

Trimble Navigation Limited

Ranger/TSC3 Bluetooth Radio

Report No. TRPO0054.1

Report Prepared By



www.nwemc.com

1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Last Date of Test: 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 Fecteau, IS Manager



NVLAP Lab Code: 200630-0

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

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

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

FCC

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



NVLAP

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



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

Industry Canada

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



CAB

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



NEMKO

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



Australia/New Zealand

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



VCCI

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



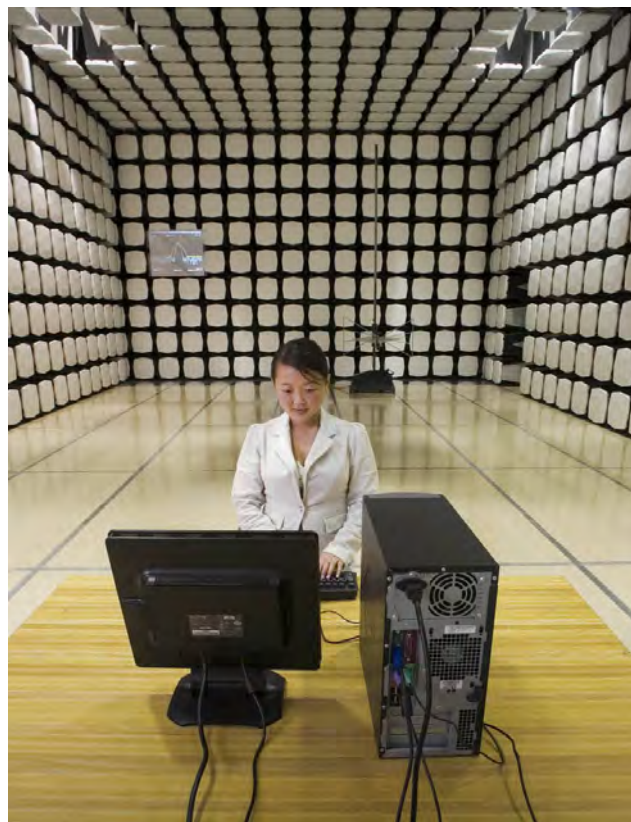
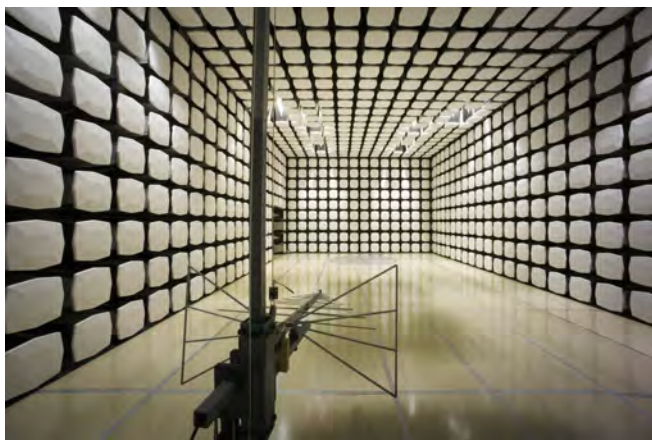
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

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

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Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
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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 MHz**.

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

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

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

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:

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

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

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

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

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

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

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

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

The input bandwidth of the receiver is 1 MHz.

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

7 Dwell time in data mode

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

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

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

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

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

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

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

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

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

8 Channel Separation in hybrid mode

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

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

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

9 Derivation and examples for a hopping sequence in hybrid mode

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

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

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

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

Example of a hopping sequence in inquiry mode:

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

Example of a hopping sequence in paging mode:

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

10 Receiver input bandwidth and synchronization in hybrid mode:

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

11 Spread rate / data rate of the direct sequence signal

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

12 Spurious emission in hybrid mode

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

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	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.

