# Trimble Navigation Limited

## Ranger/TSC3 Bluetooth Radio

EMC Test Report

**Report No. TRPO0054.1**

Report Prepared By

NORTHWEST EMC

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

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

# Certificate of Test

## Last Date of Test: January 5, 2010
## Trimble Navigation Limited
## Model: Ranger/TSC3 Bluetooth Radio

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

Phone: (503) 844-4066 Fax: (503) 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-2).

**Approved By:**

*Don Facteau, 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).

# Accreditations and Authorizations

## 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, 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)*

## SCOPE

For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

# Northwest EMC Locations

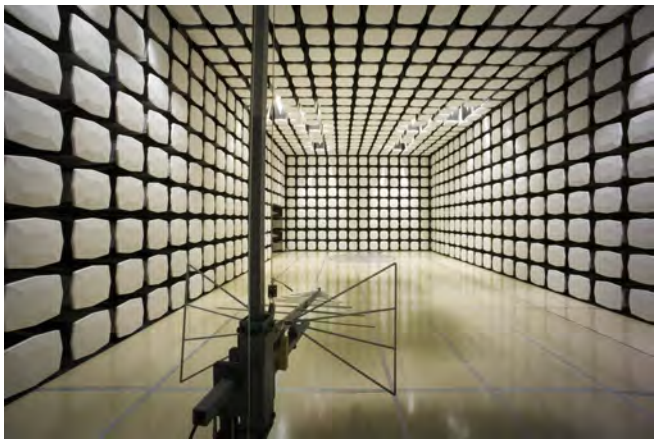

Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

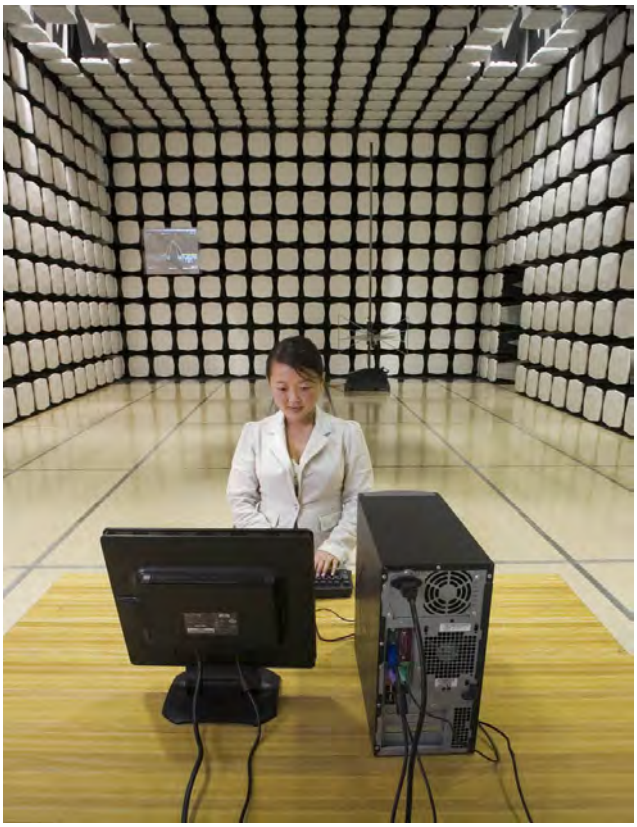
California
Labs OC01-OC13
41 Tesla
Irvine, CA 92618
(949) 861-8918

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:** | Trimble Navigation Limited |
| **Address:** | 345 SW Avery Ave |
| **City, State, Zip:** | Corvallis, OR 97333 |
| **Test Requested By:** | Bob Grant |
| **Model:** | Ranger/TSC3 Bluetooth Radio |
| **First Date of Test:** | January 5, 2010 |
| **Last Date of Test:** | December 3, 2009 |
| **Receipt Date of Samples:** | December 1, 2009 |
| **Equipment Design Stage:** | Prototype |
| **Equipment Condition:** | No Damage |

## Information Provided by the Party Requesting the Test

| **Functional Description of the EUT (Equipment Under Test):** |
|---|
| 802.11b/g - Bluetooth combo radio module |

| **Testing Objective:** |
|---|
| To demonstrate compliance of the Bluetooth portion of the radio with FCC 15.247 requirements. |

## CONFIGURATION 1 TRPO0054

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Windows Mobile Professional | 6.5 |
| BT_Spew (For BT radio) | 1.2.0.2 |
| WIFI_Spew (For 802.11 radio) | 1.1.3.01 |

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Hand Held Computer | Trimble Navigation Limited | Ranger/TSC3 | RTL2A00004 |
| 802.11 / Bluetooth combo radio | Trimble Navigation Limited | Unknown | Unknown |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AC Adapter | Ault | PW173KB1500F03 | 0933A |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| DC Power | PA | 1.0m | PA | Hand Held Computer | AC Adapter |
| AC Power | No | 1.8m | No | AC Adapter | AC Mains |
| Serial | Yes | 1.0m | No | Hand Held Computer | Unterminated |
| USB | Yes | 1.0m | No | Hand Held Computer | Unterminated |
| Mini USB | Yes | 1.0m | No | Hand Held Computer | Unterminated |
| **PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.** | | | | | |

## CONFIGURATION 2 TRPO0054

| Software/Firmware Running during test | |
|---|---|
| **Description** | **Version** |
| Windows Mobile Professional | 6.5 |
| BT_Spew (For BT radio) | 1.2.0.2 |
| WIFI_Spew (For 802.11 radio) | 1.1.3.01 |

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Hand Held Computer | Trimble Navigation Limited | Ranger/TSC3 | RTL2A00030 |
| 802.11 / Bluetooth combo radio | Trimble Navigation Limited | Unknown | Unknown |

| Peripherals in test setup boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| AC Adapter | Ault | PW173KB1500F03 | 0933A |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| DC Power | PA | 1.0m | PA | Hand Held Computer | AC Adapter |
| AC Power | No | 1.8m | No | AC Adapter | AC Mains |
| Serial | Yes | 1.0m | No | Hand Held Computer | Unterminated |
| USB | Yes | 1.0m | No | Hand Held Computer | Unterminated |
| Mini USB | Yes | 1.0m | No | Hand Held Computer | Unterminated |
| **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 | 12/3/2009 | 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. |
| 2 | 12/7/2009 | 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 | 12/7/2009 | 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 | 12/7/2009 | 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. |
| 5 | 12/7/2009 | 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. |
| 6 | 12/7/2009 | 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. |
| 7 | 1/5/2010 | AC Powerline Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Schedule 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 M**Hz.
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 µs. 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 µs). 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 a 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 µs * 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 µs * 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 fcenter = 75 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 | 13 |
| 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 | 7/21/2009 | 13 |

## 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.

NORTHWEST EMC

# OCCUPIED BANDWIDTH

XMit 2009.03.05

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio | | | **Work Order:** | TRPO0054 |
| **Serial Number:** | Unknown | | | **Date:** | 12/07/09 |
| **Customer:** | Trimble Navigation Limited | | | **Temperature:** | 20°C |
| **Attendees:** | None | | | **Humidity:** | 38% |
| **Project:** | None | | | **Barometric Pres.:** | 30.15 |
| **Tested by:** | Rod Peloquin | **Power:** | 120VAC/60Hz | **Job Site:** | EV06 |

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

**COMMENTS**

None

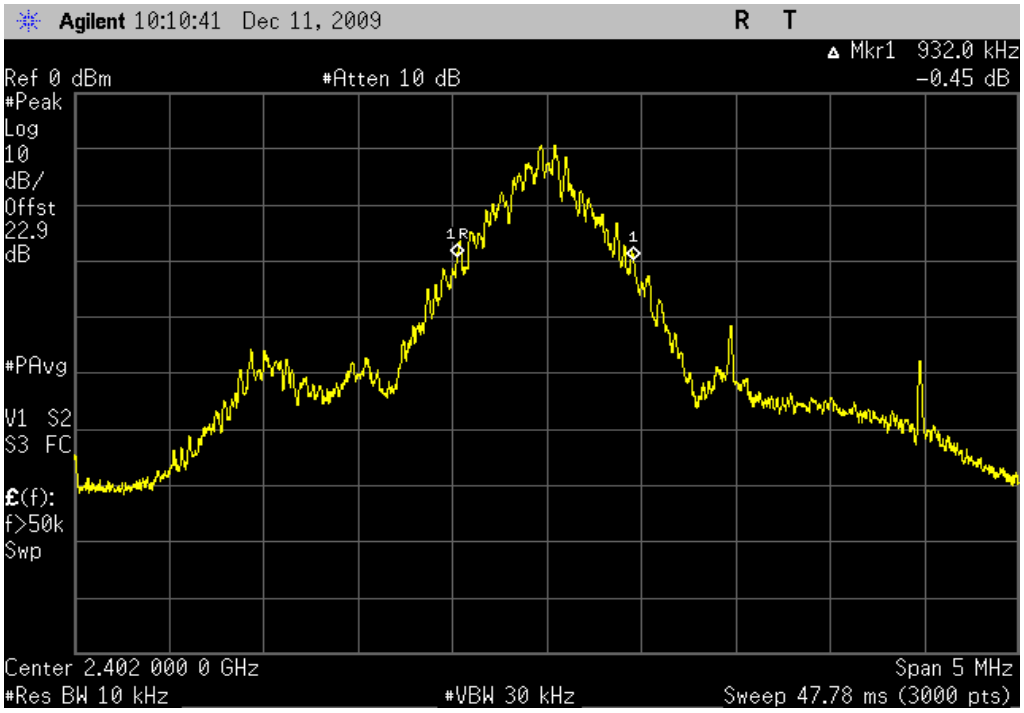
**DEVIATIONS FROM TEST STANDARD**

No Deviations

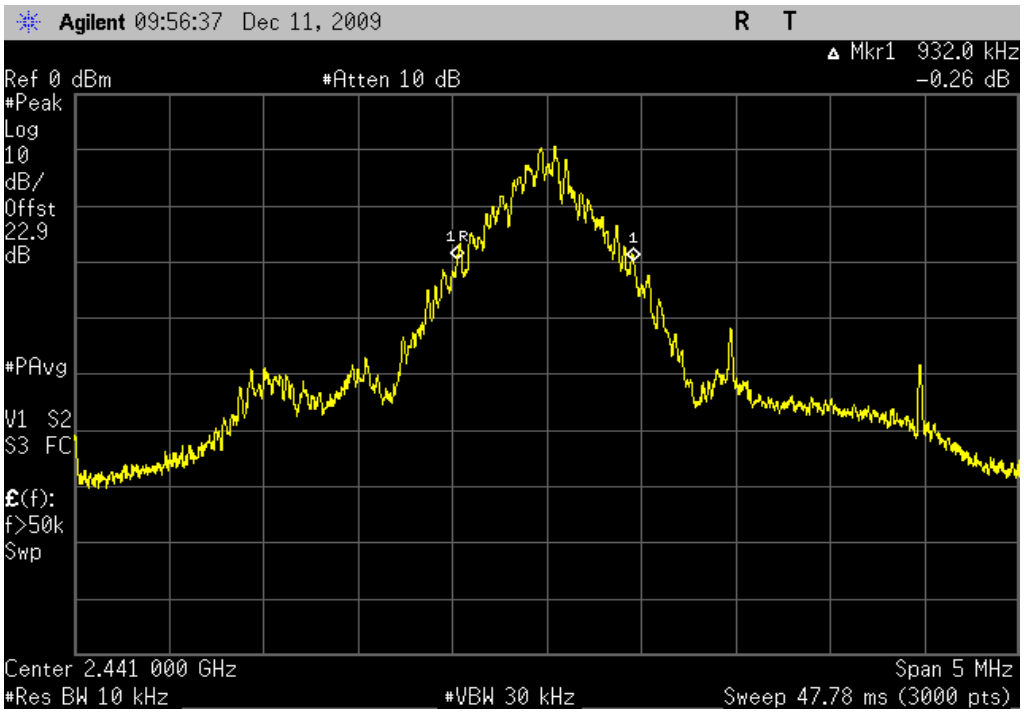
| Configuration # | 2 | Signature |
|---|---|---|

| | | Value | Limit | Results |
|---|---|---|---|---|
| GFSK, DH5 | | | | |
| | Low Channel, 2402MHz | 932 kHz | 1.5 MHz | Pass |
| | Mid Channel, 2441 MHz | 932 kHz | 1.5 MHz | Pass |
| | High Channel, 2480 MHz | 930 kHz | 1.5 MHz | Pass |
| pi/4-DQPSK, 2DH5 | | | | |
| | Low Channel, 2402MHz | 1.330 MHz | 1.5 MHz | Pass |
| | Mid Channel, 2441 MHz | 1.327 MHz | 1.5 MHz | Pass |
| | High Channel, 2480 MHz | 1.325 MHz | 1.5 MHz | Pass |
| 8-DPSK, 3DH5 | | | | |
| | Low Channel, 2402MHz | 1.327 MHz | 1.5 MHz | Pass |
| | Mid Channel, 2441 MHz | 1.325 MHz | 1.5 MHz | Pass |
| | High Channel, 2480 MHz | 1.342 MHz | 1.5 MHz | Pass |

| GFSK, DH5, Low Channel, 2402MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 932 kHz | **Limit:** | 1.5 MHz |

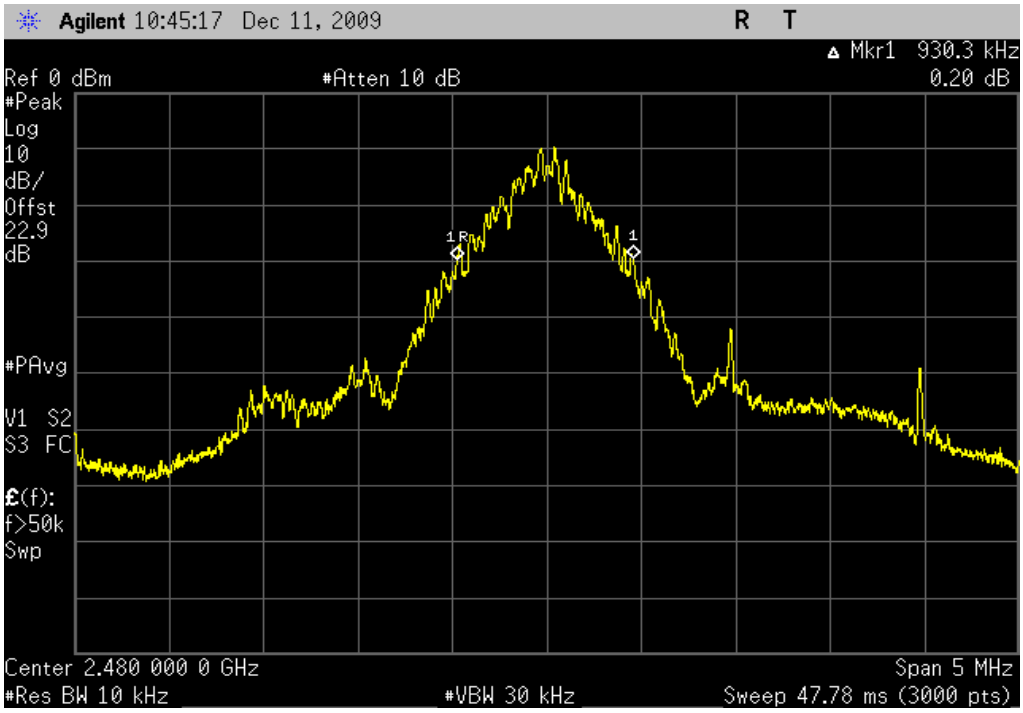



| GFSK, DH5, Mid Channel, 2441 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 932 kHz | **Limit:** | 1.5 MHz |

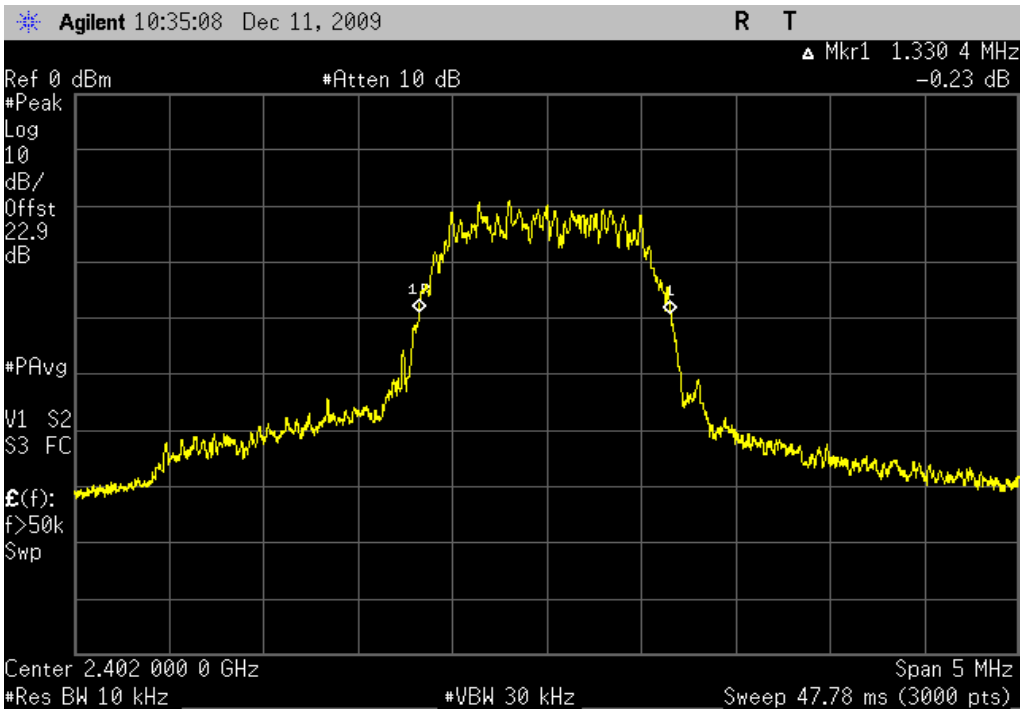


# OCCUPIED BANDWIDTH

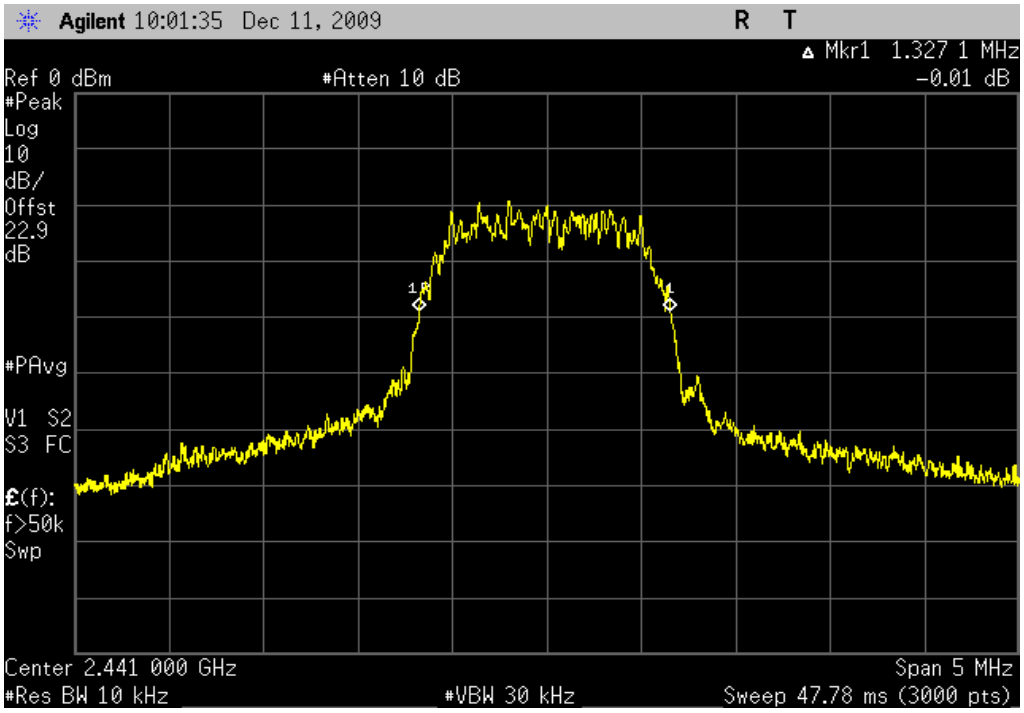
| GFSK, DH5, High Channel, 2480 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 930 kHz | **Limit:** | 1.5 MHz |



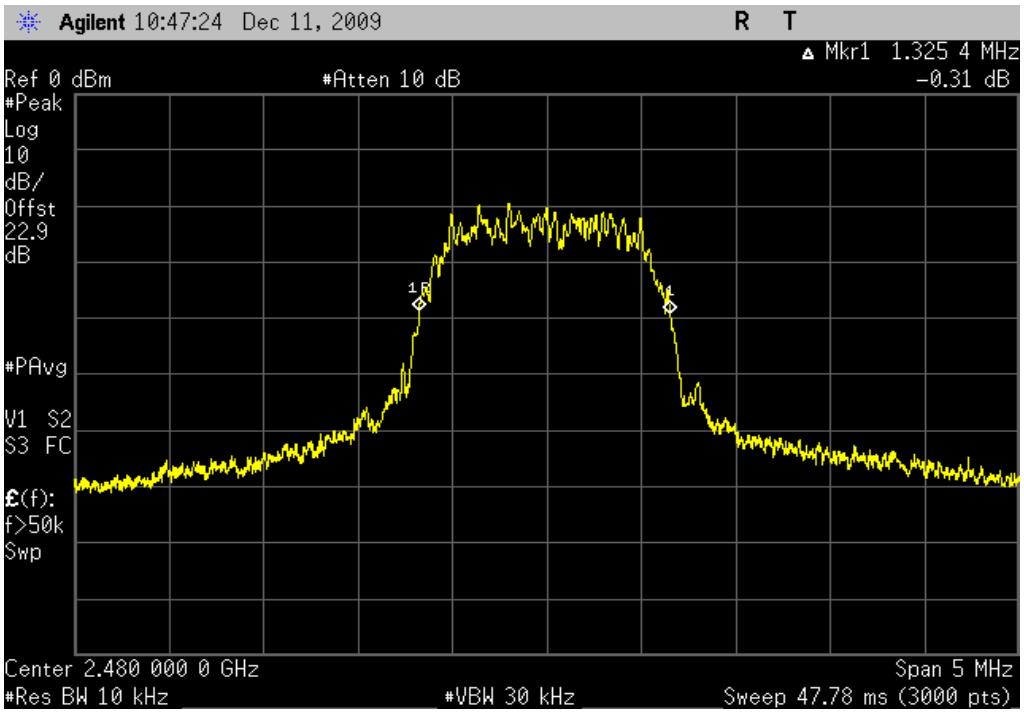

| pi/4-DQPSK, 2DH5, Low Channel, 2402MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 1.330 MHz | **Limit:** | 1.5 MHz |



