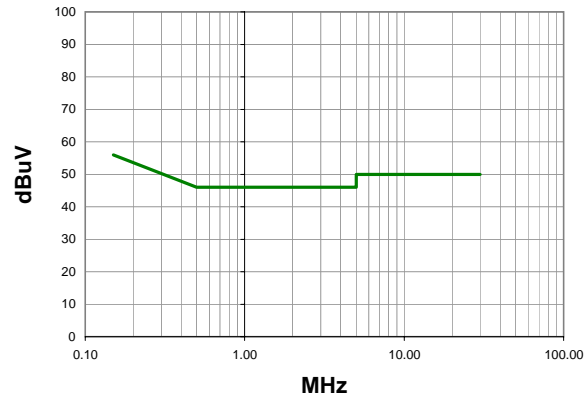
The EUT will be powered from a device that could be connected to the AC power line. Therefore, the measurements were made on the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The radio is installed in a Class A digital device. Therefore conducted emissions testing was performed with the radio operating in the specified modes and then compared to the emissions data taken with the radio turned off. Only those emissions attributed to radio were reported. The test setup and procedures were in accordance with ANSI C63.10.

| | | | | | |
|---|-------------------------------------|--------------------------|--|---|----|
| Work Order: | QUME0002 | Date: | 09/08/10 | <i>Jennifer Herrett</i> Tested by: Jennifer Herrett | |
| Project: | None | Temperature: | 22 | | |
| Job Site: | EV07 | Humidity: | 46 | | |
| Serial Number: | 18 | Barometric Pres.: | 1010.7 | | |
| EUT: | WE-ADK | | | | |
| Configuration: | 1 - Radiated Spurious Emissions | | | | |
| Customer: | Qualnetics | | | | |
| Attendees: | None | | | | |
| EUT Power: | 120VAC/60Hz | | | | |
| Operating Mode: | Transmitting, GFSK DH5, low channel | | | | |
| Deviations: | No deviations. | | | | |
| Comments: | All ports populated | | | | |
| Test Specifications FCC 15.207:2010 | | | Test Method ANSI C63.10:2009 | | |
| Run # | 3 | Line: | High Line | Ext. Attenuation: | 20 |
| Results | | | | Pass | |

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| 0.10 | 65 | 0 | 65 | 60 | +5 |
| 1.00 | 55 | 0 | 55 | 60 | -5 |
| 10.00 | 55 | 0 | 55 | 60 | -5 |
| 100.00 | 55 | 0 | 55 | 60 | -5 |

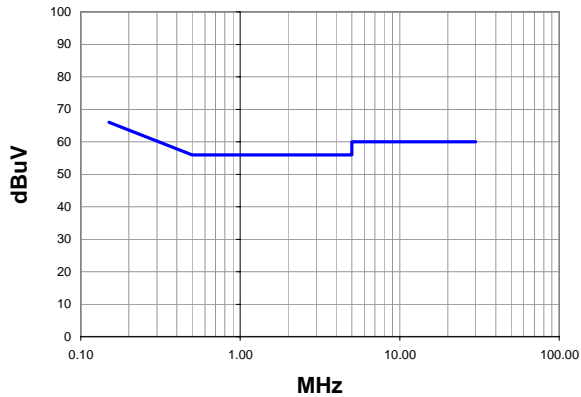
Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| 0.10 | 55 | 0 | 55 | 50 | +5 |
| 1.00 | 45 | 0 | 45 | 50 | -5 |
| 10.00 | 45 | 0 | 45 | 50 | -5 |
| 100.00 | 45 | 0 | 45 | 50 | -5 |

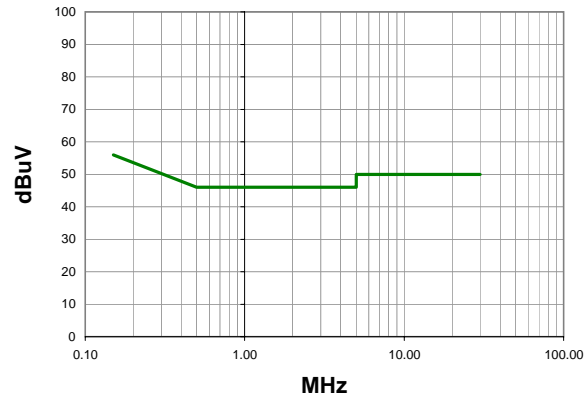
No significant emissions observed that can be attributed to the radio.