EMC

OCCUPIED BANDWIDTH

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 
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		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

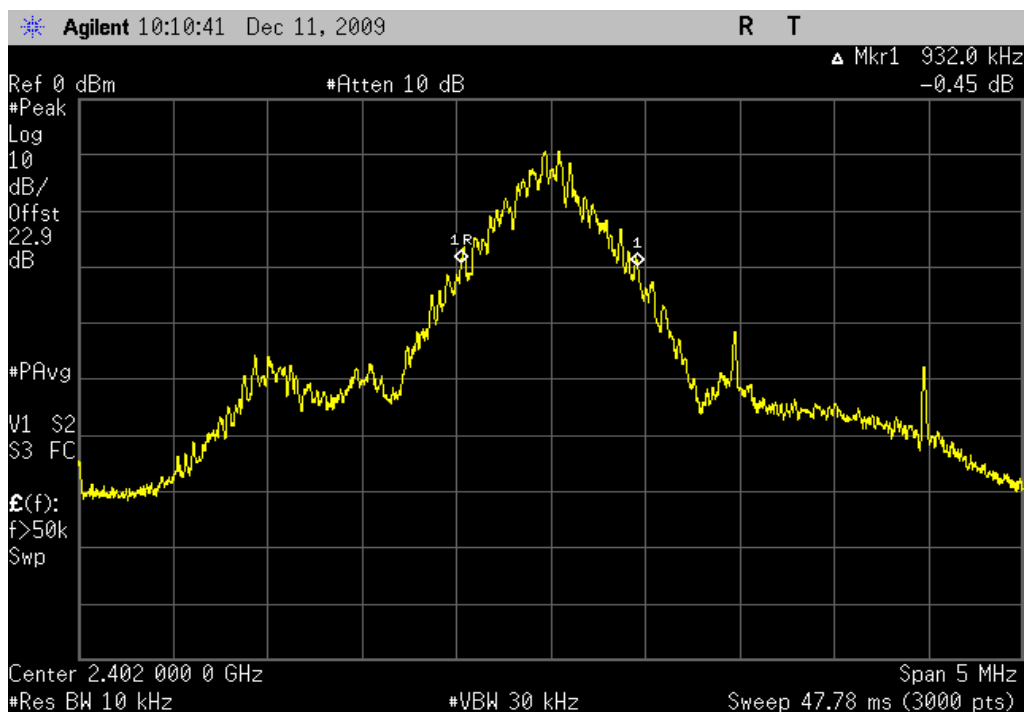
OCCUPIED BANDWIDTH

GFSK, DH5, Low Channel, 2402MHz