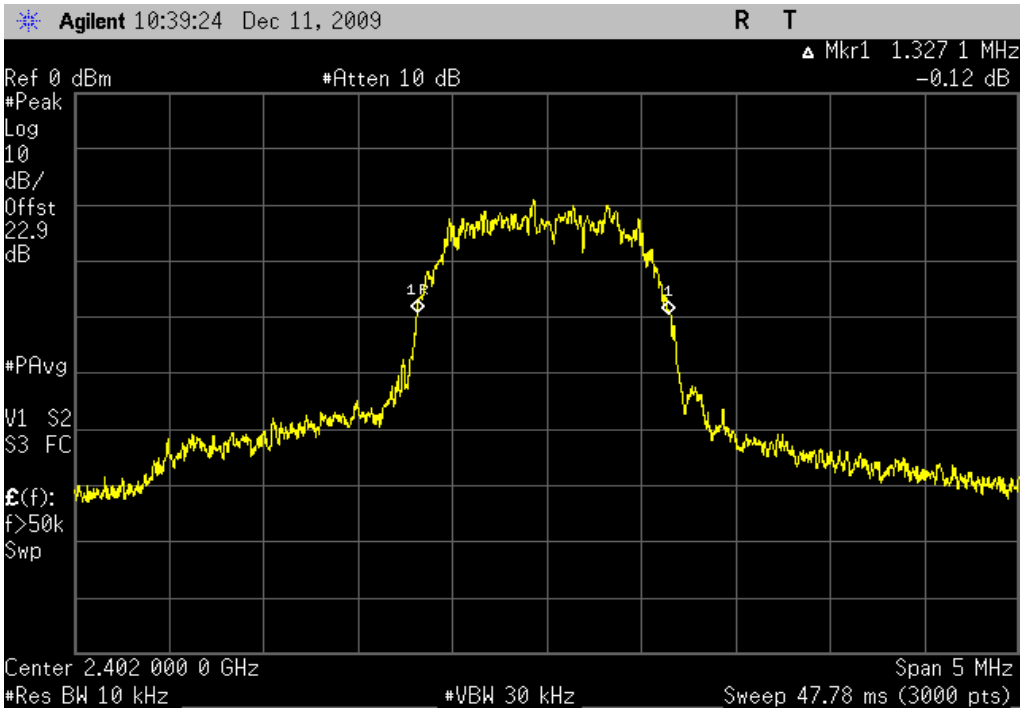
| pi/4-DQPSK, 2DH5, Mid Channel, 2441 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 1.327 MHz | **Limit:** | 1.5 MHz |



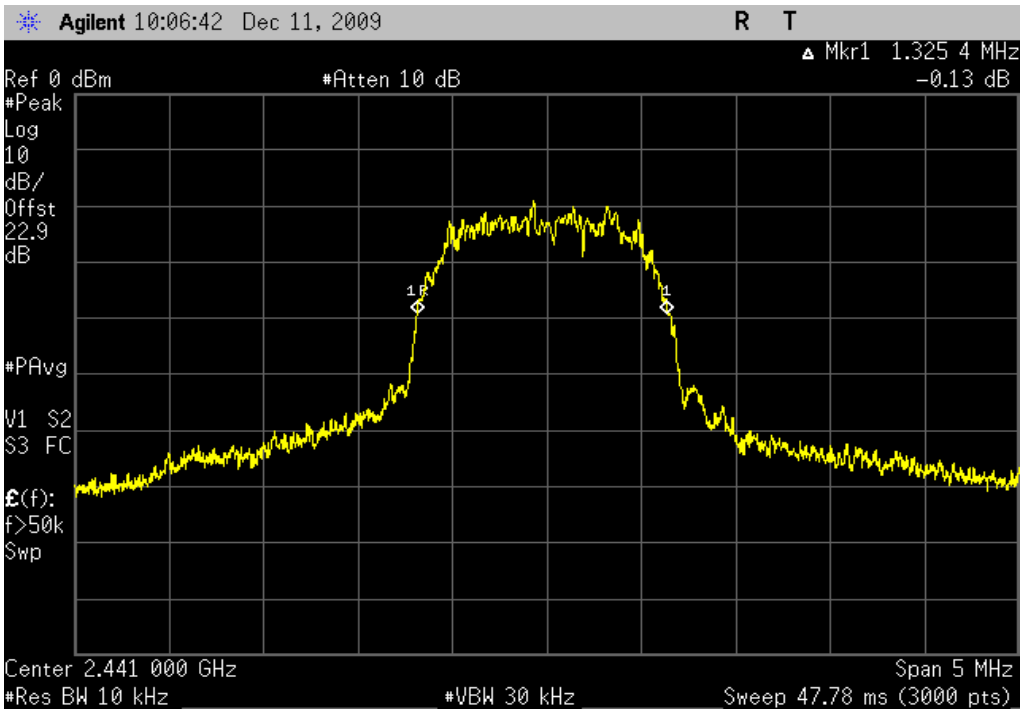

| pi/4-DQPSK, 2DH5, High Channel, 2480 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 1.325 MHz | **Limit:** | 1.5 MHz |



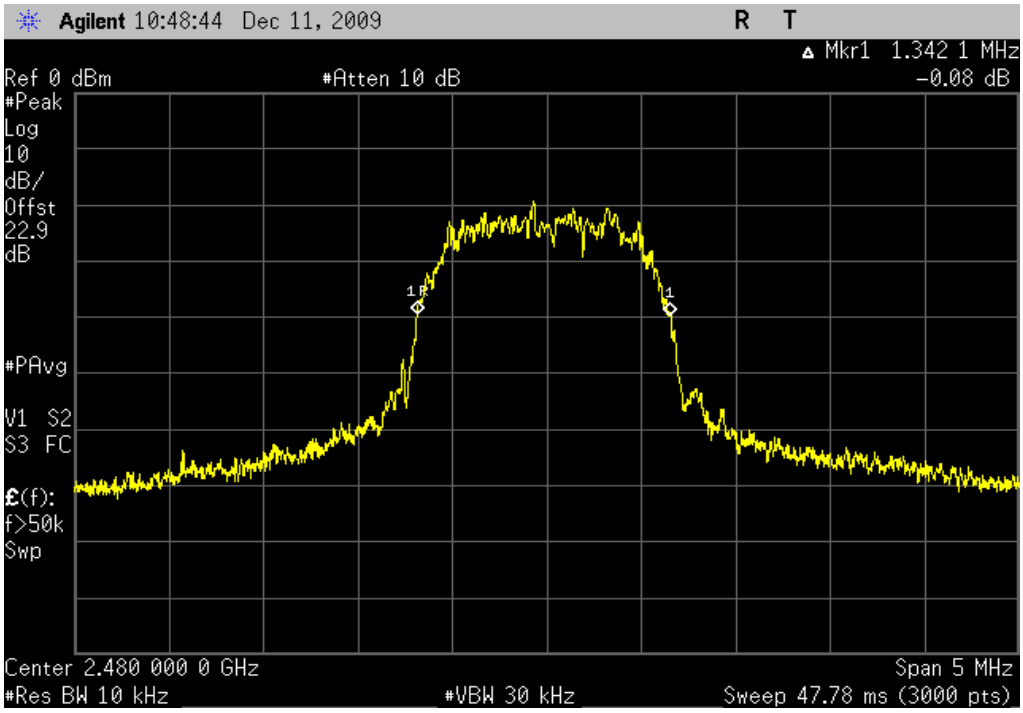
| 8-DPSK, 3DH5, Low Channel, 2402MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 1.327 MHz | **Limit:** | 1.5 MHz |




| 8-DPSK, 3DH5, Mid Channel, 2441 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 1.325 MHz | **Limit:** | 1.5 MHz |



| 8-DPSK, 3DH5, High Channel, 2480 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 1.342 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 | 13 |
| 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 | 7/21/2009 | 13 |

## 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 in a no hop mode at its maximum data rate for each of the three different modulations available.

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

NORTHWEST EMC

# OUTPUT POWER

XMit 2009.03.05

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio | | | **Work Order:** | TRPO0054 |
| **Serial Number:** | Unknown | | | **Date:** | 12/07/09 |
| **Customer:** | Trimble Navigation Limited | | | **Temperature:** | 20°C |
| **Attendees:** | None | | | **Humidity:** | 38% |
| **Project:** | None | | | **Barometric Pres.:** | 30.15 |
| **Tested by:** | Rod Peloquin | **Power:** | 120VAC/60Hz | **Job Site:** | EV06 |

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

**COMMENTS**

0.75 dB added to analyzer offset for adapter cable loss.

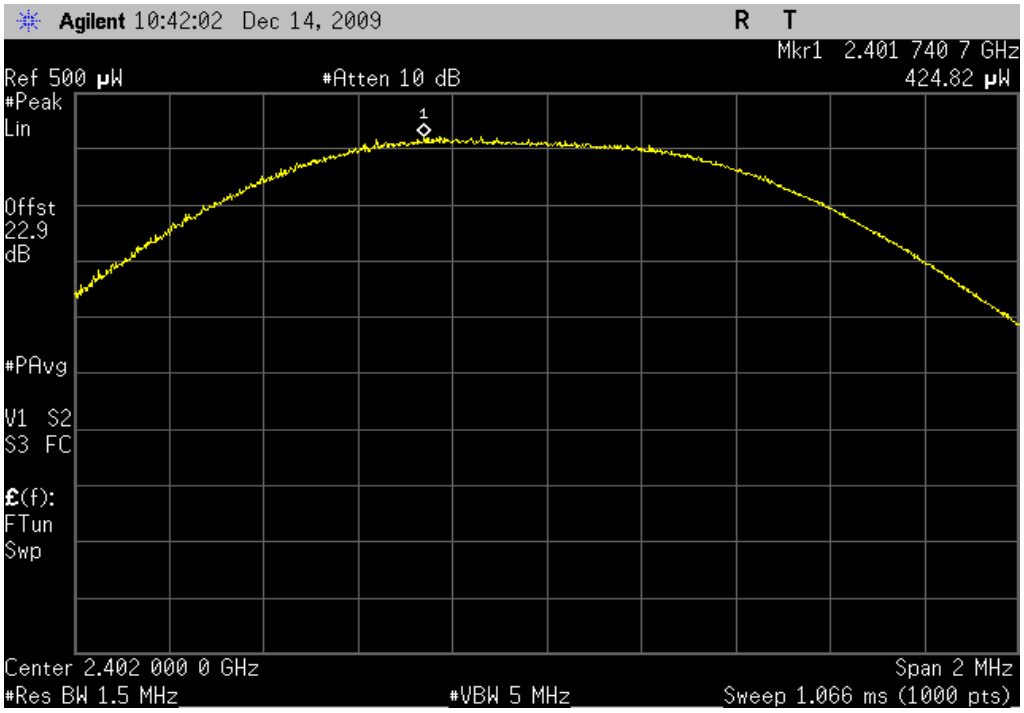
**DEVIATIONS FROM TEST STANDARD**

No Deviations

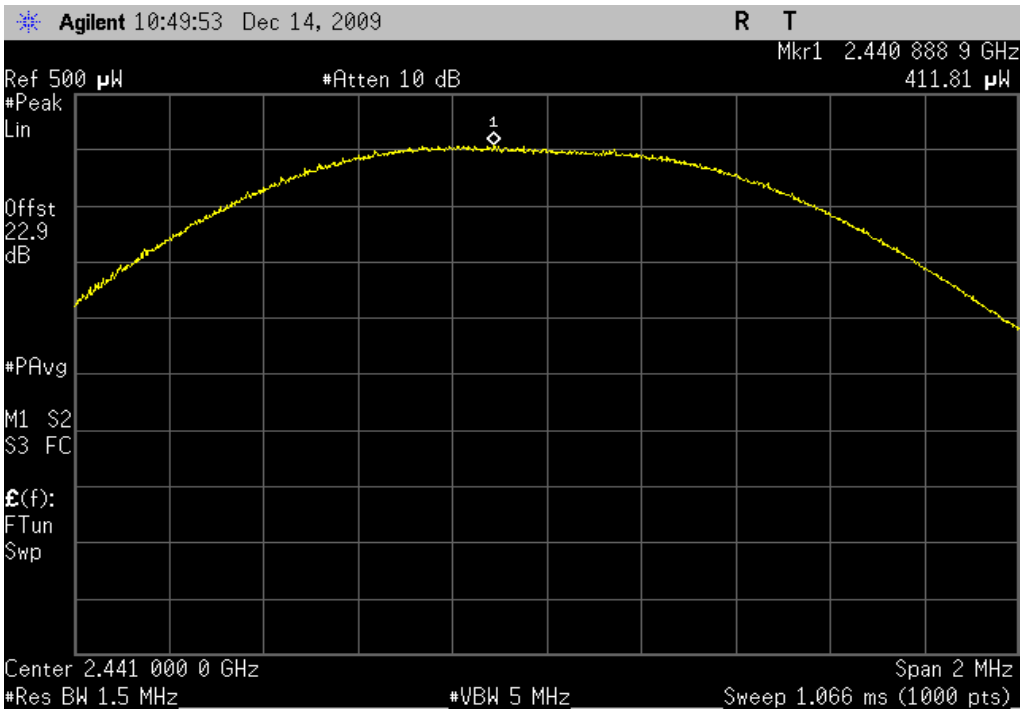
| Configuration # | 2 | Signature |
|---|---|---|

| | | Value | Limit | Results |
|---|---|---|---|---|
| DH5, GFSK | | | | |
| | Low Channel | 0.425 mW | 1 W | Pass |
| | Mid Channel | 0.412 mW | 1 W | Pass |
| | High Channel | 0.397 mW | 1 W | Pass |
| 2DH5, 4-DQPSK | | | | |
| | Low Channel | 0.221 mW | 1 W | Pass |
| | Mid Channel | 0.215 mW | 1 W | Pass |
| | High Channel | 0.206 mW | 1 W | Pass |
| 3DH5, 8-DPSK | | | | |
| | Low Channel | 0.247 mW | 1 W | Pass |
| | Mid Channel | 0.243 mW | 1 W | Pass |
| | High Channel | 0.235 mW | 1 W | Pass |

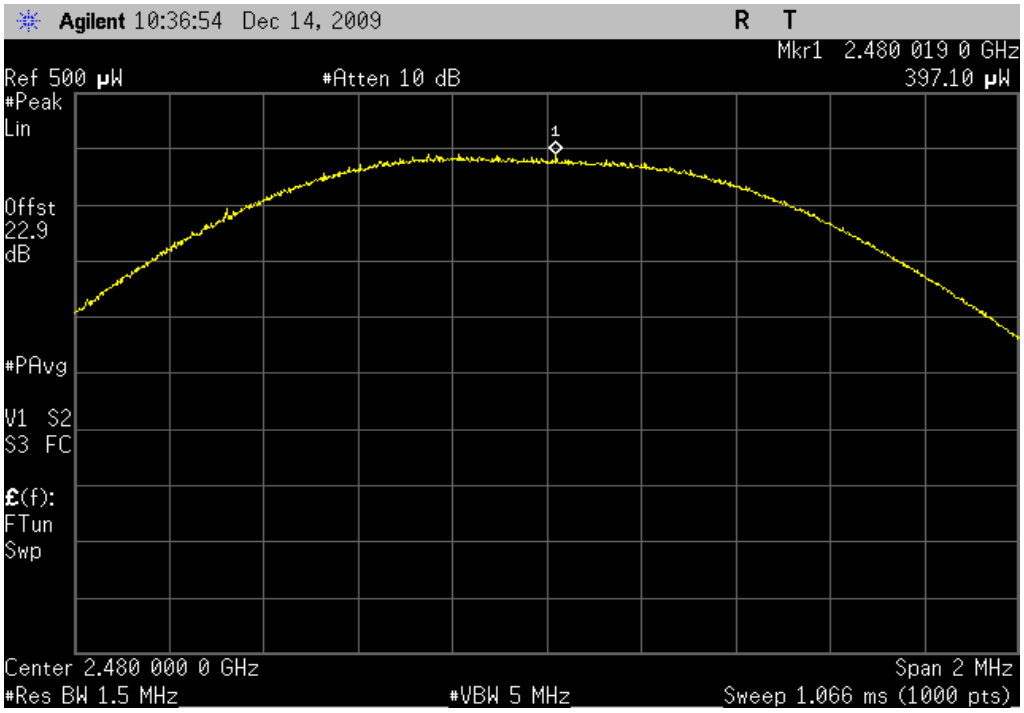
| DH5, GFSK, Low Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.425 mW | **Limit:** | 1 W |



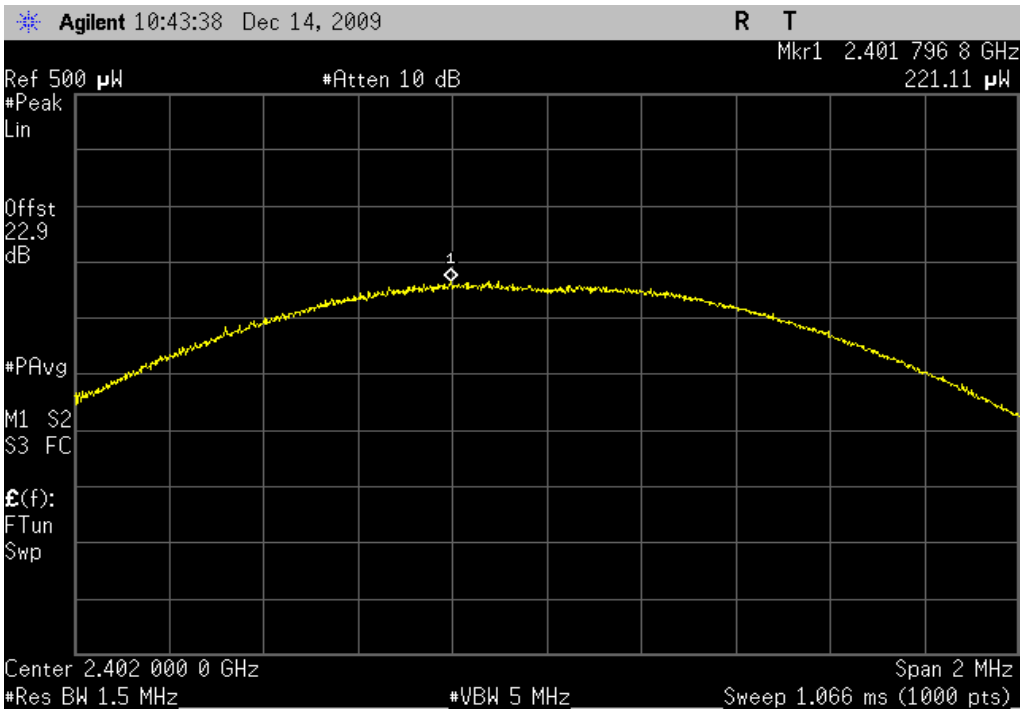

| DH5, GFSK, Mid Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.412 mW | **Limit:** | 1 W |



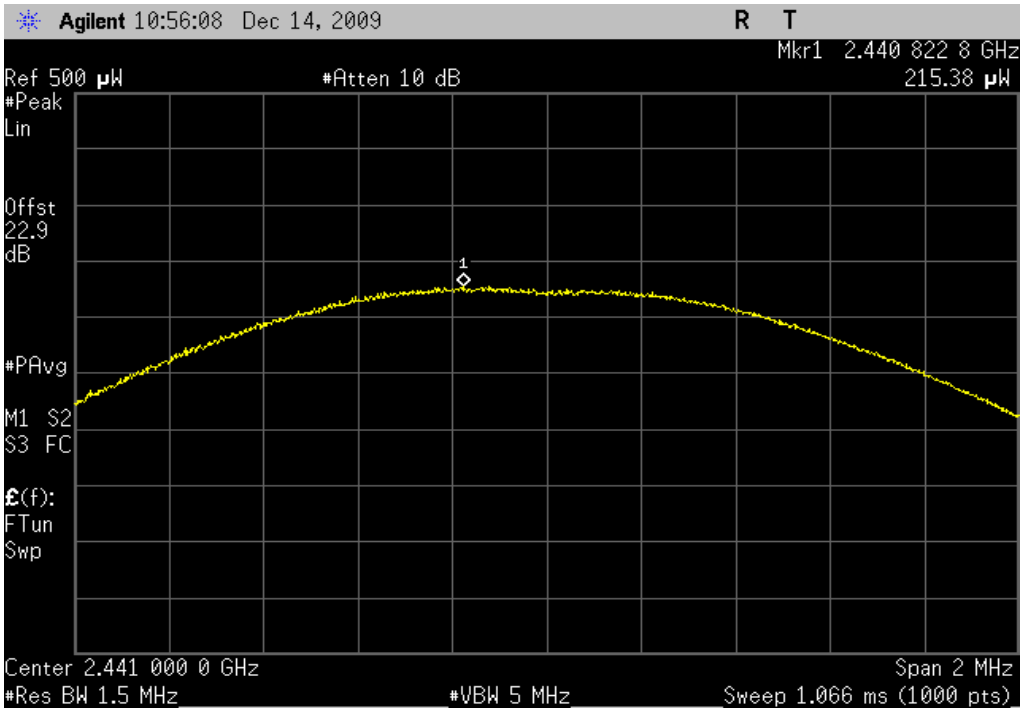
| DH5, GFSK, High Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.397 mW | **Limit:** | 1 W |



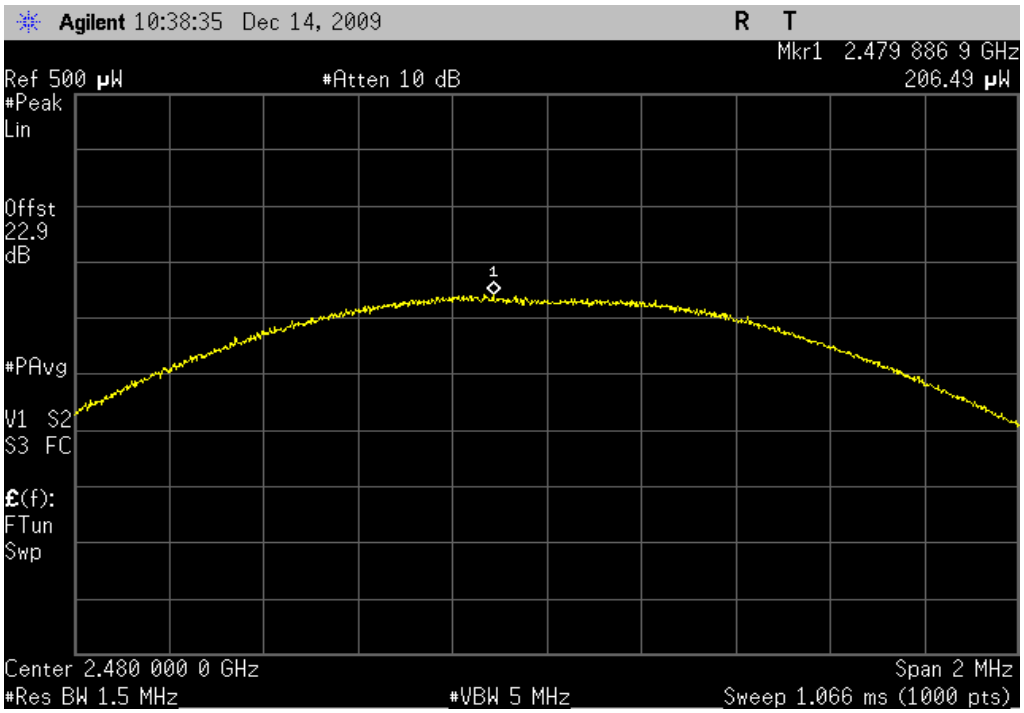

| 2DH5, 4-DQPSK, Low Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.221 mW | **Limit:** | 1 W |