| | | | | | | | |
|---|-------------------------------------|--------------------------|--|---|----|----------------|------|
| Work Order: | QUME0002 | Date: | 09/08/10 | <i>Jennifer Herrett</i> Tested by: Jennifer Herrett | | | |
| Project: | None | Temperature: | 22 | | | | |
| Job Site: | EV07 | Humidity: | 46 | | | | |
| Serial Number: | 18 | Barometric Pres.: | 1010.7 | | | | |
| EUT: | WE-ADK | | | | | | |
| Configuration: | 1 - Radiated Spurious Emissions | | | | | | |
| Customer: | Qualnetics | | | | | | |
| Attendees: | None | | | | | | |
| EUT Power: | 120VAC/60Hz | | | | | | |
| Operating Mode: | Transmitting, GFSK DH5, low channel | | | | | | |
| Deviations: | No deviations. | | | | | | |
| Comments: | All ports populated | | | | | | |
| Test Specifications FCC 15.207:2010 | | | Test Method ANSI C63.10:2009 | | | | |
| Run # | 4 | Line: | Neutral | Ext. Attenuation: | 20 | Results | Pass |

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit




Quasi Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| | | | | | |

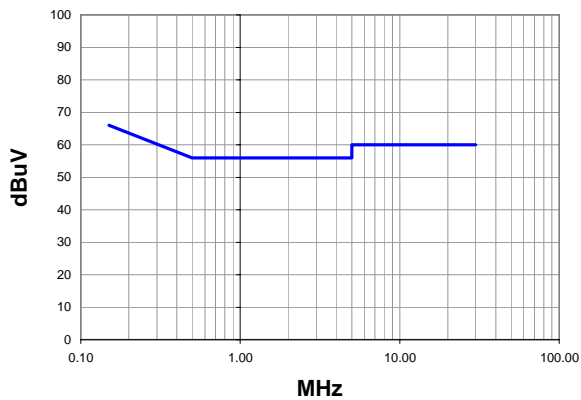
Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| | | | | | |

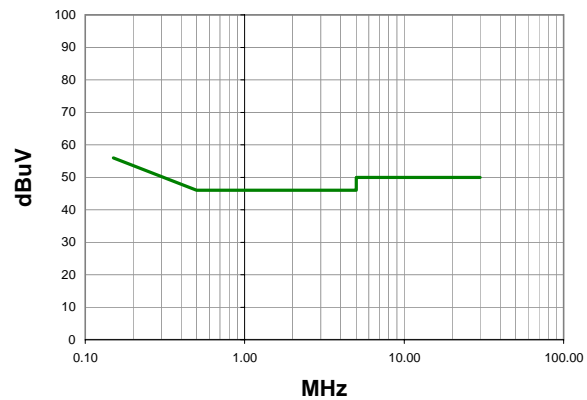
No significant emissions observed that can be attributed to the radio.

| | | | | | | | |
|---|-------------------------------------|--------------------------|--|---|----|----------------|------|
| Work Order: | QUME0002 | Date: | 09/08/10 |  | | | |
| Project: | None | Temperature: | 22 | | | | |
| Job Site: | EV07 | Humidity: | 46 | | | | |
| Serial Number: | 18 | Barometric Pres.: | 1010.7 | | | | |
| EUT: | WE-ADK | | | | | | |
| Configuration: | 1 - Radiated Spurious Emissions | | | | | | |
| Customer: | Qualnetics | | | | | | |
| Attendees: | None | | | | | | |
| EUT Power: | 120VAC/60Hz | | | | | | |
| Operating Mode: | Transmitting, GFSK DH5, mid channel | | | | | | |
| Deviations: | No deviations. | | | | | | |
| Comments: | All ports populated | | | | | | |
| Test Specifications FCC 15.207:2010 | | | Test Method ANSI C63.10:2009 | | | | |
| Run # | 7 | Line: | High Line | Ext. Attenuation: | 20 | Results | Pass |