Result: Pass

Value: 932 kHz

Limit: 1.5 MHz

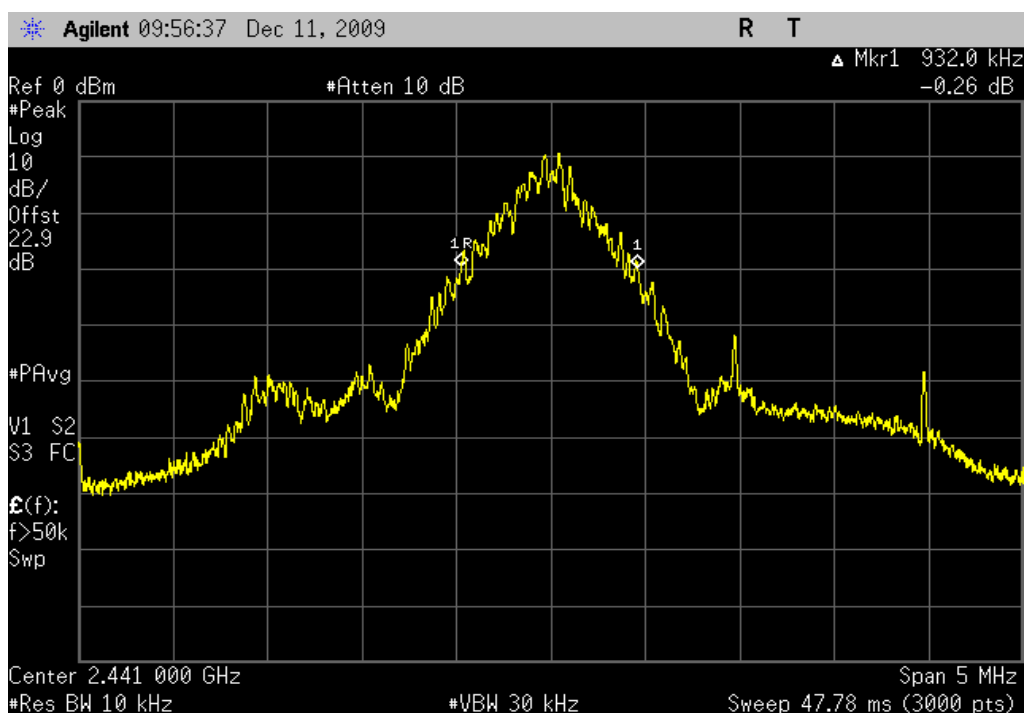


GFSK, DH5, Mid Channel, 2441 MHz

Result: Pass

Value: 932 kHz

Limit: 1.5 MHz



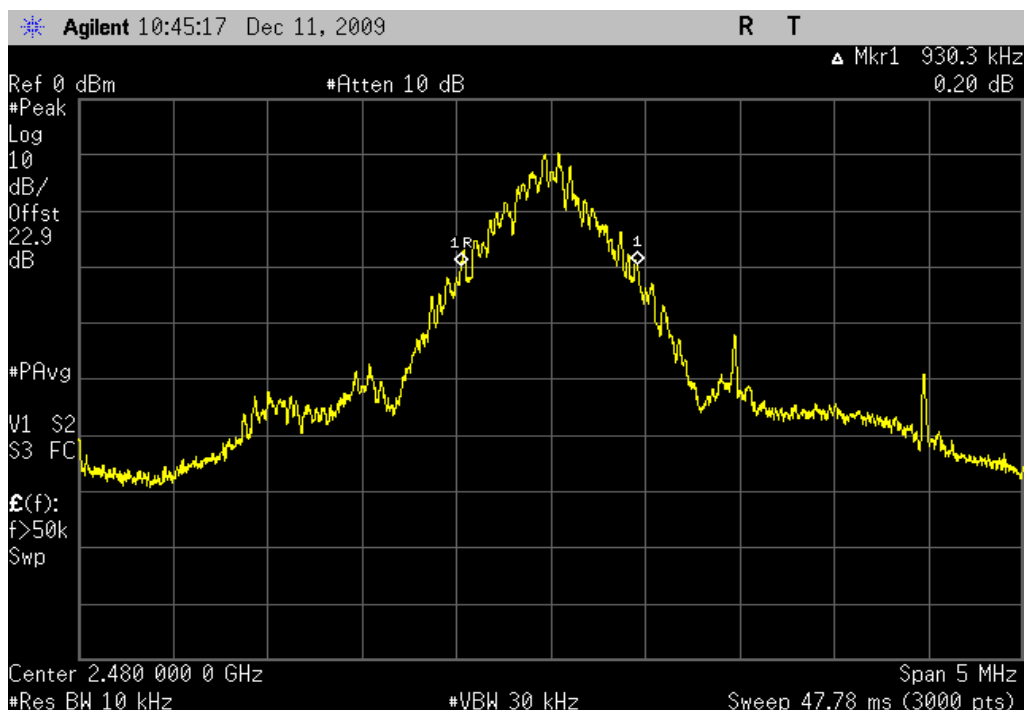
OCCUPIED BANDWIDTH

GFSK, DH5, High Channel, 2480 MHz

Result: Pass

Value: 930 kHz