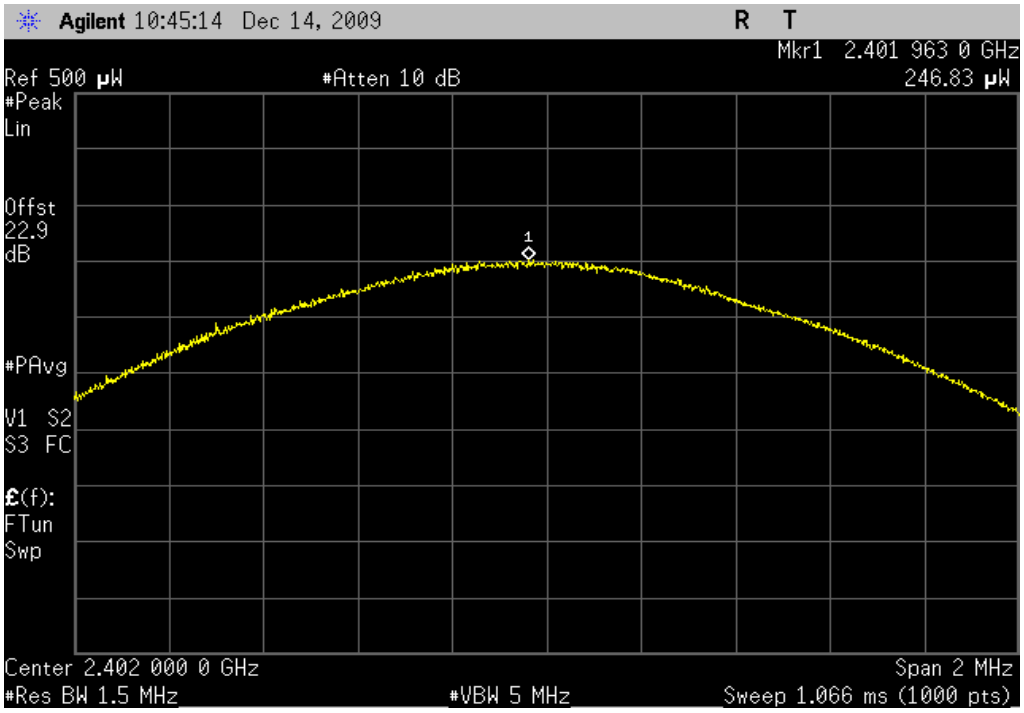
| 2DH5, 4-DQPSK, Mid Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.215 mW | **Limit:** | 1 W |



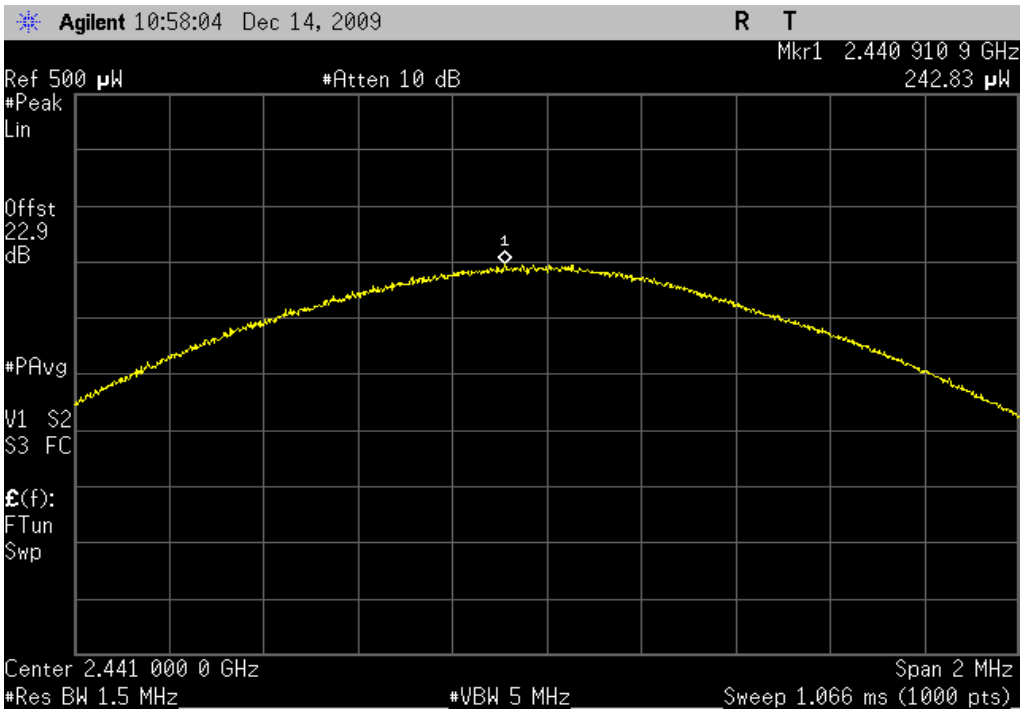

| 2DH5, 4-DQPSK, High Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.206 mW | **Limit:** | 1 W |



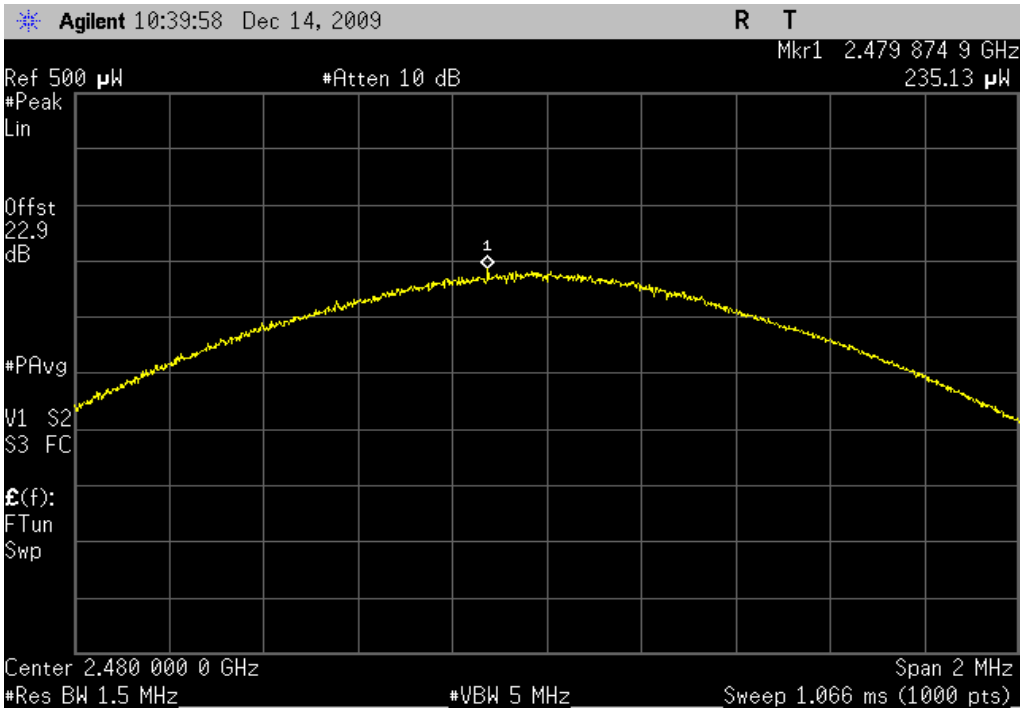
| 3DH5, 8-DPSK, Low Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.247 mW | **Limit:** | 1 W |




| 3DH5, 8-DPSK, Mid Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.243 mW | **Limit:** | 1 W |



| 3DH5, 8-DPSK, High Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | 0.235 mW | **Limit:** | 1 W |



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 | 13 |
| 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 | 7/21/2009 | 13 |

## 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.

NORTHWEST EMC

# BAND EDGE COMPLIANCE

XMit 2009.03.05

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio | | | **Work Order:** | TRPO0054 |
| **Serial Number:** | Unknown | | | **Date:** | 12/07/09 |
| **Customer:** | Trimble Navigation Limited | | | **Temperature:** | 20°C |
| **Attendees:** | None | | | **Humidity:** | 38% |
| **Project:** | None | | | **Barometric Pres.:** | 30.15 |
| **Tested by:** | Rod Peloquin | **Power:** | 120VAC/60Hz | **Job Site:** | EV06 |

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

**COMMENTS**

0.75 dB added to analyzer offset for adapter cable loss.

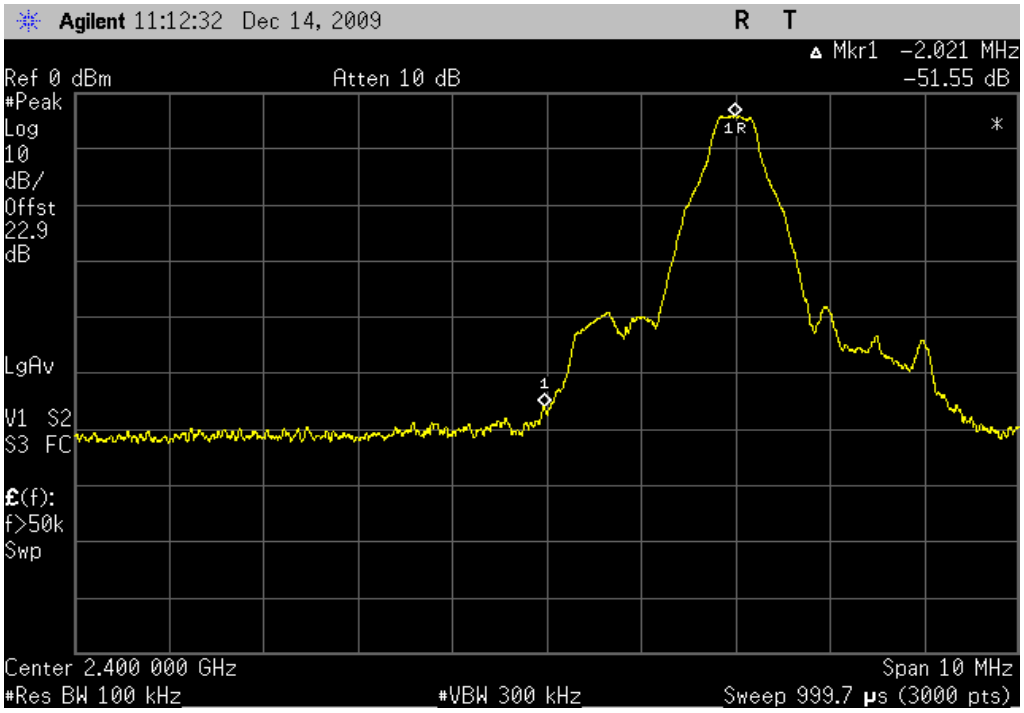
**DEVIATIONS FROM TEST STANDARD**

No Deviations

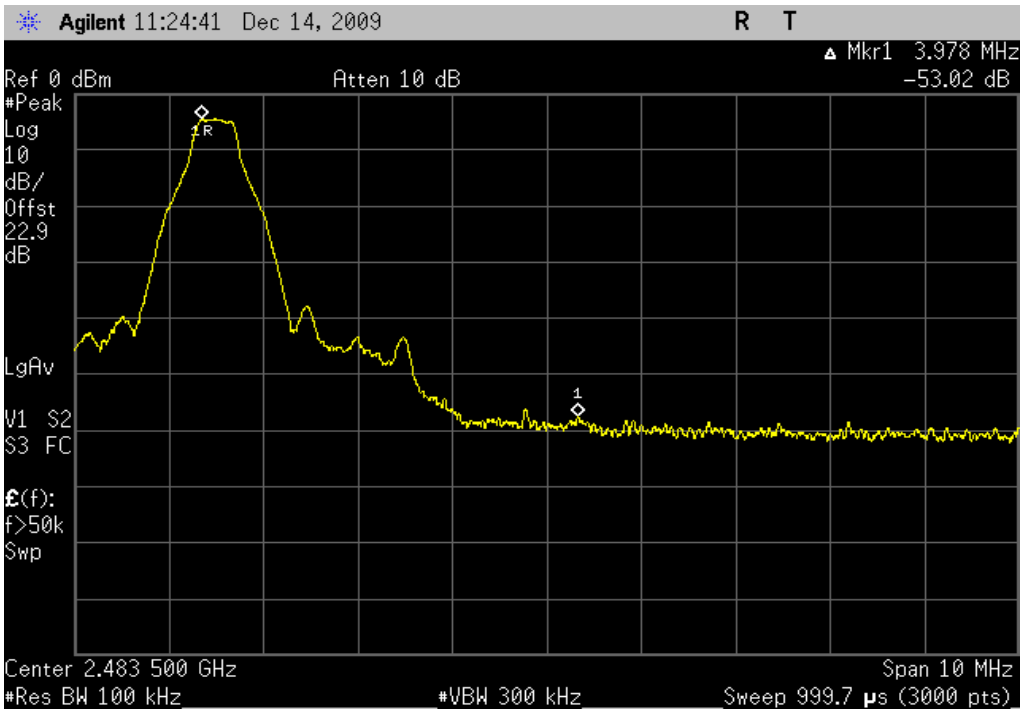
| Configuration # | 2 | Signature |
|---|---|---|

| | | Value | Limit | Results |
|---|---|---|---|---|
| GFSK, DH5 | | | | |
| | Low Channel | -51.6 dBc | ≤ -20 dBc | Pass |
| | High Channel | -53.0 dBc | ≤ -20 dBc | Pass |
| pi/4-DQPSK, 2DH5 | | | | |
| | Low Channel | -42.8 dBc | ≤ -20 dBc | Pass |
| | High Channel | -48.1 dBc | ≤ -20 dBc | Pass |
| 8-DPSK, 3DH5 | | | | |
| | Low Channel | -43.8 dBc | ≤ -20 dBc | Pass |
| | High Channel | -47.7 dBc | ≤ -20 dBc | Pass |

| GFSK, DH5, Low Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -51.6 dBc | **Limit:** | ≤ -20 dBc |

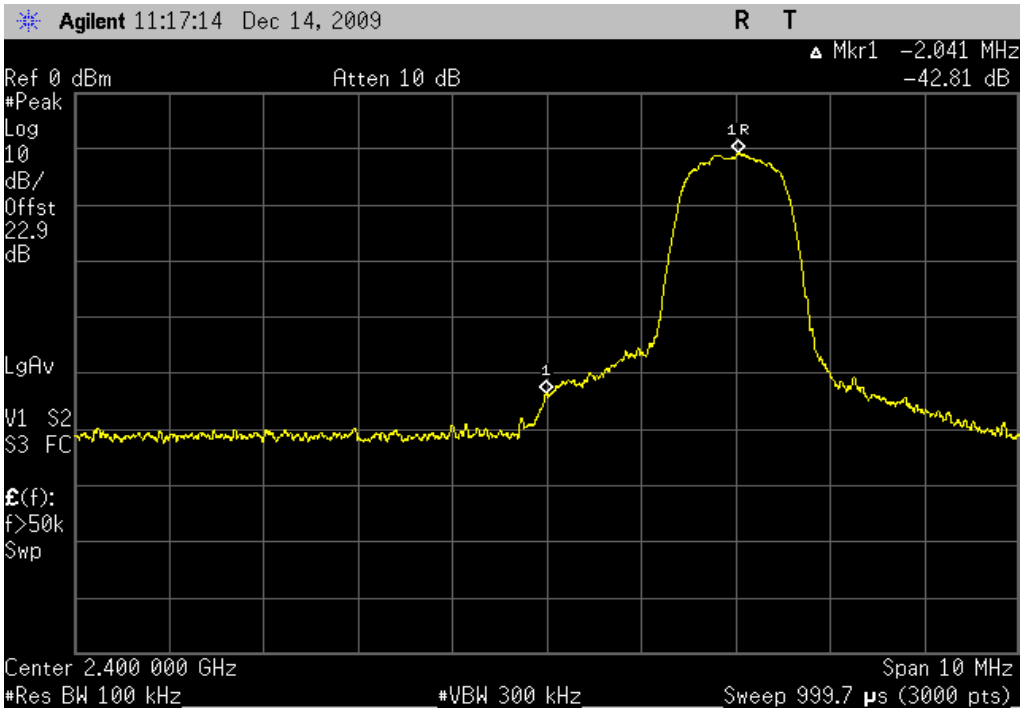



| GFSK, DH5, High Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -53.0 dBc | **Limit:** | ≤ -20 dBc |

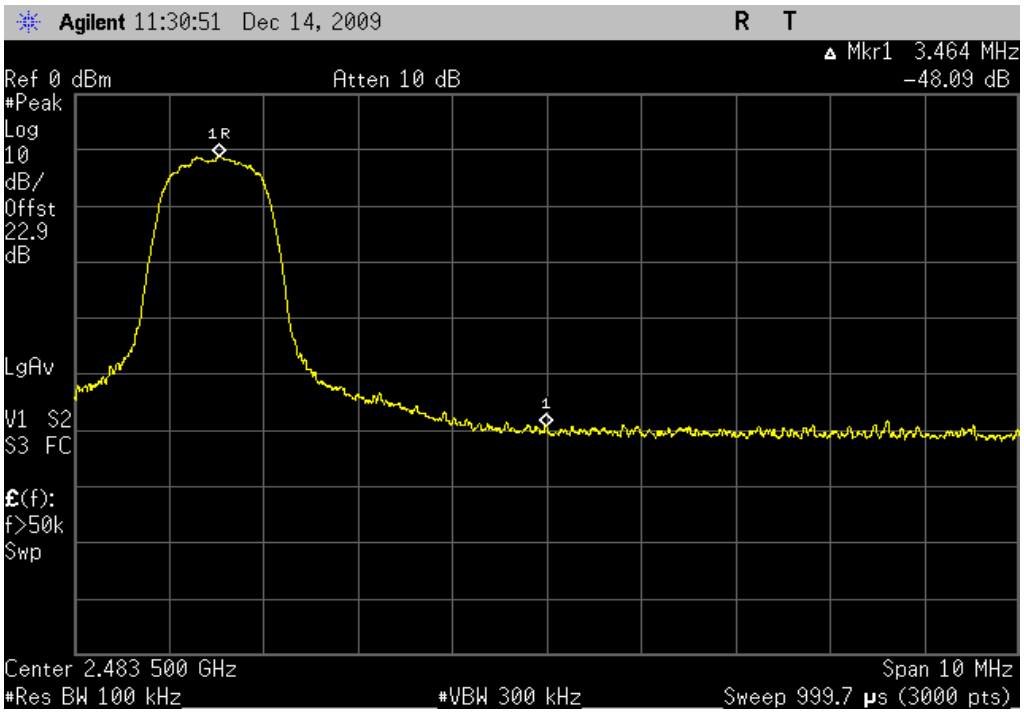


# BAND EDGE COMPLIANCE

| pi/4-DQPSK, 2DH5, Low Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -42.8 dBc | **Limit:** | ≤ -20 dBc |

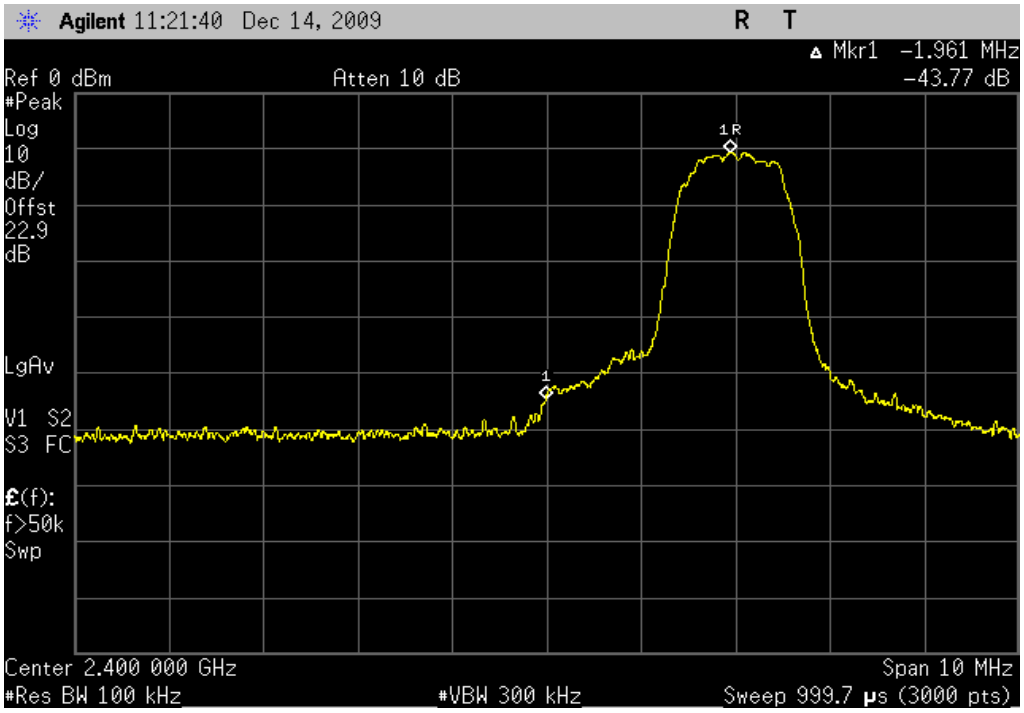



| pi/4-DQPSK, 2DH5, High Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -48.1 dBc | **Limit:** | ≤ -20 dBc |

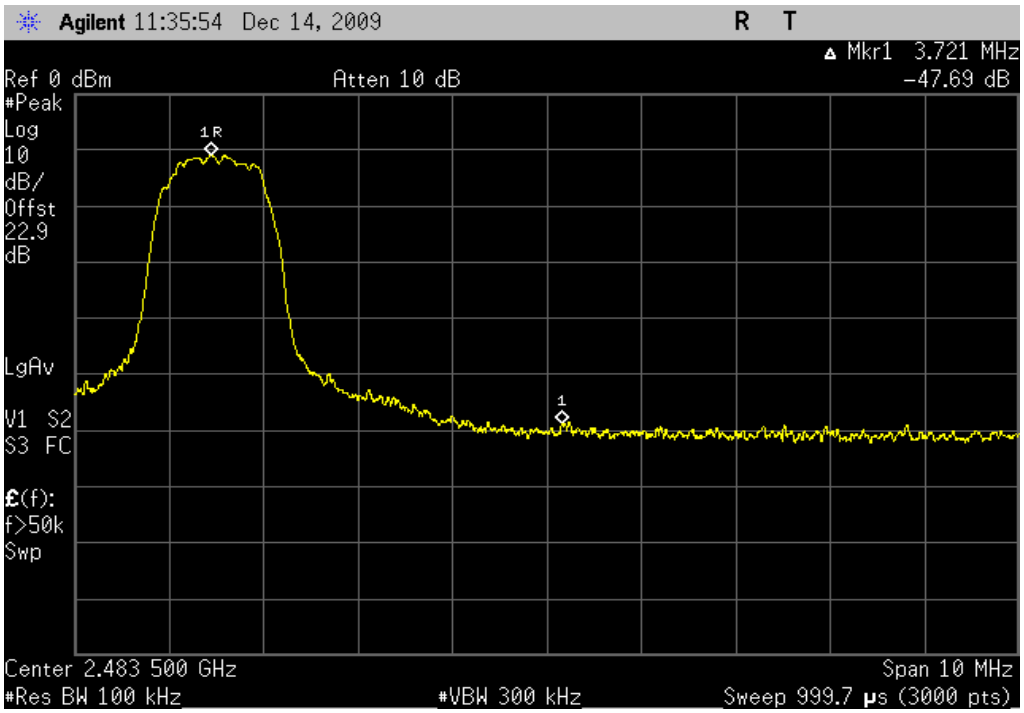


# BAND EDGE COMPLIANCE

| 8-DPSK, 3DH5, Low Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -43.8 dBc | **Limit:** | ≤ -20 dBc |




| 8-DPSK, 3DH5, High Channel | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -47.7 dBc | **Limit:** | ≤ -20 dBc |



# SPURIOUS CONDUCTED 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.

## TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4440A | AFD | 6/1/2009 | 13 |
| 26 GHz DC Block, SMA | Pasternack | PE8210 | AME | 10/19/2009 | 13 |
| Power Meter | Gigatronics | 8651A | SPM | 1/7/2010 | 13 |
| Power Sensor | Gigatronics | 80701A | SPL | 1/7/2010 | 13 |
| Signal Generator | Hewlett-Packard | 8648D | TGC | 12/9/2008 | 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 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.