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit

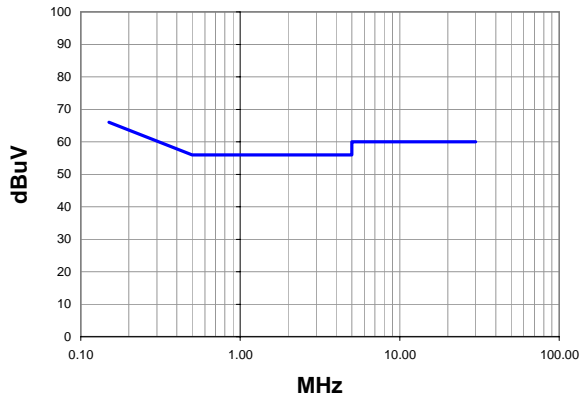


| Quasi Peak Data - vs - Quasi Peak Limit | | | | | | Average Data - vs - Average Limit | | | | | |
|---|------------------|-------------|-------------|----------------|------------------------|-----------------------------------|------------------|-------------|-------------|----------------|------------------------|
| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) | Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
| | | | | | | | | | | | |

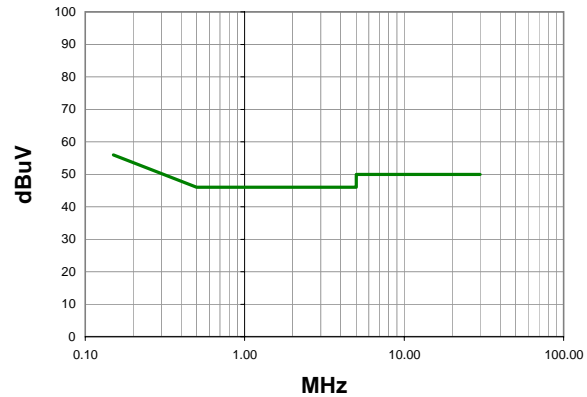
No significant emissions observed that can be attributed to the radio.

| | | | | | | | |
|---|-------------------------------------|--------------------------|--|------------------------------------|----|----------------|------|
| Work Order: | QUME0002 | Date: | 09/08/10 | <i>Jennifer Herrett</i> | | | |
| Project: | None | Temperature: | 22 | | | | |
| Job Site: | EV07 | Humidity: | 46 | | | | |
| Serial Number: | 18 | Barometric Pres.: | 1010.7 | Tested by: Jennifer Herrett | | | |
| EUT: | WE-ADK | | | | | | |
| Configuration: | 1 - Radiated Spurious Emissions | | | | | | |
| Customer: | Qualnetics | | | | | | |
| Attendees: | None | | | | | | |
| EUT Power: | 120VAC/60Hz | | | | | | |
| Operating Mode: | Transmitting, GFSK DH5, mid channel | | | | | | |
| Deviations: | No deviations. | | | | | | |
| Comments: | All ports populated | | | | | | |
| Test Specifications FCC 15.207:2010 | | | Test Method ANSI C63.10:2009 | | | | |
| Run # | 8 | Line: | Neutral | Ext. Attenuation: | 20 | Results | Pass |

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| | | | | | |

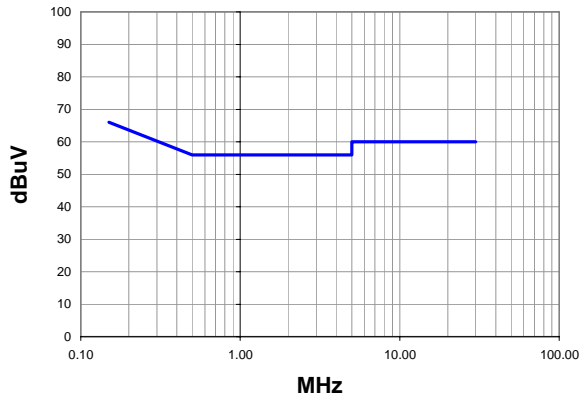
Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| | | | | | |

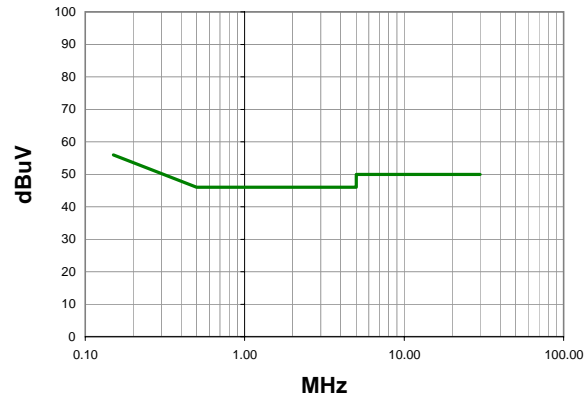
No significant emissions observed that can be attributed to the radio.