Limit: 1.5 MHz

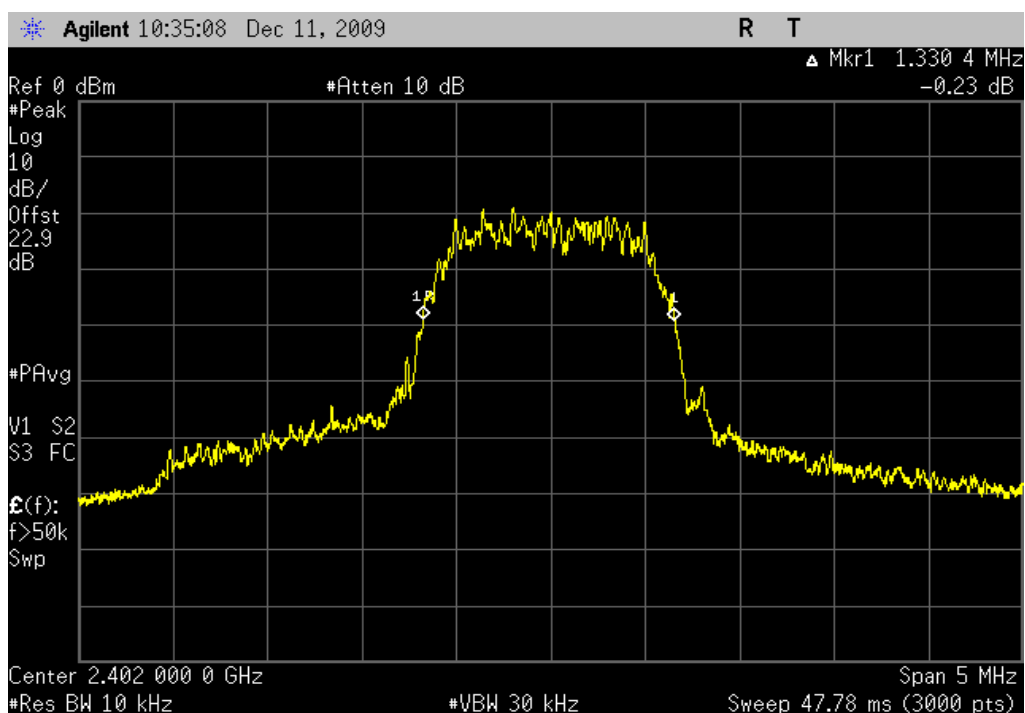


pi/4-DQPSK, 2DH5, Low Channel, 2402MHz

Result: Pass

Value: 1.330 MHz

Limit: 1.5 MHz

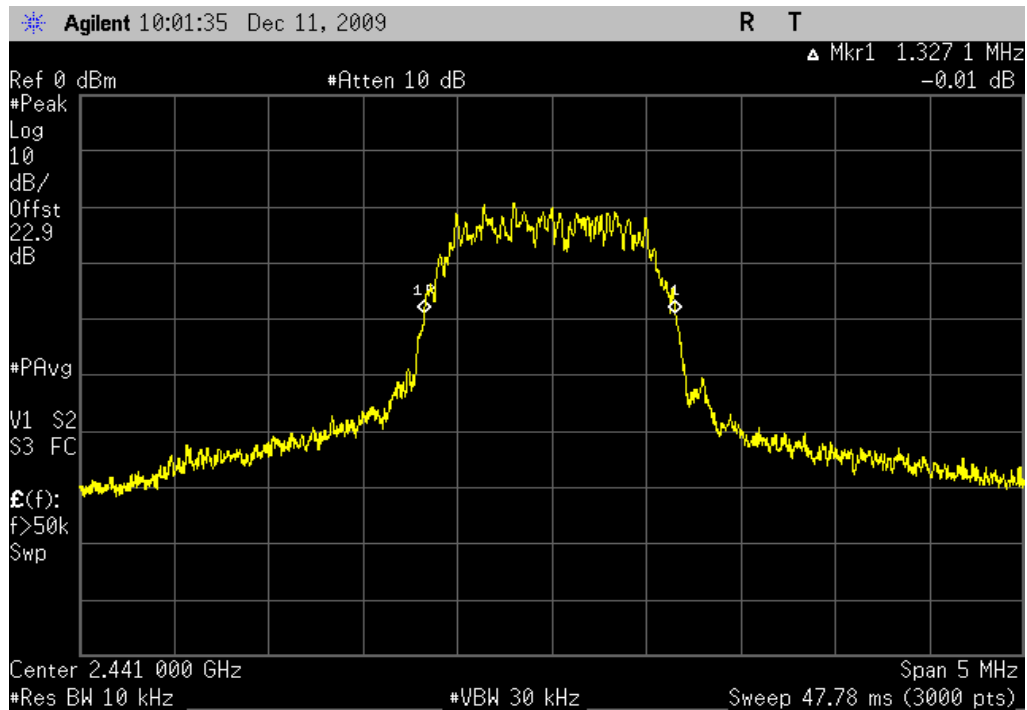


pi/4-DQPSK, 2DH5, Mid Channel, 2441 MHz

Result: Pass

Value: 1.327 MHz

Limit: 1.5 MHz