NORTHWEST EMC

# SPURIOUS CONDUCTED EMISSIONS

XMit 2009.03.05

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio | | | **Work Order:** | TRPO0054 |
| **Serial Number:** | Unknown | | | **Date:** | 12/07/09 |
| **Customer:** | Trimble Navigation Limited | | | **Temperature:** | 20°C |
| **Attendees:** | none | | | **Humidity:** | 38% |
| **Project:** | None | | | **Barometric Pres.:** | 30.15 |
| **Tested by:** | Rod Peloquin | **Power:** | 120VAC/60Hz | **Job Site:** | EV06 |

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

**COMMENTS**

0.75 dB added to analyzer offset for adapter cable loss.

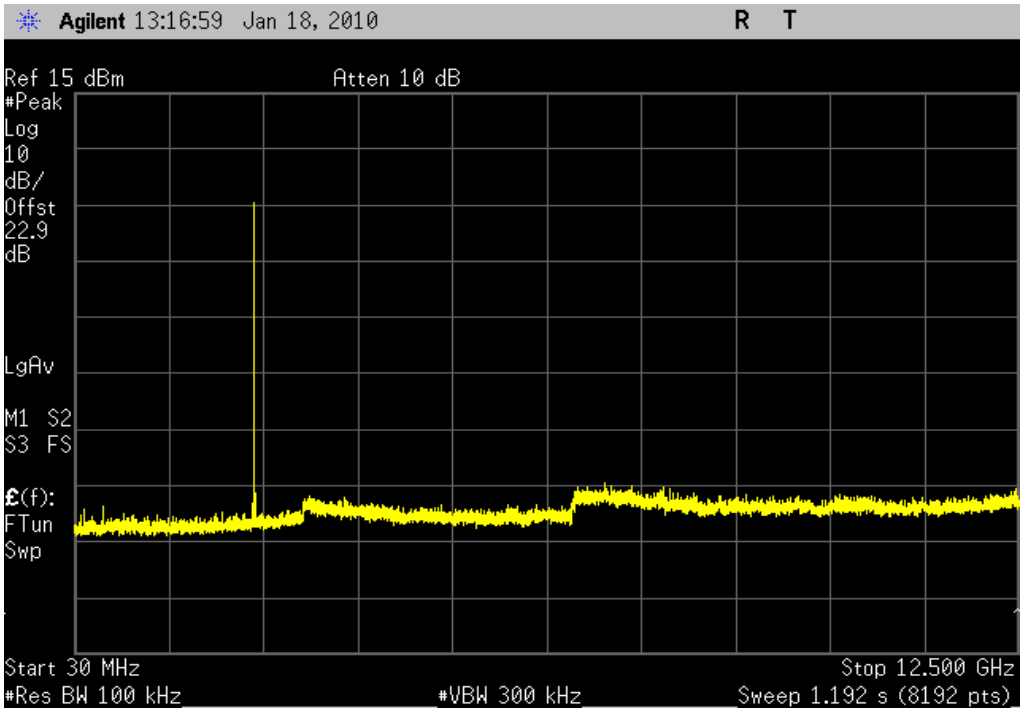
**DEVIATIONS FROM TEST STANDARD**

No Deviations

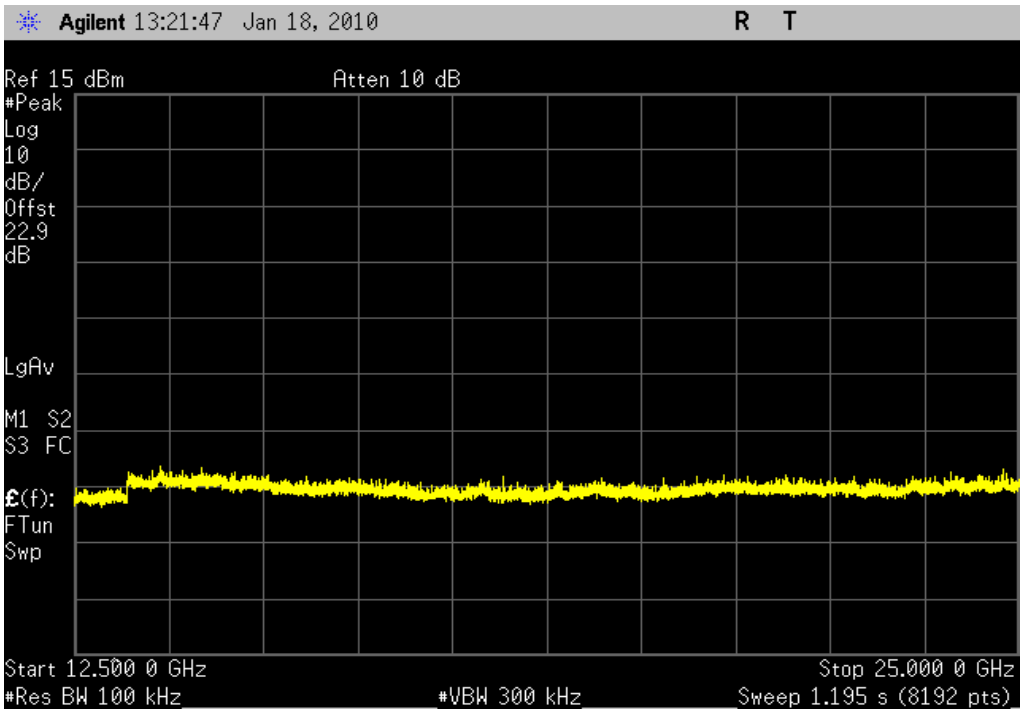
| Configuration # | 2 | Signature |
|---|---|---|

| | | Value | Limit | Results |
|---|---|---|---|---|
| GFSK, DH5 | | | | |
| | Low Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | High Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| pi/4-DQPSK, 2DH5 | | | | |
| | Low Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | High Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| 8DPSK, 3DH5 | | | | |
| | Low Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | Mid Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | High Channel | | | |
| | 30MHz - 12.5GHz | < -40 dBc | ≤ -20 dBc | Pass |
| | 12.4GHz-25GHz | < -40 dBc | ≤ -20 dBc | Pass |

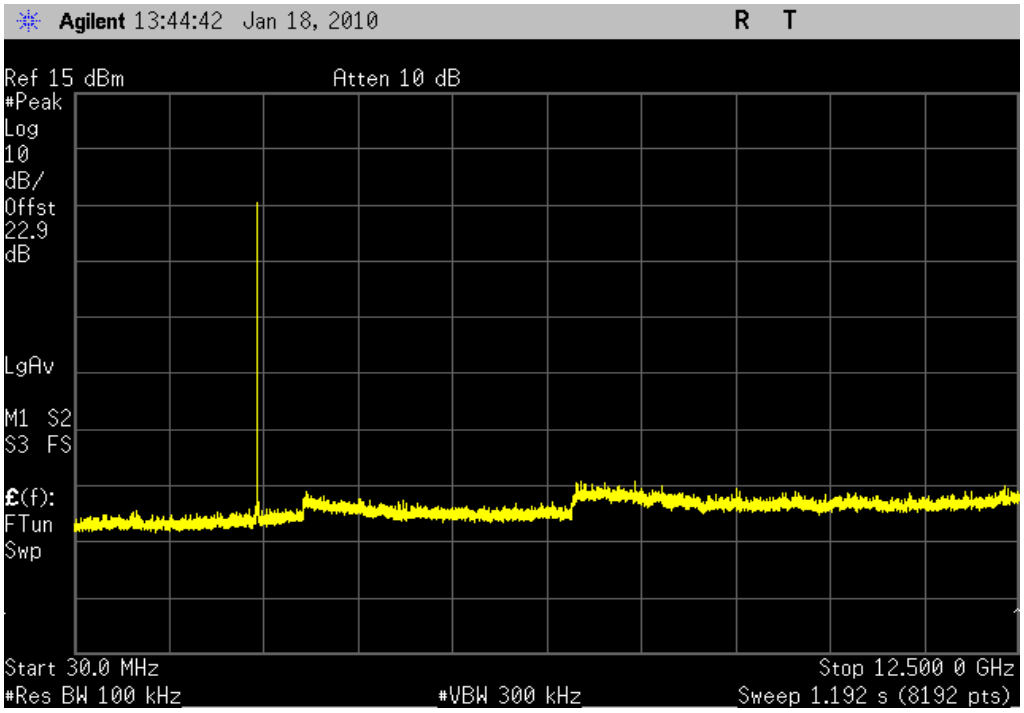
| GFSK, DH5, Low Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



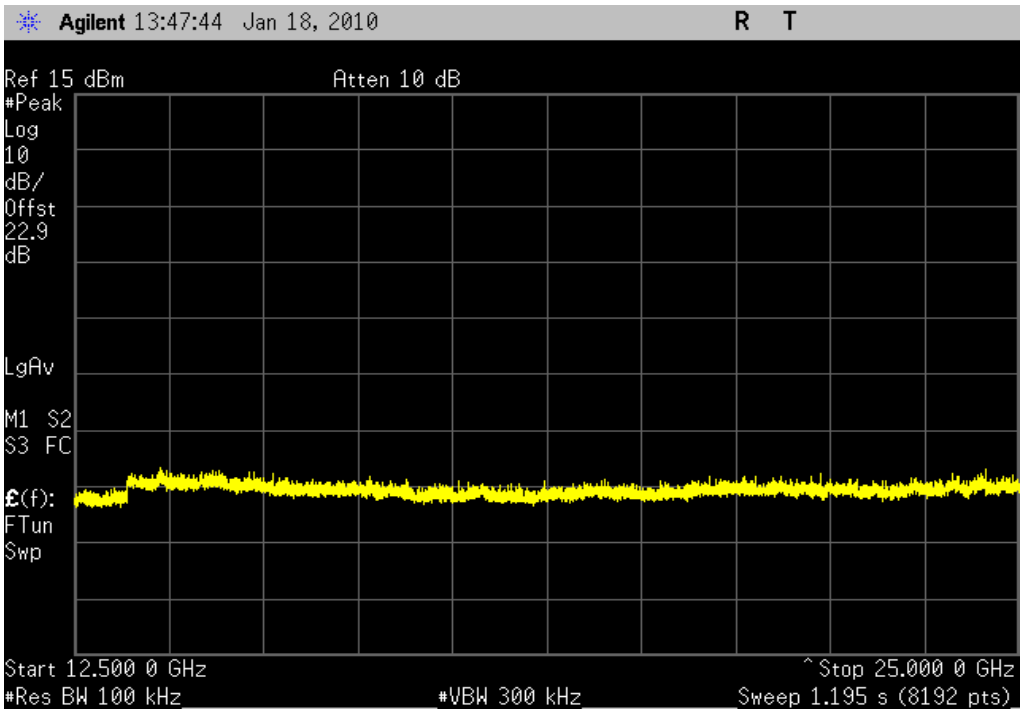

| GFSK, DH5, Low Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



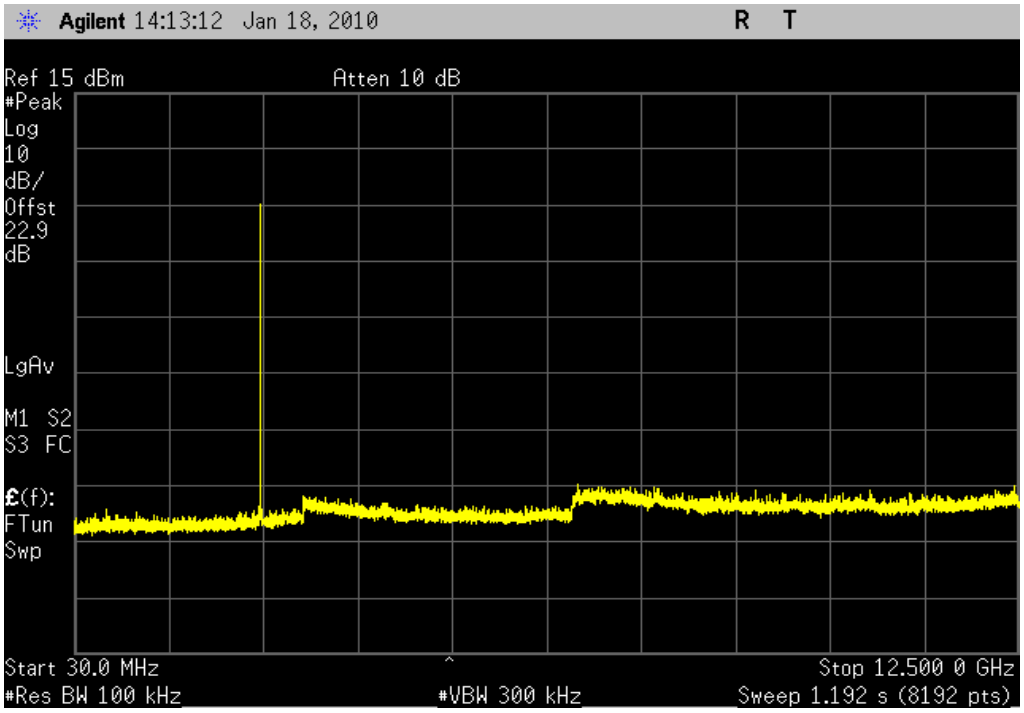
| GFSK, DH5, Mid Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



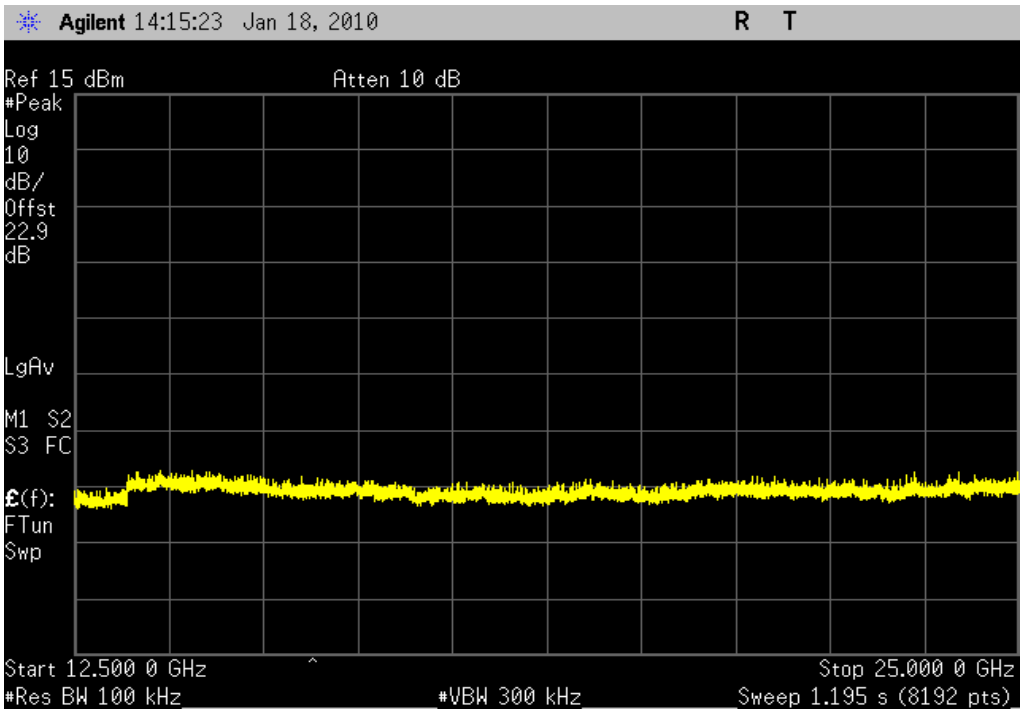

| GFSK, DH5, Mid Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



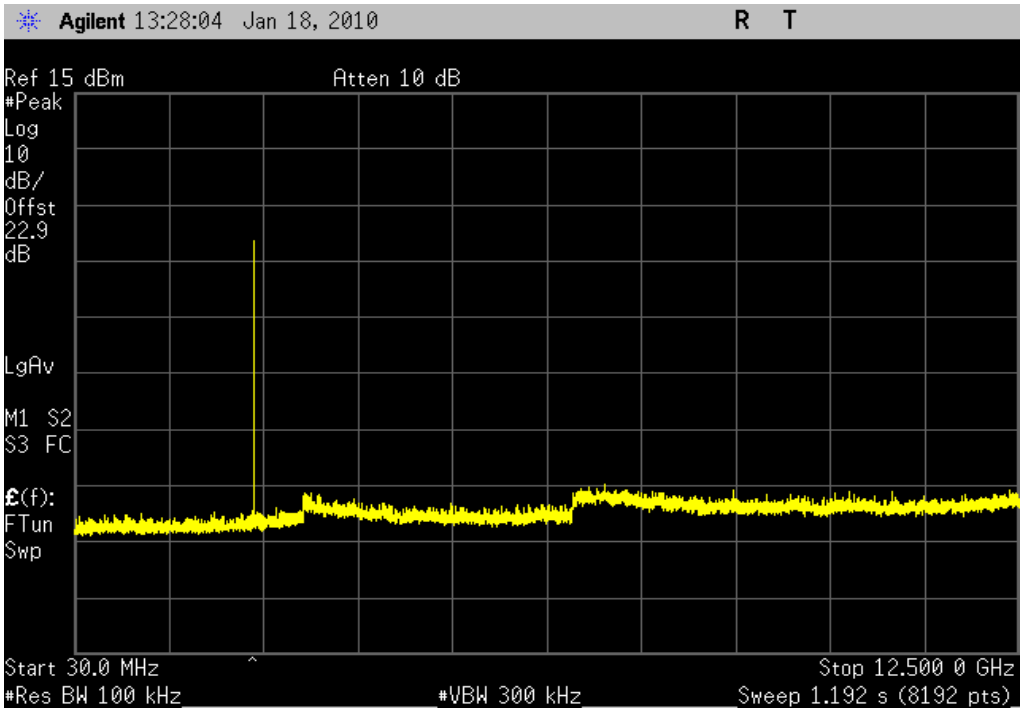
| GFSK, DH5, High Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



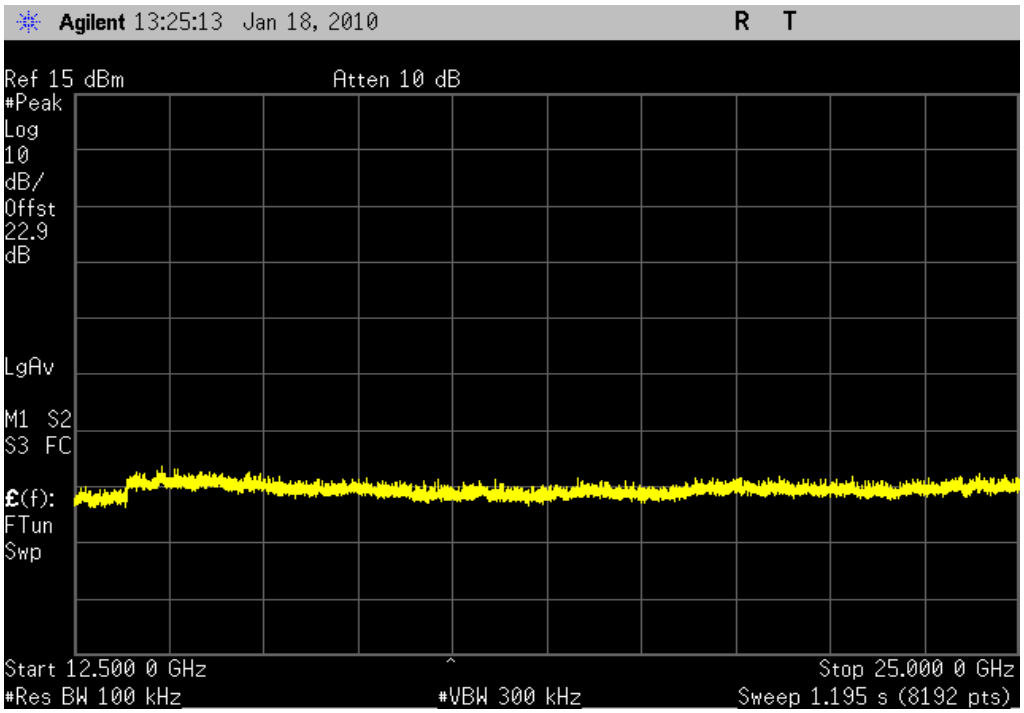

| GFSK, DH5, High Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



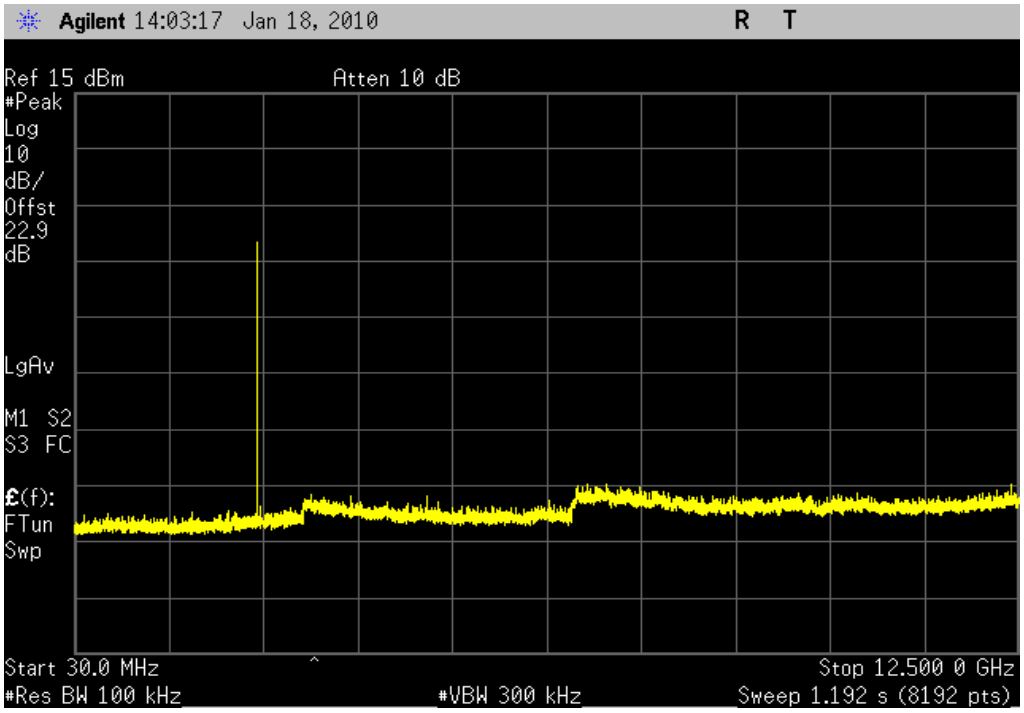
| pi/4-DQPSK, 2DH5, Low Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