| | | | | | | | |
|---|--------------------------------------|--------------------------|--|------------------------------------|----|----------------|------|
| Work Order: | QUME0002 | Date: | 09/08/10 | <i>Jennifer Herrett</i> | | | |
| Project: | None | Temperature: | 22 | | | | |
| Job Site: | EV07 | Humidity: | 46 | | | | |
| Serial Number: | 18 | Barometric Pres.: | 1010.7 | Tested by: Jennifer Herrett | | | |
| EUT: | WE-ADK | | | | | | |
| Configuration: | 1 - Radiated Spurious Emissions | | | | | | |
| Customer: | Qualnetics | | | | | | |
| Attendees: | None | | | | | | |
| EUT Power: | 120VAC/60Hz | | | | | | |
| Operating Mode: | Transmitting, GFSK DH5, high channel | | | | | | |
| Deviations: | No deviations. | | | | | | |
| Comments: | All ports populated | | | | | | |
| Test Specifications FCC 15.207:2010 | | | Test Method ANSI C63.10:2009 | | | | |
| Run # | 9 | Line: | Neutral | Ext. Attenuation: | 20 | Results | Pass |

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| | | | | | |

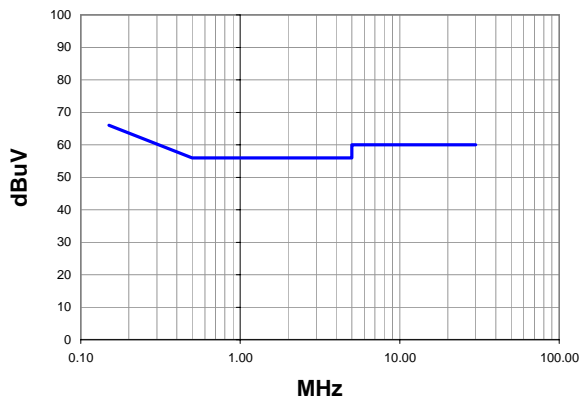
Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|------------|------------------|-------------|-------------|----------------|------------------------|
| | | | | | |

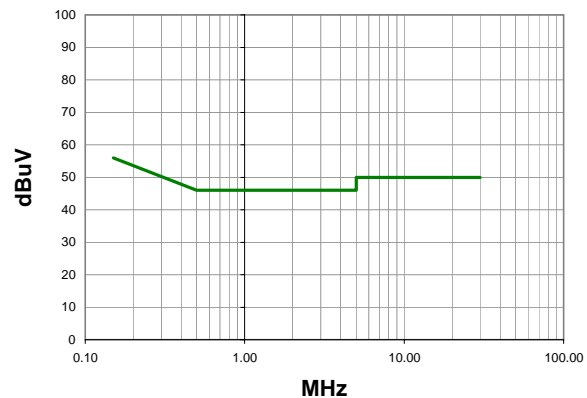
No significant emissions observed that can be attributed to the radio.

| | | | | | | | |
|---|--------------------------------------|--------------------------|--|------------------------------------|----|----------------|------|
| Work Order: | QUME0002 | Date: | 09/08/10 | <i>Jennifer Herrett</i> | | | |
| Project: | None | Temperature: | 22 | | | | |
| Job Site: | EV07 | Humidity: | 46 | | | | |
| Serial Number: | 18 | Barometric Pres.: | 1010.7 | Tested by: Jennifer Herrett | | | |
| EUT: | WE-ADK | | | | | | |
| Configuration: | 1 - Radiated Spurious Emissions | | | | | | |
| Customer: | Qualnetics | | | | | | |
| Attendees: | None | | | | | | |
| EUT Power: | 120VAC/60Hz | | | | | | |
| Operating Mode: | Transmitting, GFSK DH5, high channel | | | | | | |
| Deviations: | No deviations. | | | | | | |
| Comments: | All ports populated | | | | | | |
| Test Specifications FCC 15.207:2010 | | | Test Method ANSI C63.10:2009 | | | | |
| Run # | 10 | Line: | High Line | Ext. Attenuation: | 20 | Results | Pass |

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



| Quasi Peak Data - vs - Quasi Peak Limit | | | | | | Average Data - vs - Average Limit | | | | | |
|---|------------------|-------------|-------------|----------------|------------------------|-----------------------------------|------------------|-------------|-------------|----------------|------------------------|
| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) | Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |

No significant emissions observed that can be attributed to the radio.