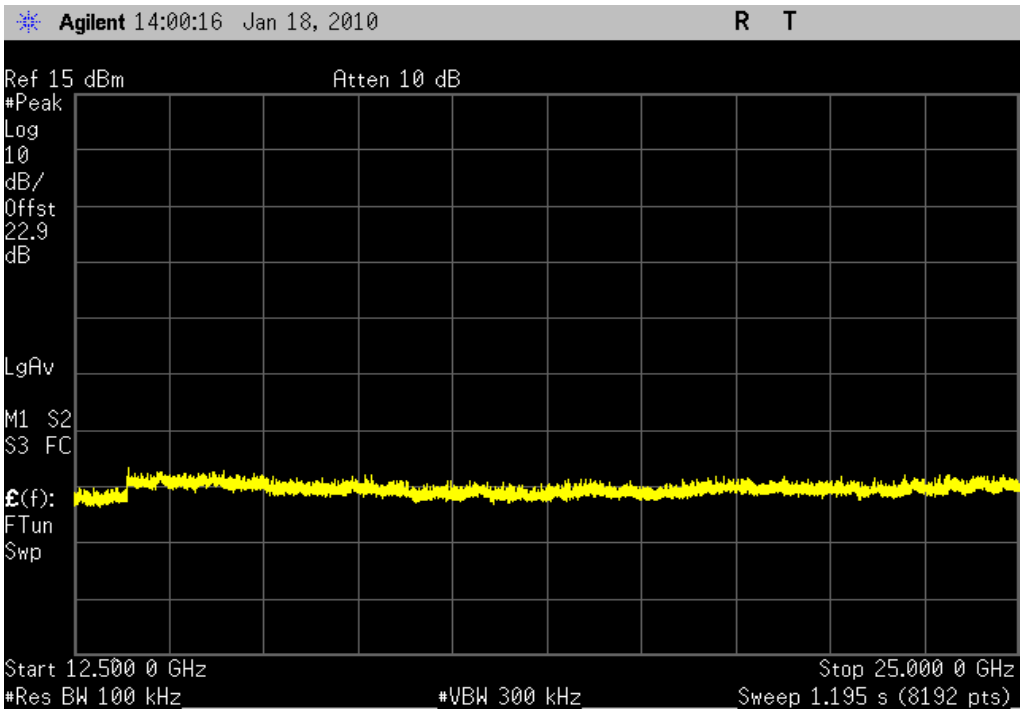

| pi/4-DQPSK, 2DH5, Low Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



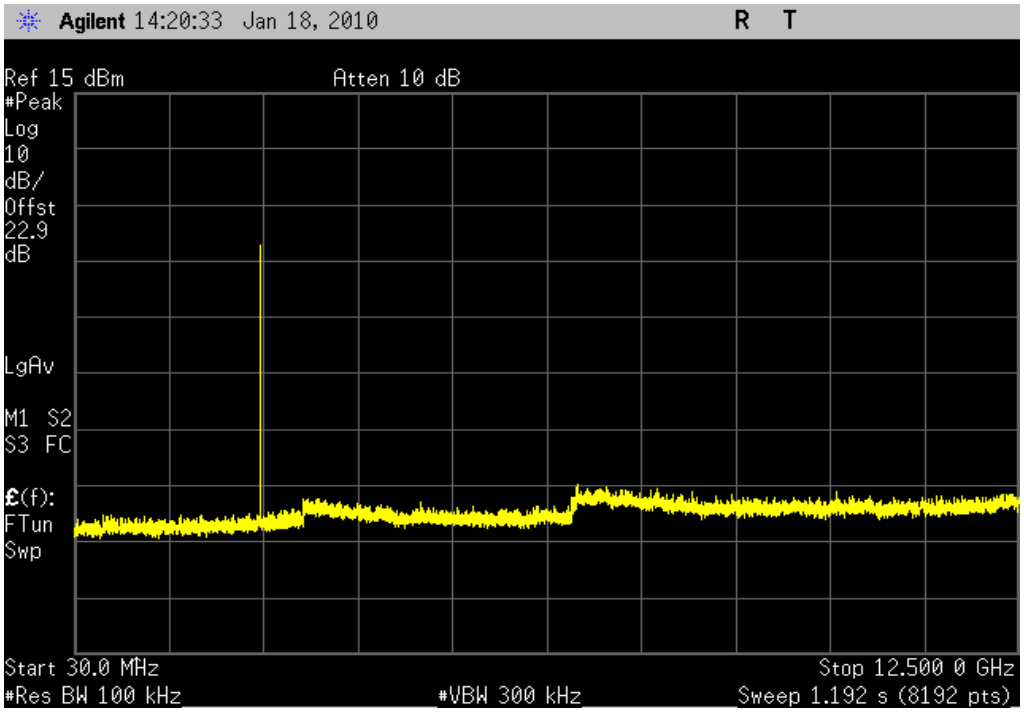
| pi/4-DQPSK, 2DH5, Mid Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



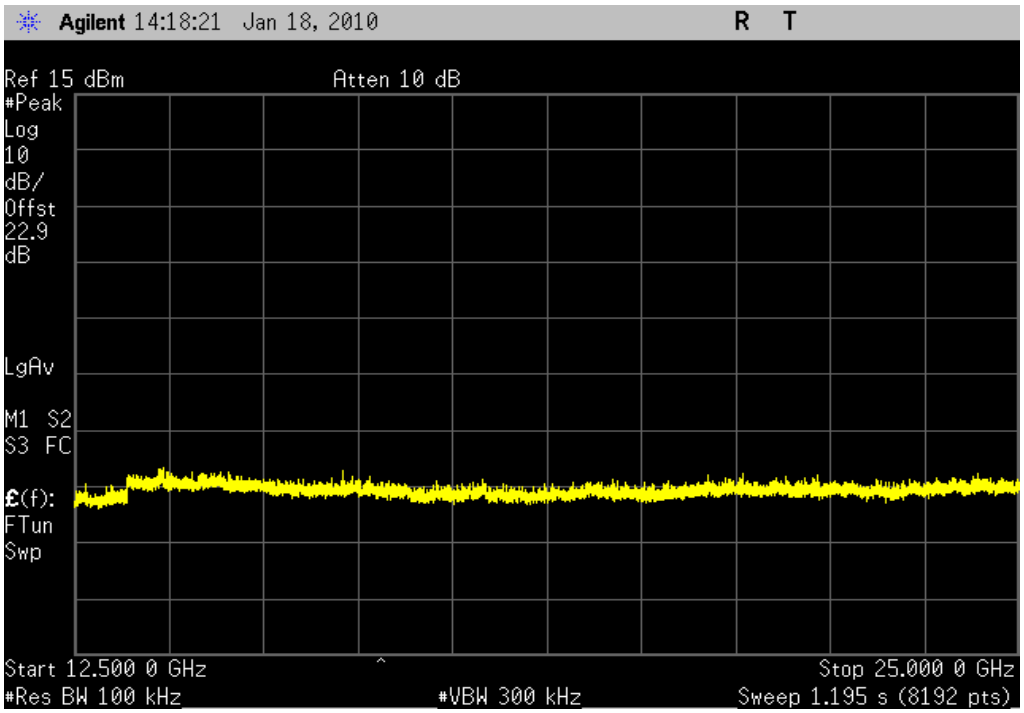

| pi/4-DQPSK, 2DH5, Mid Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



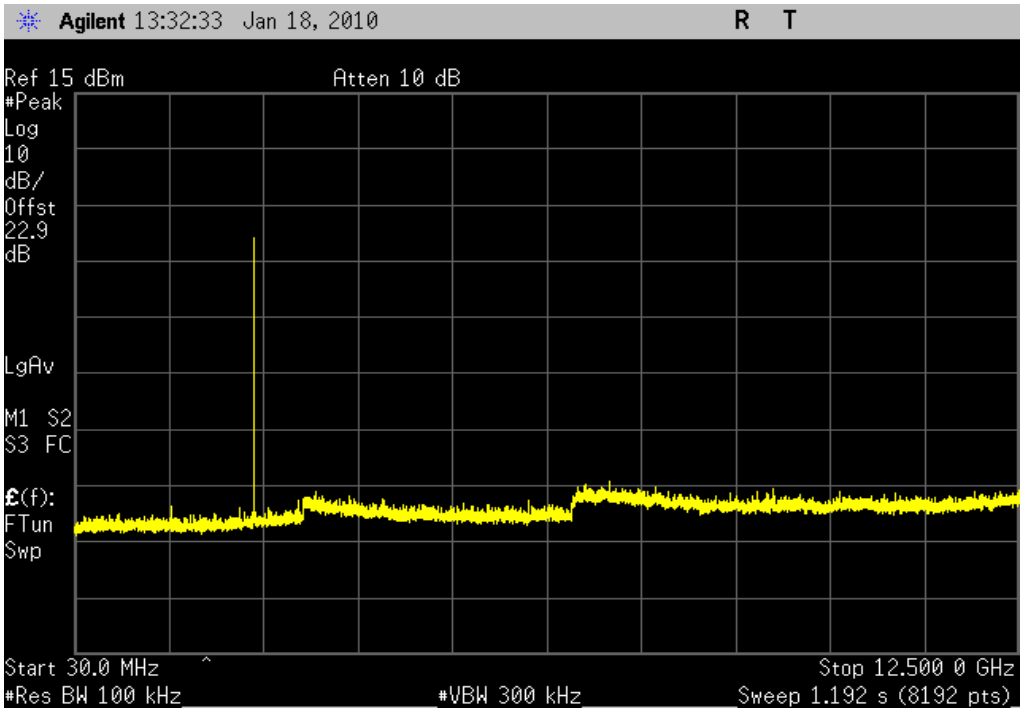
| pi/4-DQPSK, 2DH5, High Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



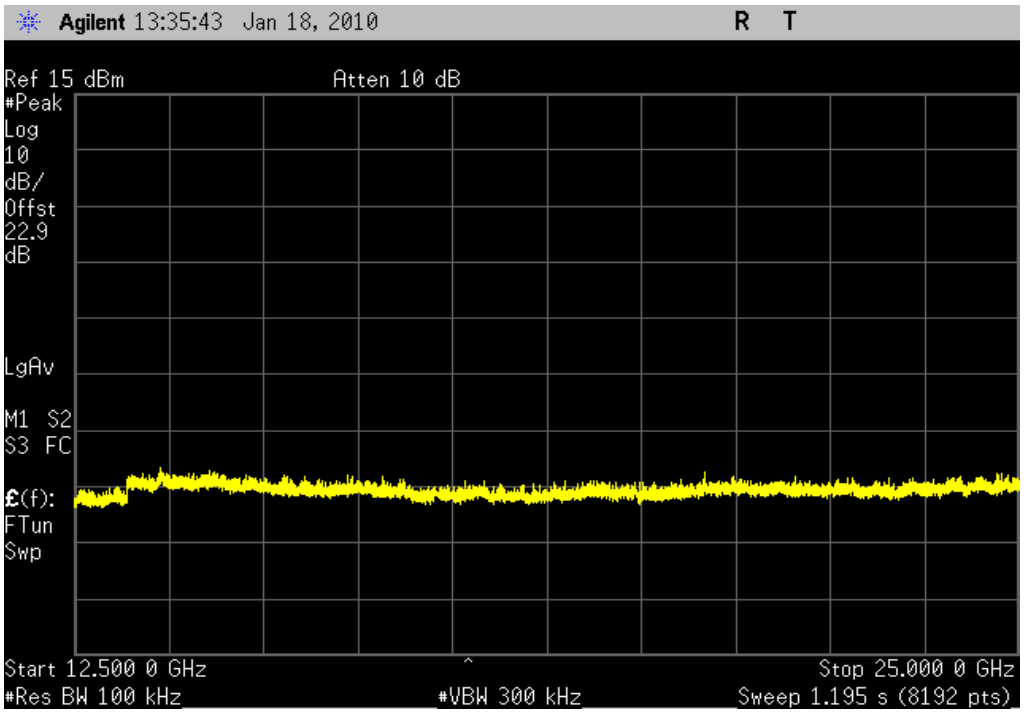

| pi/4-DQPSK, 2DH5, High Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



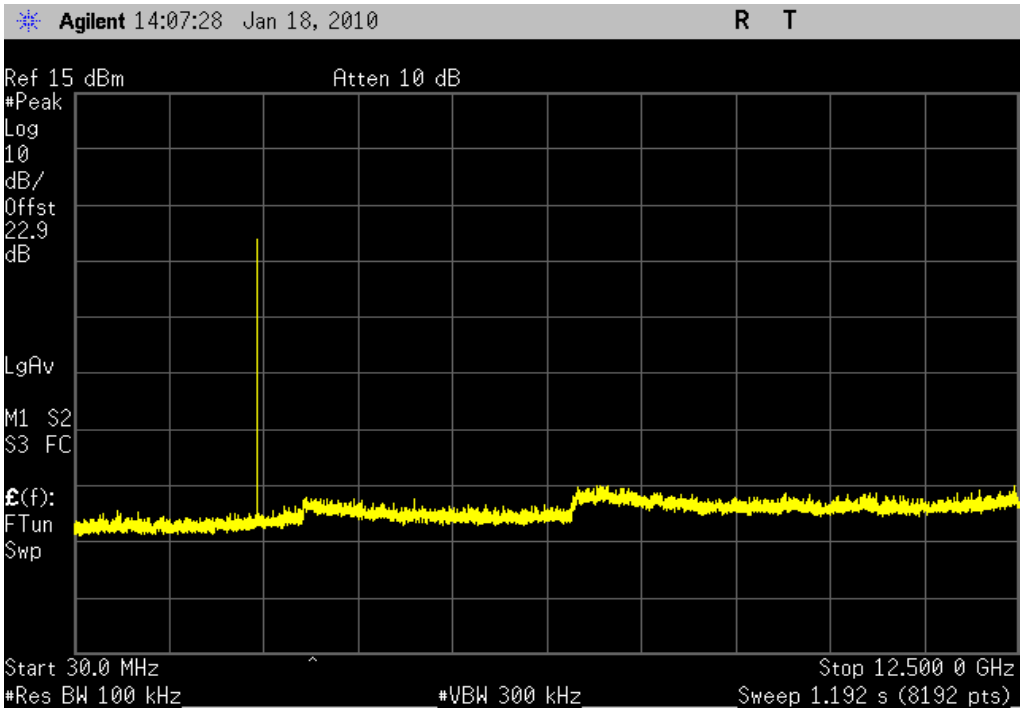
| 8DPSK, 3DH5, Low Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



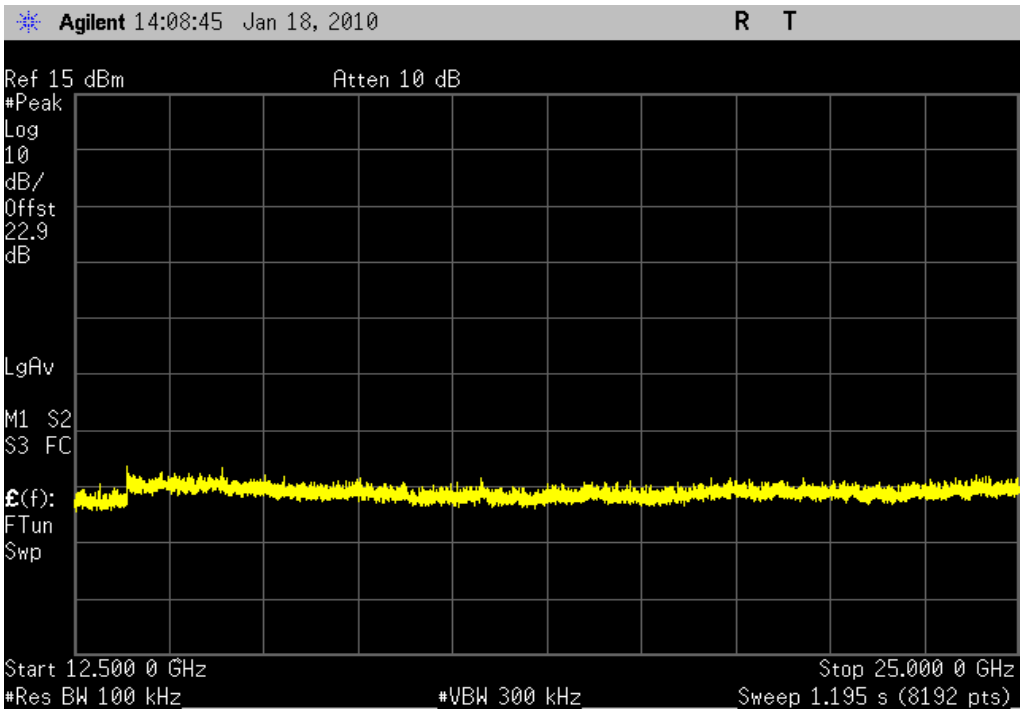

| 8DPSK, 3DH5, Low Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



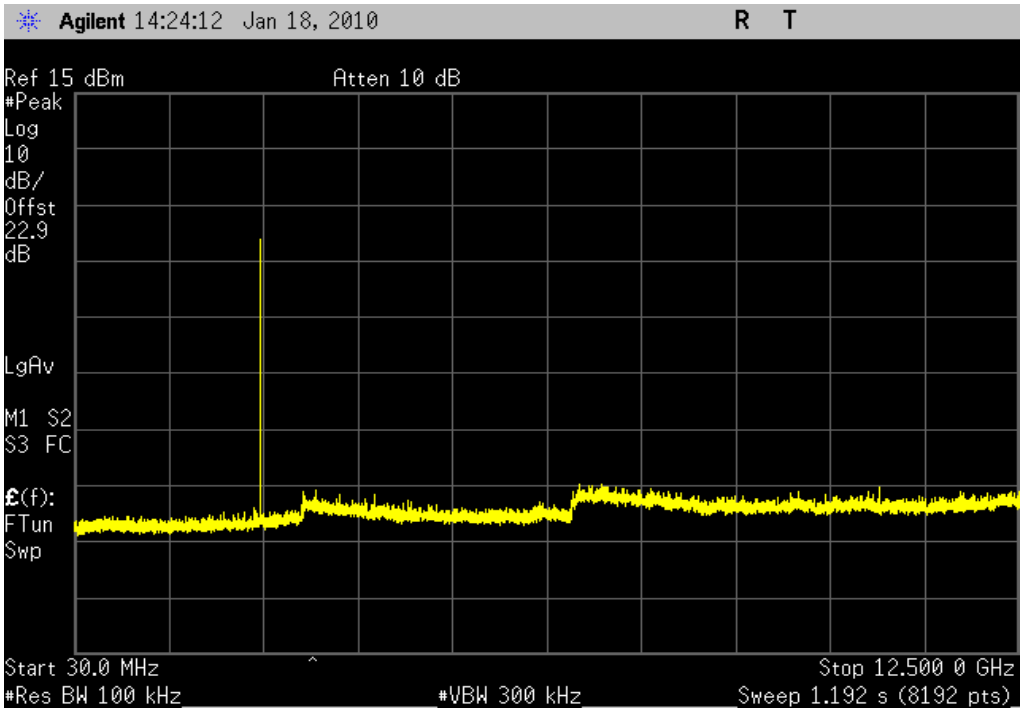
| 8DPSK, 3DH5, Mid Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



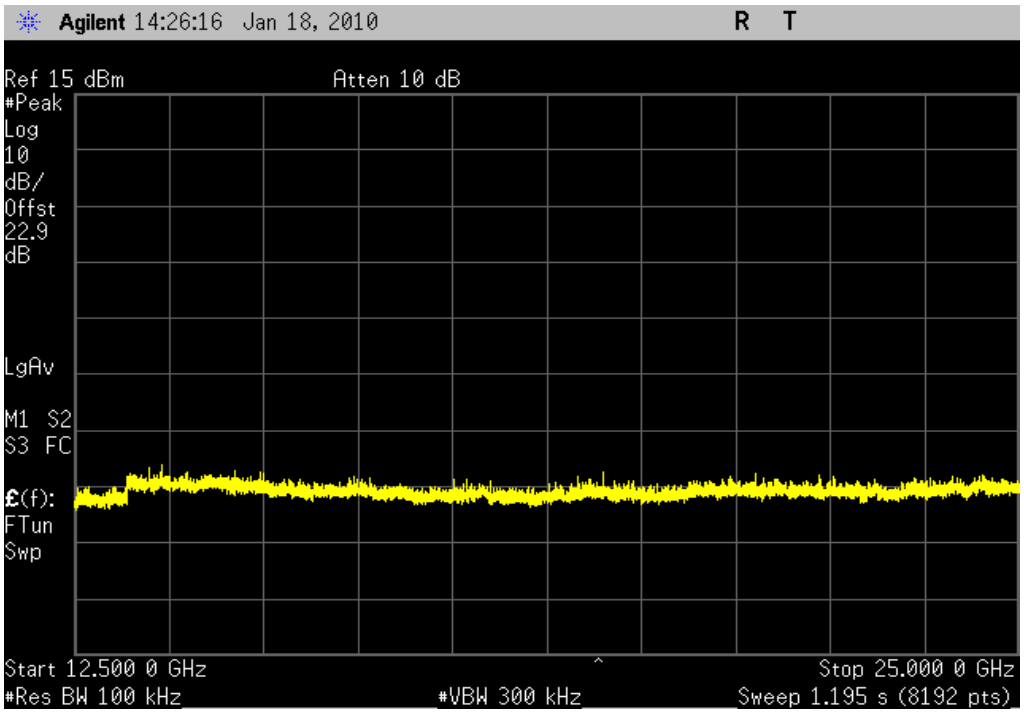

| 8DPSK, 3DH5, Mid Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



| 8DPSK, 3DH5, High Channel, 30MHz - 12.5GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |




| 8DPSK, 3DH5, High Channel, 12.4GHz-25GHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | < -40 dBc | **Limit:** | ≤ -20 dBc |



# POWER SPECTRAL DENSITY

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 | 7/21/2009 | 13 |
| 26 GHz DC Block, SMA | Pasternack | PE8210 | AME | 10/19/2009 | 13 |
| Power Meter | Gigatronics | 8651A | SPM | 1/7/2010 | 13 |
| Power Sensor | Gigatronics | 80701A | SPL | 1/7/2010 | 13 |
| Signal Generator | Hewlett-Packard | 8648D | TGC | 12/9/2008 | 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 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. Per the procedure outlined in FCC KDB 558074, March 23, 2005, the spectrum analyzer was used as follows:

> The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = (SPAN/3 kHz)). For example, given a span of 1.5 MHz, the sweep should be 1.5 x $10^6$ ÷ 3 x $10^3$ = 500 seconds. External attenuation was used and added to the reading. The following FCC procedure was used for modifying the power spectral density measurements:

*"If the spectrum line spacing cannot be resolved on the available spectrum analyzer, the noise density function on most modern conventional spectrum analyzers will directly measure the noise power density normalized to a 1 Hz noise power bandwidth. Add 35 dB for correction to 3 kHz*."

NORTHWEST EMC

# POWER SPECTRAL DENSITY

XMit 2009.03.05

| | | | | | |
|---|---|---|---|---|---|
| EUT: | Ranger/TSC3 Bluetooth radio | | | Work Order: | TRPO0054 |
| Serial Number: | Unknown | | | Date: | 12/07/09 |
| Customer: | Trimble Navigation Limited | | | Temperature: | 20°C |
| Attendees: | None | | | Humidity: | 38% |
| Project: | None | | | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: | 120VAC/60Hz | Job Site: | EV06 |

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

**COMMENTS**

0.75 dB added to analyzer offset for adapter cable loss.

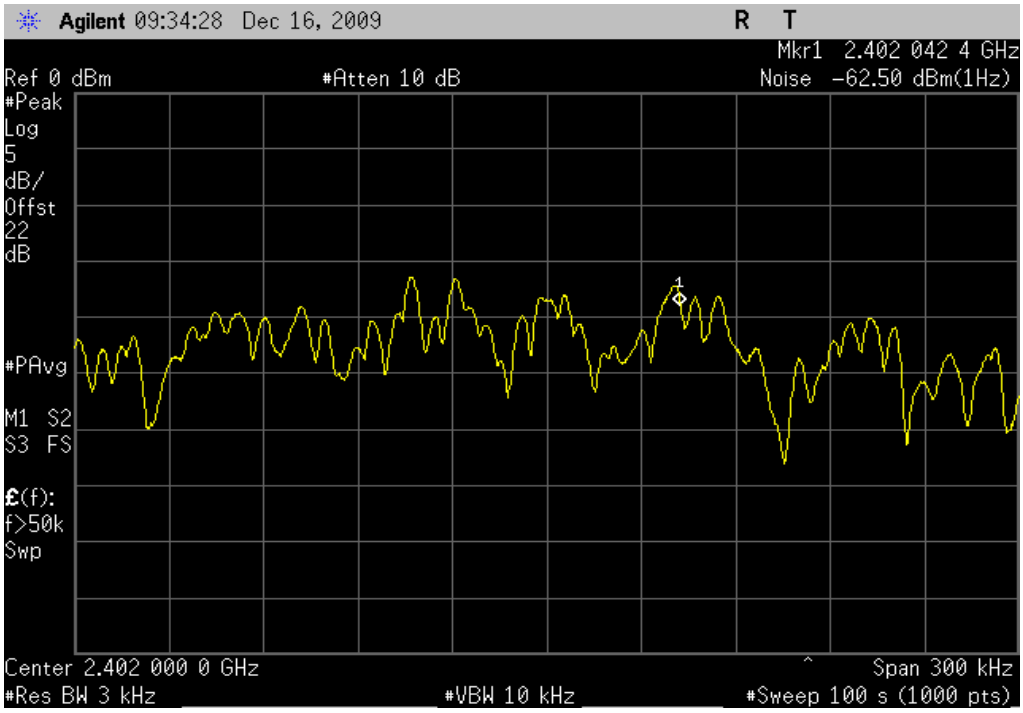
**DEVIATIONS FROM TEST STANDARD**

No Deviations

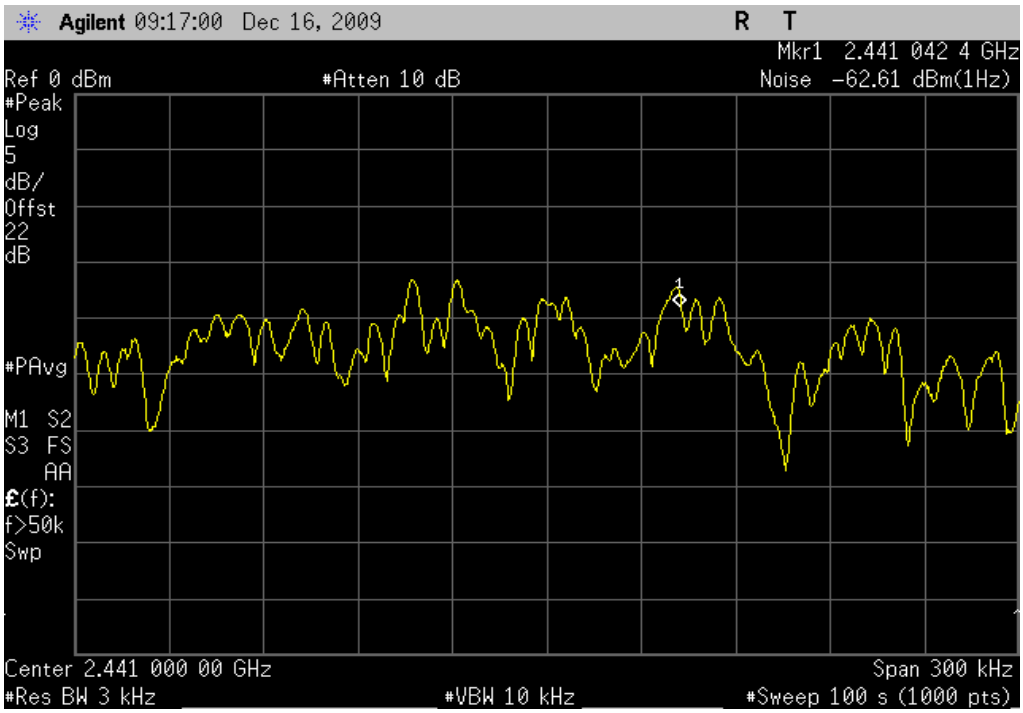
| Configuration # | 2 | Signature |
|---|---|---|

| | | Value | Limit | Results |
|---|---|---|---|---|
| DH5, GFSK | | | | |
| | Low Channel, 2402 MHz | -27.7 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | Mid Channel, 2441 MHz | -27.8 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | High Channel, 2480 MHz | -28.3 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| 2-DH5, Pi/4-DQPSK | | | | |
| | Low Channel, 2402 MHz | -37.0 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | Mid Channel, 2441 MHz | -38.0 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | High Channel, 2480 MHz | -38.2 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| 3-DH5, 8-DPSK | | | | |
| | Low Channel, 2402 MHz | -36.9 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | Mid Channel, 2441 MHz | -37.1 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |
| | High Channel, 2480 MHz | -37.2 dBm / 3 kHz | 8 dBm / 3 kHz | Pass |

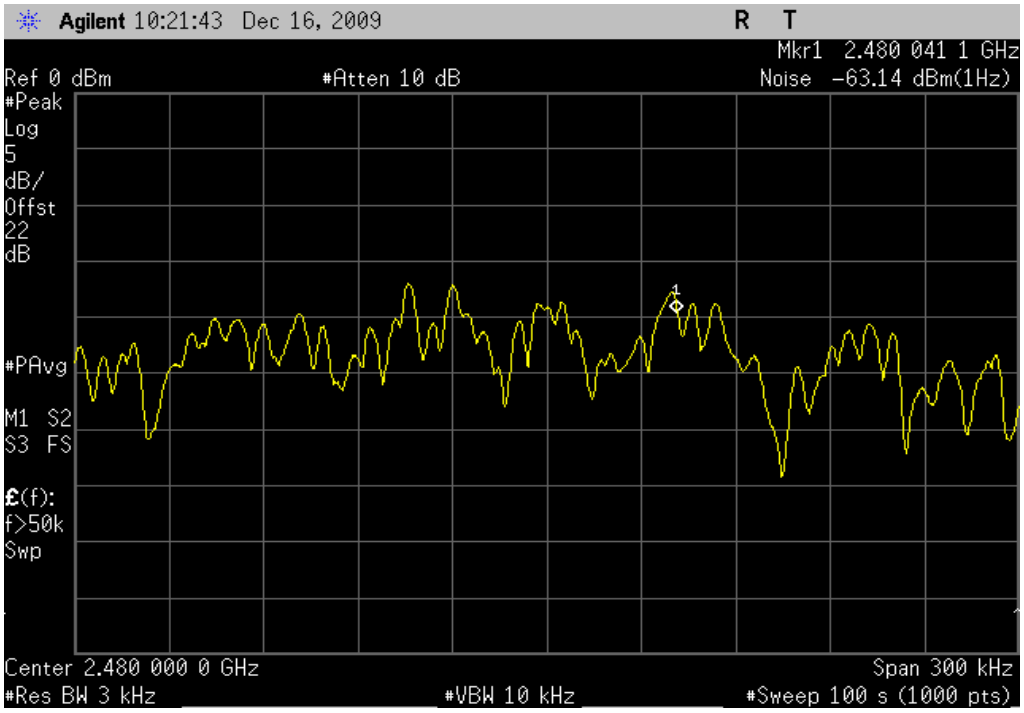
| DH5, GFSK, Low Channel, 2402 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -27.7 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



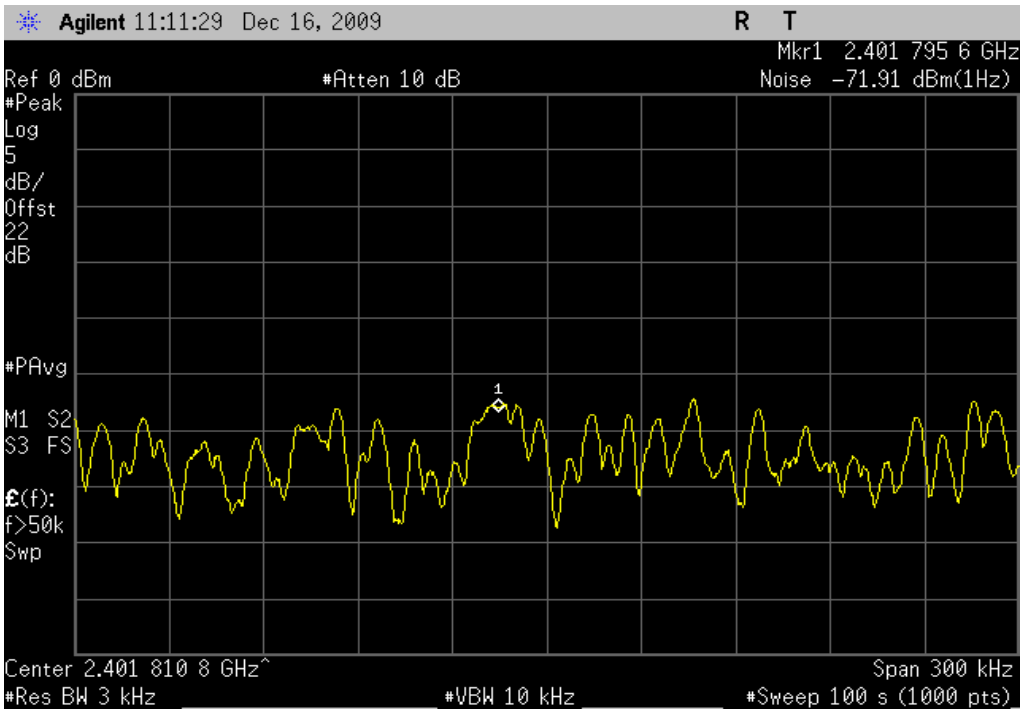

| DH5, GFSK, Mid Channel, 2441 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -27.8 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



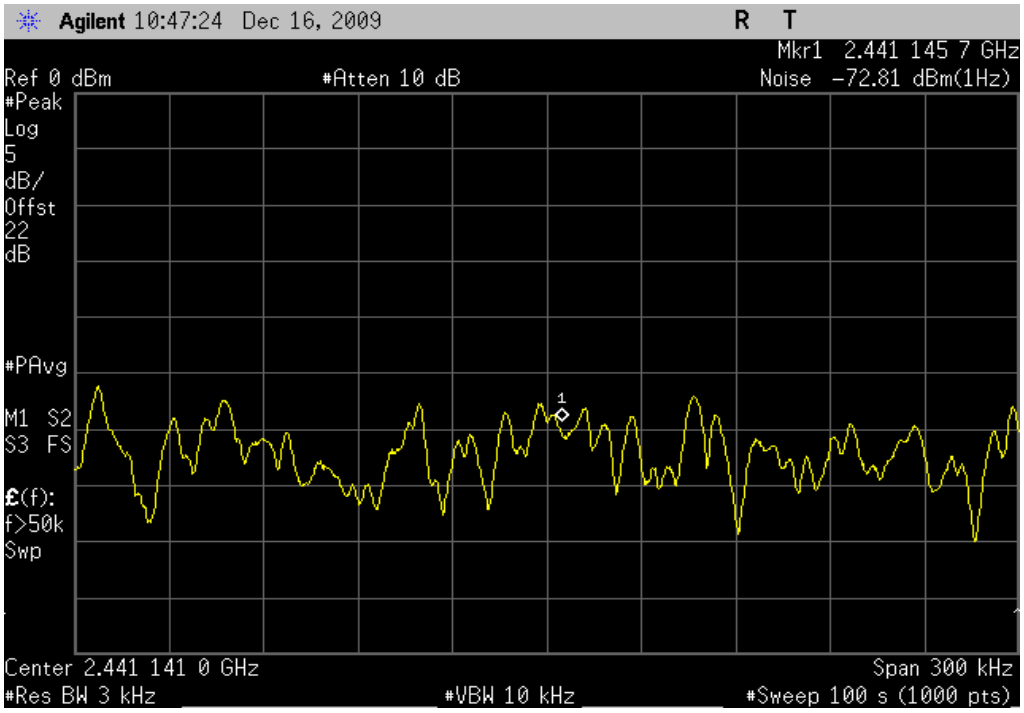
| DH5, GFSK, High Channel, 2480 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -28.3 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



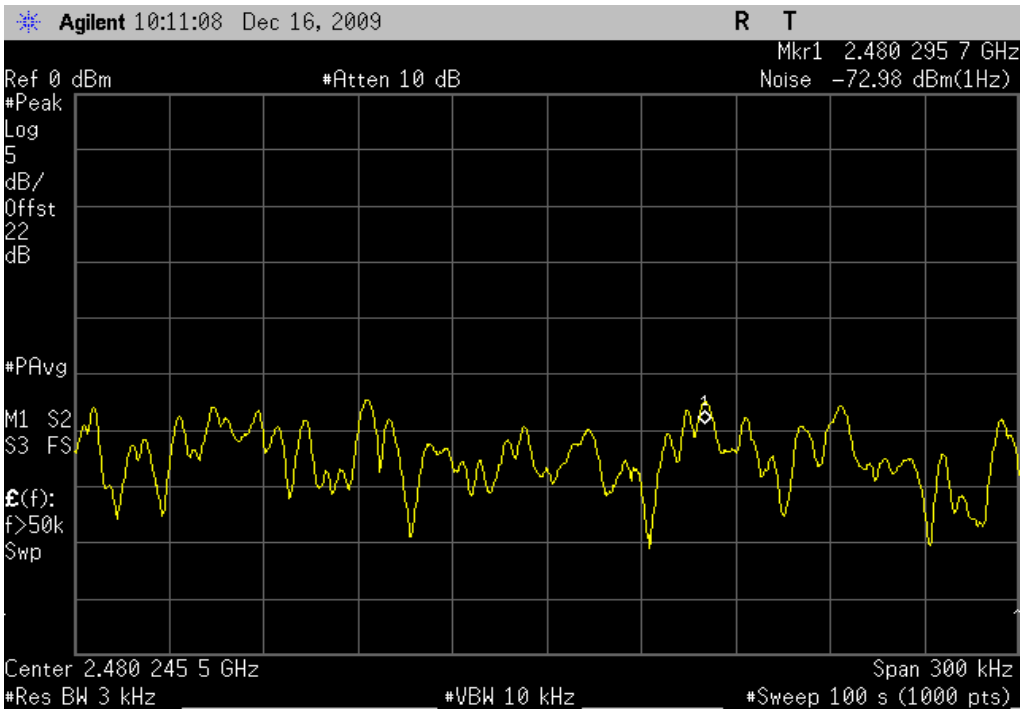

| 2-DH5, Pi/4-DQPSK, Low Channel, 2402 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -37.0 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



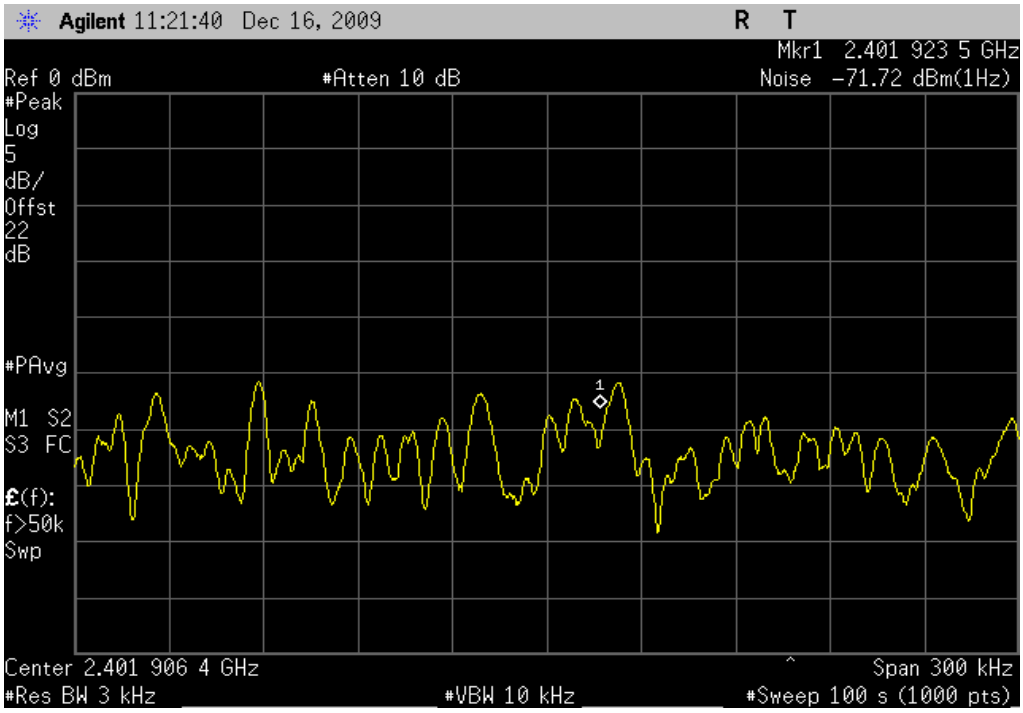
| 2-DH5, Pi/4-DQPSK, Mid Channel, 2441 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -38.0 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



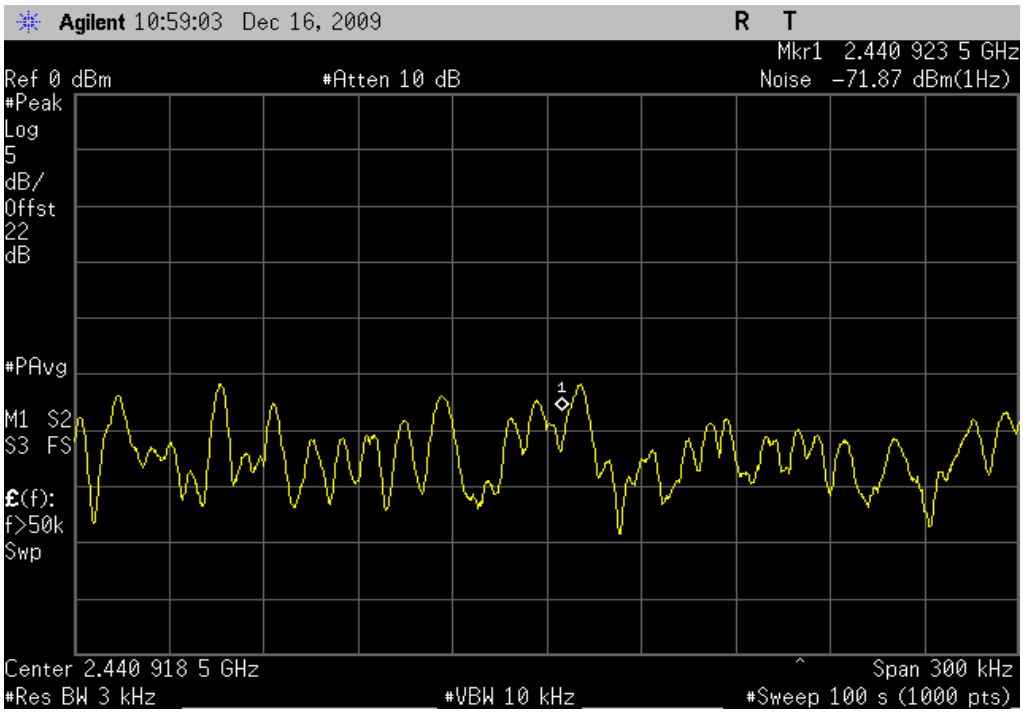

| 2-DH5, Pi/4-DQPSK, High Channel, 2480 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -38.2 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



| 3-DH5, 8-DPSK, Low Channel, 2402 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -36.9 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



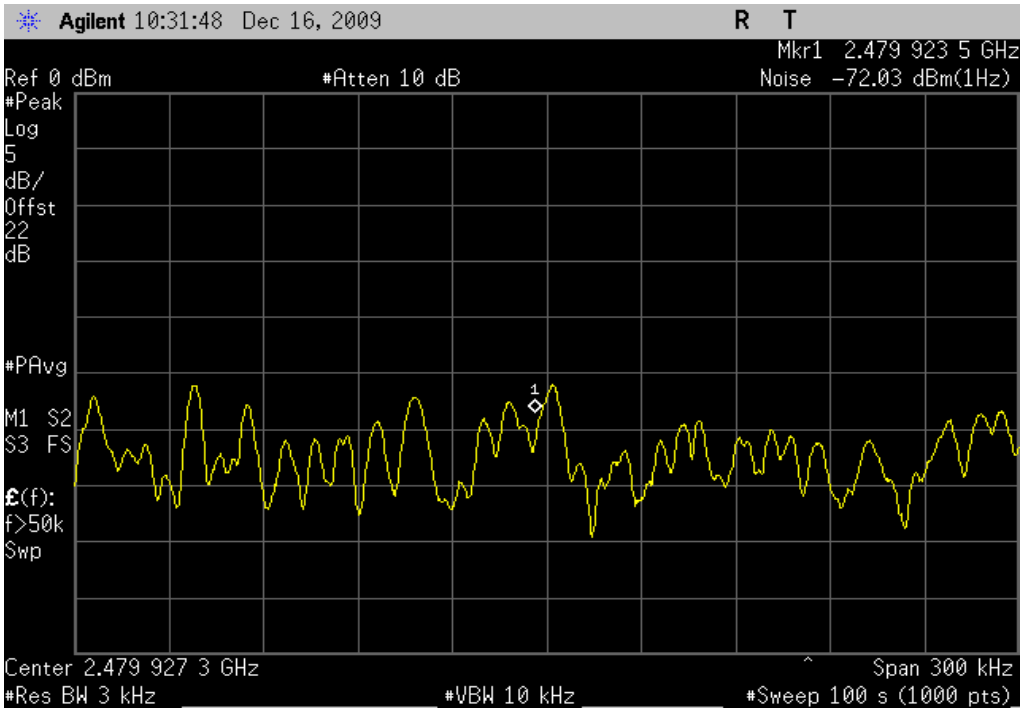

| 3-DH5, 8-DPSK, Mid Channel, 2441 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -37.1 dBm / 3 kHz | **Limit:** | 8 dBm / 3 kHz |



# POWER SPECTRAL DENSITY



| 3-DH5, 8-DPSK, High Channel, 2480 MHz | | | | | |
|---|---|---|---|---|---|
| **Result:** | Pass | **Value:** | -37.2 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 |
|---|
| Transmitting Bluetooth, GFSK modulation, DH5 data rate |
| Transmitting Bluetooth, Pi / 4-DQPSK modulation, 2DH5 data rate |
| Transmitting Bluetooth, 8-DPSK modulation, 3DH5 data rate |

| CHANNELS USED FOR FINAL DATA |
|---|
| Low channel 1, 2402 MHz |
| Mid channel 39, 2439 MHz |
| High channel 79, 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 | E44440A | AFA | 11/14/2008 | 15 |
| High Pass Filter | Micro-Tronics | 50111 | HGE | 6/25/2009 | 13 |
| Pre-Amplifier | Miteq | AM-1616-1000 | AVM | 6/25/2009 | 13 |
| Antenna, Biconilog | EMCO | 3141 | AXG | 11/4/2008 | 16 |
| EV12 Cables | | Bilog Cables | EVS | 6/25/2009 | 13 |
| Pre-Amplifier | Miteq | AMF-3D00100800-32-13P | AVF | 6/25/2009 | 13 |
| Antenna, Horn | ETS | 3115 | AIB | 8/25/2008 | 24 |
| EV12 Cables | | Double Ridge Horn Cables | EVT | 10/23/2009 | 13 |
| Pre-Amplifier | Miteq | AMF-6F-08001200-30-10P | AVH | 6/26/2009 | 13 |
| Antenna, Horn | ETS | 3160.07 | AHZ | 10/14/2008 | 24 |
| Pre-Amplifier | Miteq | AMF-6F-12001800-30-10P | AVI | 6/26/2009 | 13 |
| Antenna, Horn | ETS | 3160-08 | AIA | NCR | 0 |
| EV12 Cables | | Standard Gain Horn Cables | EVU | 6/25/2009 | 13 |
| Pre-Amplifier | Miteq | AMF-6F-18002650-25-10P | AVU | 5/19/2009 | 13 |
| Antenna, Horn | ETS Lindgren | 3160-09 | AIV | NCR | 0 |
| Cable | ESM Cable Corp. | KMKM-72 | EVY | 11/3/2009 | 13 |

**MEASUREMENT BANDWIDTHS**

| | Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST EMC

# SPURIOUS RADIATED EMISSIONS

PSA 2008.07.21
EMI 2009.4.13

| | | | |
|---|---|---|---|
| EUT: | Ranger/TSC3 Bluetooth radio | Work Order: | TRPO0054 |
| Serial Number: | Unknown | Date: | 12/03/09 |
| Customer: | Trimble Navigation Limited | Temperature: | 21 |
| Attendees: | None | Humidity: | 38% |
| Project: | None | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: 120VAC/60Hz | Job Site: EV12 |

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

| TEST PARAMETERS | | | |
|---|---|---|---|
| Antenna Height(s) (m) | 1 - 4 | Test Distance (m) | 3 |

**COMMENTS**

None

**EUT OPERATING MODES**

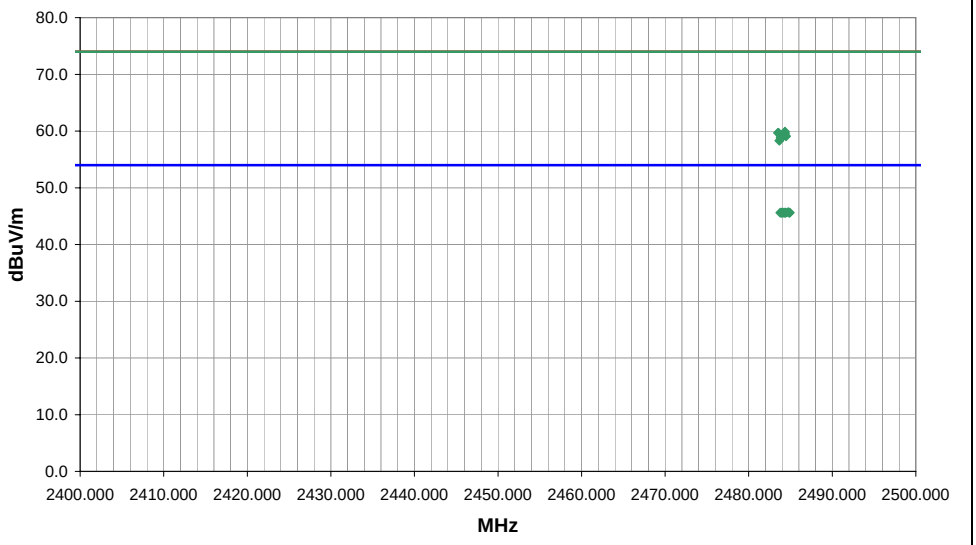
Transmitting Bluetooth, high channel

**DEVIATIONS FROM TEST STANDARD**

No deviations.

| | |
|---|---|
| Run # | 4 |
| Configuration # | 1 |
| Results | Pass |

*Signature*




| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2484.720 | 26.7 | -1.0 | 200.0 | 3.4 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 45.7 | 54.0 | -8.3 | High channel, 2-DH5, EUT vertical |
| 2483.785 | 26.6 | -1.0 | 215.0 | 1.0 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, DH5, EUT on side |
| 2483.940 | 26.6 | -1.0 | 354.0 | 3.4 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, 3-DH5, EUT vertical |
| 2483.955 | 26.6 | -1.0 | 360.0 | 1.3 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, 2-DH5, EUT vertical |
| 2484.142 | 26.6 | -1.0 | 267.0 | 1.0 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, DH5, EUT horizontal |
| 2484.290 | 26.6 | -1.0 | 314.0 | 1.0 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, DH5, EUT on side |
| 2484.370 | 26.6 | -1.0 | 135.0 | 1.0 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, DH5, EUT vertical |
| 2484.435 | 26.6 | -1.0 | 172.0 | 1.0 | 3.0 | 20.0 | H-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, DH5, EUT horizontal |
| 2484.828 | 26.6 | -1.0 | 324.0 | 2.3 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, 3-DH5, EUT vertical |
| 2484.918 | 26.6 | -1.0 | 213.0 | 1.3 | 3.0 | 20.0 | V-Horn | AV | 0.0 | 45.6 | 54.0 | -8.4 | High channel, DH5, EUT vertical |
| 2484.332 | 40.9 | -1.0 | 215.0 | 1.0 | 3.0 | 20.0 | V-Horn | PK | 0.0 | 59.9 | 74.0 | -14.1 | High channel, DH5, EUT on side |
| 2483.513 | 40.7 | -1.0 | 267.0 | 1.0 | 3.0 | 20.0 | V-Horn | PK | 0.0 | 59.7 | 74.0 | -14.3 | High channel, DH5, EUT horizontal |
| 2483.563 | 40.7 | -1.0 | 172.0 | 1.0 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 59.7 | 74.0 | -14.3 | High channel, DH5, EUT horizontal |
| 2484.340 | 40.6 | -1.0 | 200.0 | 3.4 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 59.6 | 74.0 | -14.4 | High channel, 2-DH5, EUT vertical |
| 2484.032 | 40.1 | -1.0 | 213.0 | 1.3 | 3.0 | 20.0 | V-Horn | PK | 0.0 | 59.1 | 74.0 | -14.9 | High channel, DH5, EUT vertical |
| 2484.467 | 40.1 | -1.0 | 135.0 | 1.0 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 59.1 | 74.0 | -14.9 | High channel, DH5, EUT vertical |
| 2484.077 | 40.0 | -1.0 | 354.0 | 3.4 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 59.0 | 74.0 | -15.0 | High channel, 3-DH5, EUT vertical |
| 2483.812 | 39.9 | -1.0 | 314.0 | 1.0 | 3.0 | 20.0 | H-Horn | PK | 0.0 | 58.9 | 74.0 | -15.1 | High channel, DH5, EUT on side |
| 2483.845 | 39.8 | -1.0 | 324.0 | 2.3 | 3.0 | 20.0 | V-Horn | PK | 0.0 | 58.8 | 74.0 | -15.2 | High channel, 3-DH5, EUT vertical |
| 2483.662 | 39.3 | -1.0 | 360.0 | 1.3 | 3.0 | 20.0 | V-Horn | PK | 0.0 | 58.3 | 74.0 | -15.7 | High channel, 2-DH5, EUT vertical |

NORTHWEST EMC

# SPURIOUS RADIATED EMISSIONS

PSA 2008.07.21
EMI 2009.4.13

| | | | |
|---|---|---|---|
| EUT: | Ranger/TSC3 Bluetooth radio | Work Order: | TRPO0054 |
| Serial Number: | Unknown | Date: | 12/03/09 |
| Customer: | Trimble Navigation Limited | Temperature: | 21 |
| Attendees: | None | Humidity: | 38% |
| Project: | None | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: 120VAC/60Hz | Job Site: EV12 |

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

| TEST PARAMETERS | | | |
|---|---|---|---|
| Antenna Height(s) (m) | 1 - 4 | Test Distance (m) | 3 |

**COMMENTS**

None

**EUT OPERATING MODES**

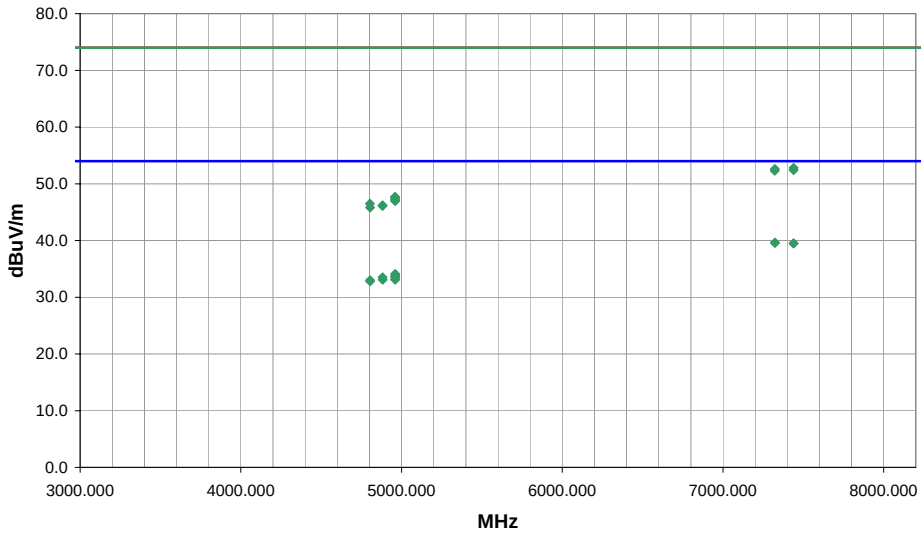
Transmitting Bluetooth

**DEVIATIONS FROM TEST STANDARD**

No deviations.

| | |
|---|---|
| Run # | 5 |
| Configuration # | 1 |
| Results | Pass |

Signature




| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7322.498 | 24.3 | 15.3 | 335.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 39.6 | 54.0 | -14.4 | Mid channel, DH5, EUT horizontal |
| 7324.013 | 24.3 | 15.3 | 184.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 39.6 | 54.0 | -14.4 | Mid channel, DH5, EUT horizontal |
| 7439.323 | 23.9 | 15.6 | 353.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 39.5 | 54.0 | -14.5 | High channel, DH5, EUT horizontal |
| 7439.330 | 23.9 | 15.6 | 158.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 39.5 | 54.0 | -14.5 | High channel, DH5, EUT horizontal |
| 4960.053 | 25.5 | 8.6 | 311.0 | 1.3 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 34.1 | 54.0 | -19.9 | High channel, DH5, EUT vertical |
| 4959.940 | 25.3 | 8.6 | 280.0 | 1.5 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 33.9 | 54.0 | -20.1 | High channel, DH5, EUT on side |
| 4959.980 | 25.0 | 8.6 | 80.0 | 1.5 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 33.6 | 54.0 | -20.4 | High channel, DH5, EUT horizontal |
| 4960.027 | 25.0 | 8.6 | 20.0 | 1.2 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 33.6 | 54.0 | -20.4 | High channel, DH5, EUT horizontal |
| 4882.145 | 24.9 | 8.6 | 79.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 33.5 | 54.0 | -20.5 | Mid channel, DH5, EUT horizontal |
| 4959.973 | 24.6 | 8.6 | 311.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 33.2 | 54.0 | -20.8 | High channel, DH5, EUT on side |
| 4882.430 | 24.5 | 8.6 | 98.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 33.1 | 54.0 | -20.9 | Mid channel, DH5, EUT horizontal |
| 4960.817 | 24.5 | 8.6 | 165.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 33.1 | 54.0 | -20.9 | High channel, DH5, EUT vertical |
| 4803.675 | 24.4 | 8.6 | 126.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 33.0 | 54.0 | -21.0 | Low channel, DH5, EUT horizontal |
| 7439.603 | 37.2 | 15.6 | 353.0 | 1.0 | 3.0 | 0.0 | H-Horn | PK | 0.0 | 52.8 | 74.0 | -21.2 | High channel, DH5, EUT horizontal |
| 4803.982 | 24.3 | 8.5 | 70.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 32.8 | 54.0 | -21.2 | Low channel, DH5, EUT horizontal |
| 7322.873 | 37.3 | 15.3 | 184.0 | 1.0 | 3.0 | 0.0 | H-Horn | PK | 0.0 | 52.6 | 74.0 | -21.4 | Mid channel, DH5, EUT horizontal |
| 7439.107 | 36.8 | 15.6 | 158.0 | 1.0 | 3.0 | 0.0 | V-Horn | PK | 0.0 | 52.4 | 74.0 | -21.6 | High channel, DH5, EUT horizontal |
| 7322.330 | 37.0 | 15.3 | 335.0 | 1.0 | 3.0 | 0.0 | V-Horn | PK | 0.0 | 52.3 | 74.0 | -21.7 | Mid channel, DH5, EUT horizontal |
| 4959.043 | 39.1 | 8.6 | 311.0 | 1.0 | 3.0 | 0.0 | H-Horn | PK | 0.0 | 47.7 | 74.0 | -26.3 | High channel, DH5, EUT on side |
| 4959.027 | 39.0 | 8.6 | 280.0 | 1.5 | 3.0 | 0.0 | V-Horn | PK | 0.0 | 47.6 | 74.0 | -26.4 | High channel, DH5, EUT on side |

NORTHWEST EMC

# SPURIOUS RADIATED EMISSIONS

PSA 2008.07.21
EMI 2009.4.13

| | | | |
|---|---|---|---|
| EUT: | Ranger/TSC3 Bluetooth radio | Work Order: | TRPO0054 |
| Serial Number: | Unknown | Date: | 12/04/09 |
| Customer: | Trimble Navigation Limited | Temperature: | 21 |
| Attendees: | None | Humidity: | 38% |
| Project: | None | Barometric Pres.: | 30.15 |
| Tested by: | Rod Peloquin | Power: 120VAC/60Hz | Job Site: EV12 |

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

| TEST PARAMETERS | | | |
|---|---|---|---|
| Antenna Height(s) (m) | 1 - 4 | Test Distance (m) | 3 |

**COMMENTS**

None

**EUT OPERATING MODES**

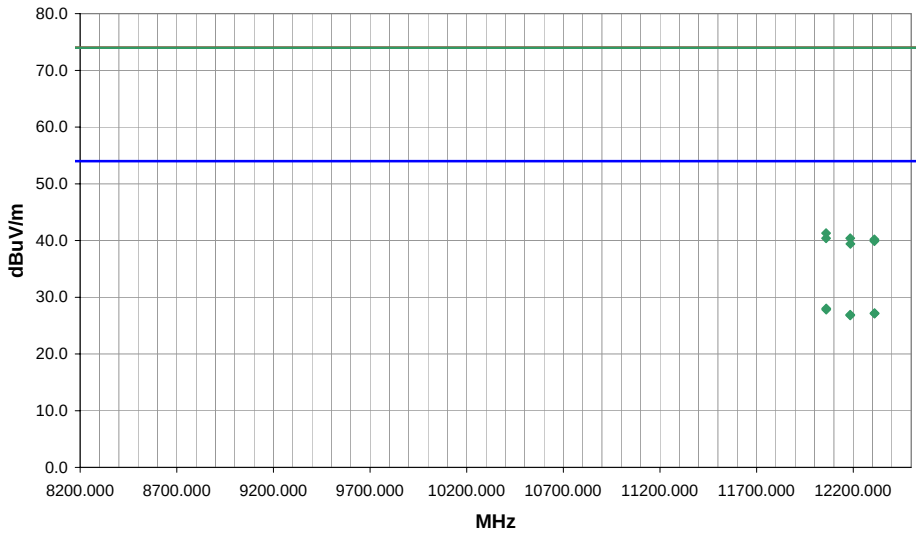
Transmitting 802.11

**DEVIATIONS FROM TEST STANDARD**

No deviations.

| | |
|---|---|
| Run # | 6 |
| Configuration # | 1 |
| Results | Pass |

Signature




| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12060.660 | 36.8 | -8.8 | 281.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 28.0 | 54.0 | -26.0 | Low channel, DH5, EUT horizontal |
| 12060.020 | 36.6 | -8.8 | 34.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 27.8 | 54.0 | -26.2 | Low channel, DH5, EUT horizontal |
| 12310.500 | 35.4 | -8.2 | 343.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 27.2 | 54.0 | -26.8 | High channel, DH5, EUT horizontal |
| 12310.230 | 35.3 | -8.2 | 263.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 27.1 | 54.0 | -26.9 | High channel, DH5, EUT horizontal |
| 12184.990 | 35.5 | -8.6 | 80.0 | 1.0 | 3.0 | 0.0 | H-Horn | AV | 0.0 | 26.9 | 54.0 | -27.1 | Mid channel, DH5, EUT horizontal |
| 12184.770 | 35.4 | -8.6 | 143.0 | 1.0 | 3.0 | 0.0 | V-Horn | AV | 0.0 | 26.8 | 54.0 | -27.2 | Mid channel, DH5, EUT horizontal |
| 12059.910 | 50.1 | -8.8 | 281.0 | 1.0 | 3.0 | 0.0 | H-Horn | PK | 0.0 | 41.3 | 74.0 | -32.7 | Low channel, DH5, EUT horizontal |
| 12059.750 | 49.2 | -8.8 | 34.0 | 1.0 | 3.0 | 0.0 | V-Horn | PK | 0.0 | 40.4 | 74.0 | -33.6 | Low channel, DH5, EUT horizontal |
| 12184.960 | 49.0 | -8.6 | 80.0 | 1.0 | 3.0 | 0.0 | H-Horn | PK | 0.0 | 40.4 | 74.0 | -33.6 | Mid channel, DH5, EUT horizontal |
| 12309.740 | 48.4 | -8.2 | 263.0 | 1.0 | 3.0 | 0.0 | H-Horn | PK | 0.0 | 40.2 | 74.0 | -33.8 | High channel, DH5, EUT horizontal |
| 12309.710 | 48.1 | -8.2 | 343.0 | 1.0 | 3.0 | 0.0 | V-Horn | PK | 0.0 | 39.9 | 74.0 | -34.1 | High channel, DH5, EUT horizontal |
| 12185.100 | 48.0 | -8.6 | 143.0 | 1.0 | 3.0 | 0.0 | V-Horn | PK | 0.0 | 39.4 | 74.0 | -34.6 | Mid channel, DH5, EUT horizontal |

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

| POWER SETTINGS INVESTIGATED |
|---|
| 120VAC/60Hz |

| CONFIGURATIONS INVESTIGATED |
|---|
| TRPO0054 - 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 | ARH | 9/25/2009 | 13 mo |
| LISN | Solar | 9252-50-R-24-BNC | LIR | 2/4/2009 | 13 mo |
| Attenuator | Coaxicom | 66702 2910-20 | ATO | 7/21/2009 | 13 mo |
| High Pass Filter | TTE | H97-100K-50-720B | HFX | 5/27/2009 | 13 mo |
| EV07 Cables | | Conducted Cables | EVG | 6/1/2009 | 13 mo |

**MEASUREMENT BANDWIDTHS**

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (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**

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm.

NORTHWEST

# EMC

PSA-ESCI 2009.06.09
Version 2009.12.18

## AC POWERLINE CONDUCTED EMISSIONS

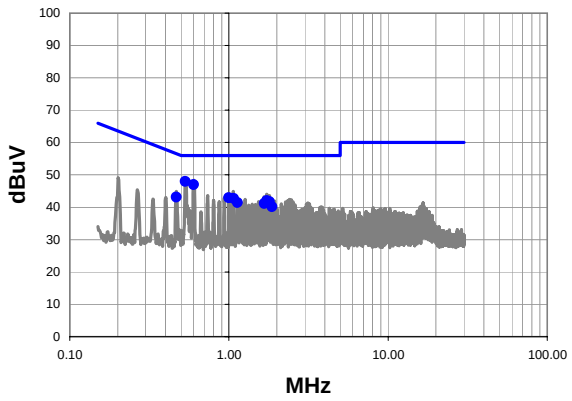
| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | TRPO0054 | **Date:** | 01/05/10 | | |
| **Project:** | None | **Temperature:** | 21 | | |
| **Job Site:** | EV07 | **Humidity:** | 38 | | |
| **Serial Number:** | Unknown | **Barometric Pres.:** | 30.15 | **Tested by:** | Rod Peloquin |

| | |
|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio |
| **Configuration:** | 1 - Radiated Spurious Emissions |
| **Customer:** | Trimble Navigation Limited |
| **Attendees:** | none |
| **EUT Power:** | 120VAC/60Hz |
| **Operating Mode:** | Transmitting Bluetooth GFSK DH5, low channel |
| **Deviations:** | No deviations. |
| **Comments:** | None |

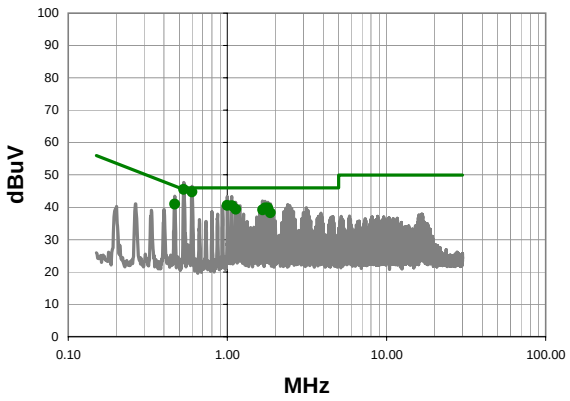
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2010 | ANSI C63.10:2009 |

| **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

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 27.5 | 20.5 | 48.0 | 56.0 | -8.0 |
| 0.599 | 26.5 | 20.5 | 47.0 | 56.0 | -9.0 |
| 1.000 | 22.5 | 20.4 | 42.9 | 56.0 | -13.1 |
| 1.068 | 22.3 | 20.4 | 42.7 | 56.0 | -13.3 |
| 0.468 | 22.7 | 20.5 | 43.2 | 56.5 | -13.4 |
| 1.732 | 21.6 | 20.4 | 42.0 | 56.0 | -14.0 |
| 1.800 | 21.3 | 20.4 | 41.7 | 56.0 | -14.3 |
| 1.132 | 21.1 | 20.4 | 41.5 | 56.0 | -14.5 |
| 1.668 | 20.8 | 20.4 | 41.2 | 56.0 | -14.8 |
| 1.868 | 19.8 | 20.4 | 40.2 | 56.0 | -15.8 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 25.0 | 20.5 | 45.5 | 46.0 | -0.5 |
| 0.599 | 24.2 | 20.5 | 44.7 | 46.0 | -1.3 |
| 1.000 | 20.2 | 20.4 | 40.6 | 46.0 | -5.4 |
| 1.068 | 20.1 | 20.4 | 40.5 | 46.0 | -5.5 |
| 0.468 | 20.5 | 20.5 | 41.0 | 46.5 | -5.6 |
| 1.732 | 19.4 | 20.4 | 39.8 | 46.0 | -6.2 |
| 1.800 | 19.4 | 20.4 | 39.8 | 46.0 | -6.2 |
| 1.132 | 19.0 | 20.4 | 39.4 | 46.0 | -6.6 |
| 1.668 | 18.8 | 20.4 | 39.2 | 46.0 | -6.8 |
| 1.868 | 17.9 | 20.4 | 38.3 | 46.0 | -7.7 |

NORTHWEST

# EMC

PSA-ESCI 2009.06.09
Version 2009.12.18

## AC POWERLINE CONDUCTED EMISSIONS

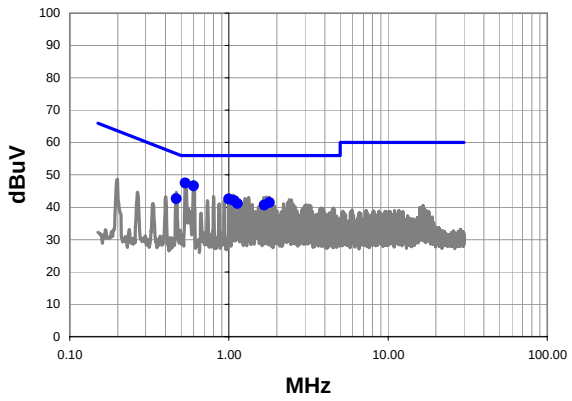
| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | TRPO0054 | **Date:** | 01/05/10 | | |
| **Project:** | None | **Temperature:** | 21 | | |
| **Job Site:** | EV07 | **Humidity:** | 38 | | |
| **Serial Number:** | Unknown | **Barometric Pres.:** | 30.15 | **Tested by:** | Rod Peloquin |

| | |
|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio |
| **Configuration:** | 1 - Radiated Spurious Emissions |
| **Customer:** | Trimble Navigation Limited |
| **Attendees:** | none |
| **EUT Power:** | 120VAC/60Hz |
| **Operating Mode:** | Transmitting Bluetooth GFSK DH5, low channel |
| **Deviations:** | No deviations. |
| **Comments:** | None |

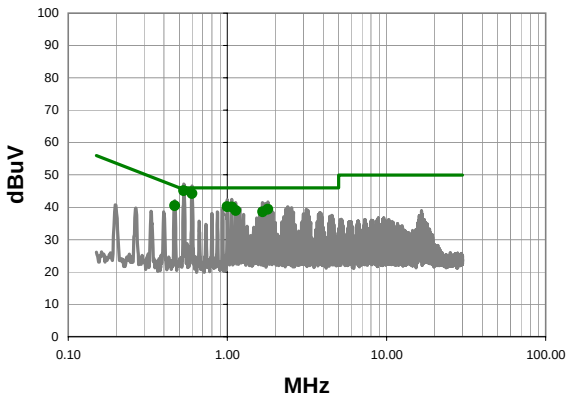
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2010 | ANSI C63.10:2009 |

| **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 (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 27.0 | 20.5 | 47.5 | 56.0 | -8.5 |
| 0.599 | 26.1 | 20.5 | 46.6 | 56.0 | -9.4 |
| 1.000 | 22.1 | 20.4 | 42.5 | 56.0 | -13.5 |
| 1.068 | 21.8 | 20.4 | 42.2 | 56.0 | -13.8 |
| 0.468 | 22.2 | 20.5 | 42.7 | 56.5 | -13.9 |
| 1.800 | 21.0 | 20.4 | 41.4 | 56.0 | -14.6 |
| 1.132 | 20.8 | 20.4 | 41.2 | 56.0 | -14.8 |
| 1.668 | 20.3 | 20.4 | 40.7 | 56.0 | -15.3 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 24.6 | 20.5 | 45.1 | 46.0 | -0.9 |
| 0.599 | 23.7 | 20.5 | 44.2 | 46.0 | -1.8 |
| 1.000 | 19.8 | 20.4 | 40.2 | 46.0 | -5.8 |
| 1.068 | 19.7 | 20.4 | 40.1 | 46.0 | -5.9 |
| 0.468 | 20.0 | 20.5 | 40.5 | 46.5 | -6.1 |
| 1.800 | 19.0 | 20.4 | 39.4 | 46.0 | -6.6 |
| 1.132 | 18.6 | 20.4 | 39.0 | 46.0 | -7.0 |
| 1.668 | 18.2 | 20.4 | 38.6 | 46.0 | -7.4 |

NORTHWEST

# EMC

PSA-ESCI 2009.06.09
Version 2009.12.18

## AC POWERLINE CONDUCTED EMISSIONS

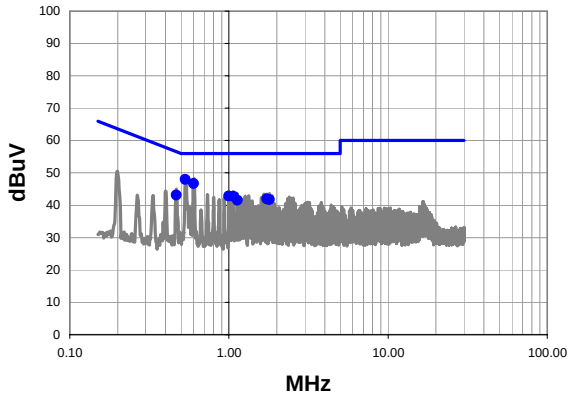
| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | TRPO0054 | **Date:** | 01/05/10 | | |
| **Project:** | None | **Temperature:** | 21 | | |
| **Job Site:** | EV07 | **Humidity:** | 38 | | |
| **Serial Number:** | Unknown | **Barometric Pres.:** | 30.15 | **Tested by:** | Rod Peloquin |

| | |
|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio |
| **Configuration:** | 1 - Radiated Spurious Emissions |
| **Customer:** | Trimble Navigation Limited |
| **Attendees:** | none |
| **EUT Power:** | 120VAC/60Hz |
| **Operating Mode:** | Transmitting Bluetooth GFSK DH5, mid channel |
| **Deviations:** | No deviations. |
| **Comments:** | None |

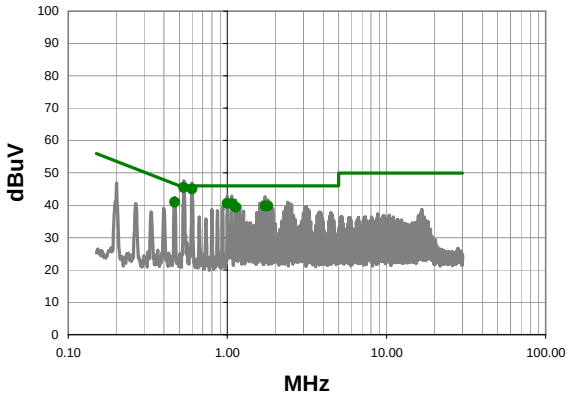
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2010 | ANSI C63.10:2009 |

| **Run #** | 9 | **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 (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 27.5 | 20.5 | 48.0 | 56.0 | -8.0 |
| 0.601 | 26.2 | 20.5 | 46.7 | 56.0 | -9.3 |
| 1.000 | 22.4 | 20.4 | 42.8 | 56.0 | -13.2 |
| 1.068 | 22.3 | 20.4 | 42.7 | 56.0 | -13.3 |
| 0.468 | 22.7 | 20.5 | 43.2 | 56.5 | -13.4 |
| 1.732 | 21.5 | 20.4 | 41.9 | 56.0 | -14.1 |
| 1.800 | 21.3 | 20.4 | 41.7 | 56.0 | -14.3 |
| 1.132 | 21.2 | 20.4 | 41.6 | 56.0 | -14.4 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 25.0 | 20.5 | 45.5 | 46.0 | -0.5 |
| 0.601 | 24.5 | 20.5 | 45.0 | 46.0 | -1.0 |
| 1.000 | 20.2 | 20.4 | 40.6 | 46.0 | -5.4 |
| 1.068 | 20.1 | 20.4 | 40.5 | 46.0 | -5.5 |
| 0.468 | 20.5 | 20.5 | 41.0 | 46.5 | -5.6 |
| 1.732 | 19.4 | 20.4 | 39.8 | 46.0 | -6.2 |
| 1.800 | 19.4 | 20.4 | 39.8 | 46.0 | -6.2 |
| 1.132 | 19.0 | 20.4 | 39.4 | 46.0 | -6.6 |

NORTHWEST
# EMC

PSA-ESCI 2009.06.09
Version 2009.12.18

## AC POWERLINE CONDUCTED EMISSIONS

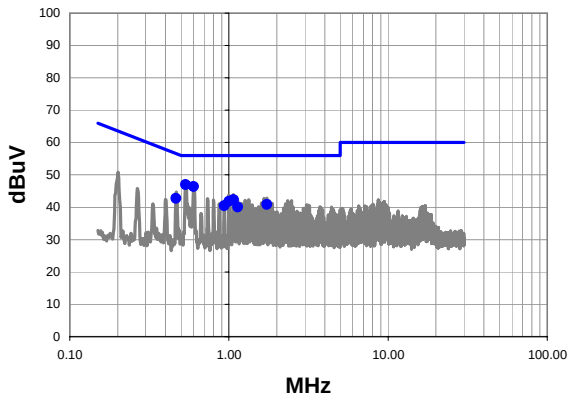
| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | TRPO0054 | **Date:** | 01/05/10 | | |
| **Project:** | None | **Temperature:** | 21 | | |
| **Job Site:** | EV07 | **Humidity:** | 38 | | |
| **Serial Number:** | Unknown | **Barometric Pres.:** | 30.15 | **Tested by:** | Rod Peloquin |

| | |
|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio |
| **Configuration:** | 1 - Radiated Spurious Emissions |
| **Customer:** | Trimble Navigation Limited |
| **Attendees:** | none |
| **EUT Power:** | 120VAC/60Hz |
| **Operating Mode:** | Transmitting Bluetooth GFSK DH5, mid channel |
| **Deviations:** | No deviations. |
| **Comments:** | None |

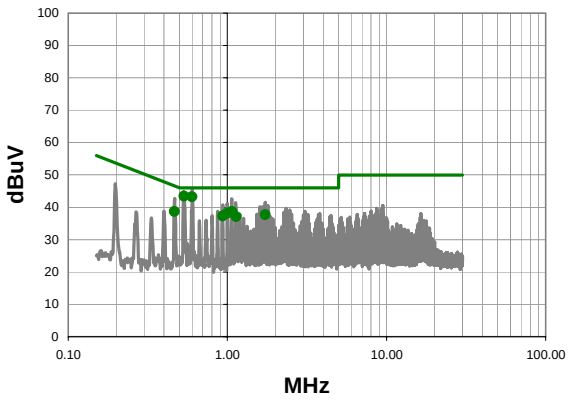
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2010 | ANSI C63.10:2009 |

| **Run #** | 10 | **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 (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.535 | 26.5 | 20.5 | 47.0 | 56.0 | -9.0 |
| 0.601 | 25.9 | 20.5 | 46.4 | 56.0 | -9.6 |
| 1.068 | 22.0 | 20.4 | 42.4 | 56.0 | -13.6 |
| 0.466 | 22.3 | 20.5 | 42.8 | 56.6 | -13.8 |
| 1.002 | 21.5 | 20.4 | 41.9 | 56.0 | -14.1 |
| 1.736 | 20.5 | 20.4 | 40.9 | 56.0 | -15.1 |
| 0.934 | 20.1 | 20.4 | 40.5 | 56.0 | -15.5 |
| 1.136 | 19.7 | 20.4 | 40.1 | 56.0 | -15.9 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.535 | 22.9 | 20.5 | 43.4 | 46.0 | -2.6 |
| 0.601 | 22.7 | 20.5 | 43.2 | 46.0 | -2.8 |
| 1.068 | 18.3 | 20.4 | 38.7 | 46.0 | -7.3 |
| 1.002 | 17.8 | 20.4 | 38.2 | 46.0 | -7.8 |
| 0.466 | 18.2 | 20.5 | 38.7 | 46.6 | -7.9 |
| 1.736 | 17.3 | 20.4 | 37.7 | 46.0 | -8.3 |
| 0.934 | 16.9 | 20.4 | 37.3 | 46.0 | -8.7 |
| 1.136 | 16.7 | 20.4 | 37.1 | 46.0 | -8.9 |

NORTHWEST
# EMC

PSA-ESCI 2009.06.09
Version 2009.12.18

## AC POWERLINE CONDUCTED EMISSIONS

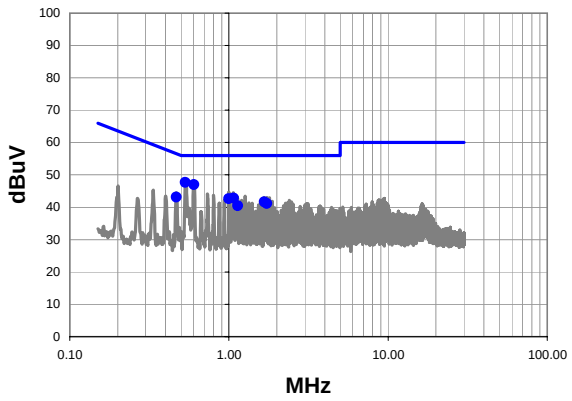
| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | TRPO0054 | **Date:** | 01/05/10 | | |
| **Project:** | None | **Temperature:** | 21 | | |
| **Job Site:** | EV07 | **Humidity:** | 38 | | |
| **Serial Number:** | Unknown | **Barometric Pres.:** | 30.15 | **Tested by:** | Rod Peloquin |

| | |
|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio |
| **Configuration:** | 1 - Radiated Spurious Emissions |
| **Customer:** | Trimble Navigation Limited |
| **Attendees:** | none |
| **EUT Power:** | 120VAC/60Hz |
| **Operating Mode:** | Transmitting Bluetooth GFSK DH5, high channel |
| **Deviations:** | No deviations. |
| **Comments:** | None |

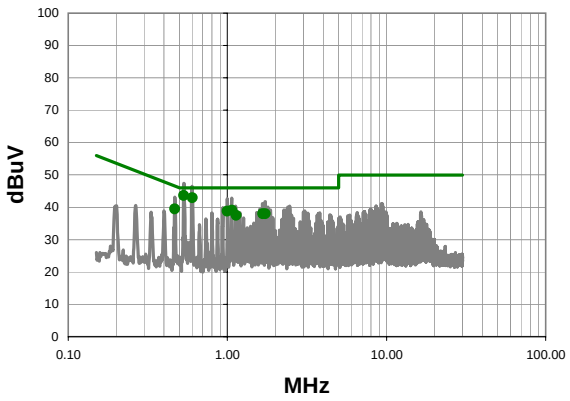
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2010 | ANSI C63.10:2009 |

| **Run #** | 11 | **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 (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 27.2 | 20.5 | 47.7 | 56.0 | -8.3 |
| 0.603 | 26.5 | 20.5 | 47.0 | 56.0 | -9.0 |
| 1.068 | 22.4 | 20.4 | 42.8 | 56.0 | -13.2 |
| 0.468 | 22.7 | 20.5 | 43.2 | 56.5 | -13.4 |
| 1.000 | 22.2 | 20.4 | 42.6 | 56.0 | -13.4 |
| 1.668 | 21.2 | 20.4 | 41.6 | 56.0 | -14.4 |
| 1.736 | 20.7 | 20.4 | 41.1 | 56.0 | -14.9 |
| 1.136 | 20.1 | 20.4 | 40.5 | 56.0 | -15.5 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 23.1 | 20.5 | 43.6 | 46.0 | -2.4 |
| 0.603 | 22.4 | 20.5 | 42.9 | 46.0 | -3.1 |
| 1.068 | 18.7 | 20.4 | 39.1 | 46.0 | -6.9 |
| 0.468 | 19.0 | 20.5 | 39.5 | 46.5 | -7.1 |
| 1.000 | 18.4 | 20.4 | 38.8 | 46.0 | -7.2 |
| 1.736 | 17.6 | 20.4 | 38.0 | 46.0 | -8.0 |
| 1.668 | 17.6 | 20.4 | 38.0 | 46.0 | -8.0 |
| 1.136 | 17.1 | 20.4 | 37.5 | 46.0 | -8.5 |

NORTHWEST
# EMC

PSA-ESCI 2009.06.09
Version 2009.12.18

## AC POWERLINE CONDUCTED EMISSIONS

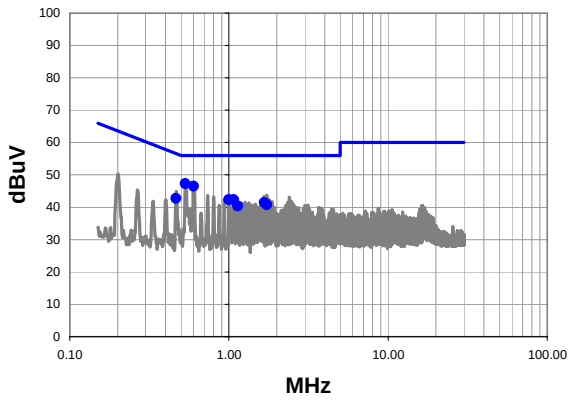
| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | TRPO0054 | **Date:** | 01/05/10 | | |
| **Project:** | None | **Temperature:** | 21 | | |
| **Job Site:** | EV07 | **Humidity:** | 38 | | |
| **Serial Number:** | Unknown | **Barometric Pres.:** | 30.15 | **Tested by:** | Rod Peloquin |

| | |
|---|---|
| **EUT:** | Ranger/TSC3 Bluetooth radio |
| **Configuration:** | 1 - Radiated Spurious Emissions |
| **Customer:** | Trimble Navigation Limited |
| **Attendees:** | none |
| **EUT Power:** | 120VAC/60Hz |
| **Operating Mode:** | Transmitting Bluetooth GFSK DH5, high channel |
| **Deviations:** | No deviations. |
| **Comments:** | None |

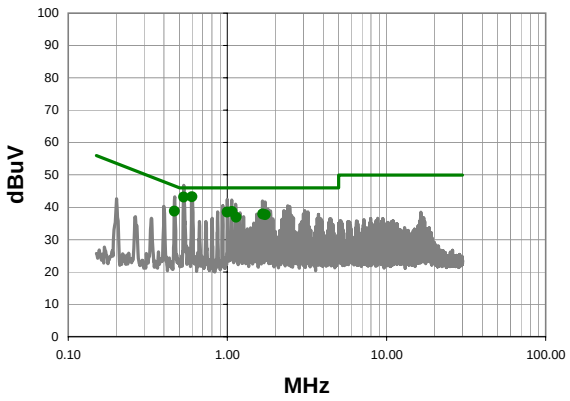
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2010 | ANSI C63.10:2009 |

| **Run #** | 12 | **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 (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.533 | 26.8 | 20.5 | 47.3 | 56.0 | -8.7 |
| 0.601 | 26.0 | 20.5 | 46.5 | 56.0 | -9.5 |
| 1.068 | 22.0 | 20.4 | 42.4 | 56.0 | -13.6 |
| 1.000 | 21.9 | 20.4 | 42.3 | 56.0 | -13.7 |
| 0.466 | 22.3 | 20.5 | 42.8 | 56.6 | -13.8 |
| 1.668 | 21.0 | 20.4 | 41.4 | 56.0 | -14.6 |
| 1.736 | 20.4 | 20.4 | 40.8 | 56.0 | -15.2 |
| 1.136 | 20.0 | 20.4 | 40.4 | 56.0 | -15.6 |

Average Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.601 | 22.7 | 20.5 | 43.2 | 46.0 | -2.8 |
| 0.533 | 22.6 | 20.5 | 43.1 | 46.0 | -2.9 |
| 1.068 | 18.3 | 20.4 | 38.7 | 46.0 | -7.3 |
| 1.000 | 18.1 | 20.4 | 38.5 | 46.0 | -7.5 |
| 0.466 | 18.3 | 20.5 | 38.8 | 46.6 | -7.8 |
| 1.668 | 17.5 | 20.4 | 37.9 | 46.0 | -8.1 |
| 1.736 | 17.3 | 20.4 | 37.7 | 46.0 | -8.3 |
| 1.136 | 16.5 | 20.4 | 36.9 | 46.0 | -9.1 |