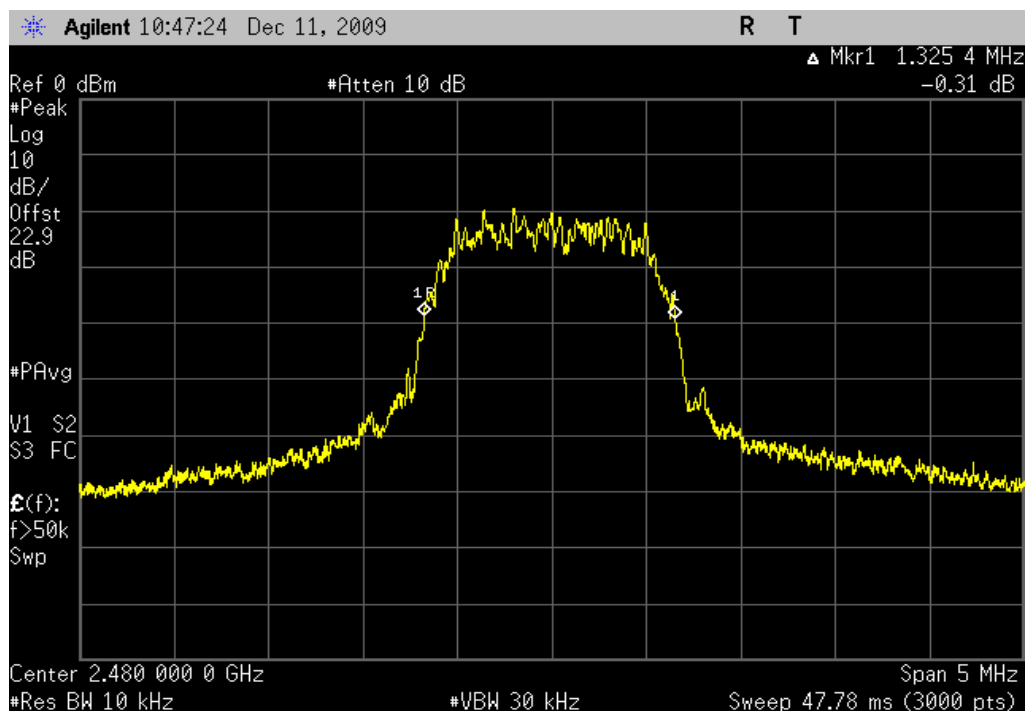


pi/4-DQPSK, 2DH5, High Channel, 2480 MHz

Result: Pass

Value: 1.325 MHz

Limit: 1.5 MHz



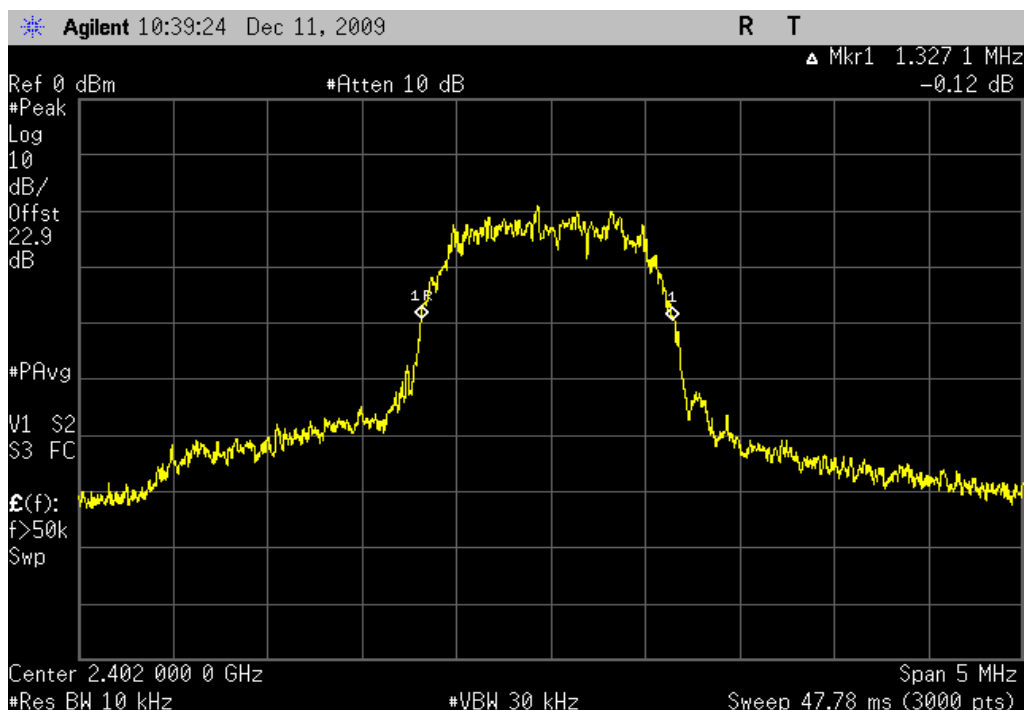
OCCUPIED BANDWIDTH

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

Result: Pass

Value: 1.327 MHz

Limit: 1.5 MHz

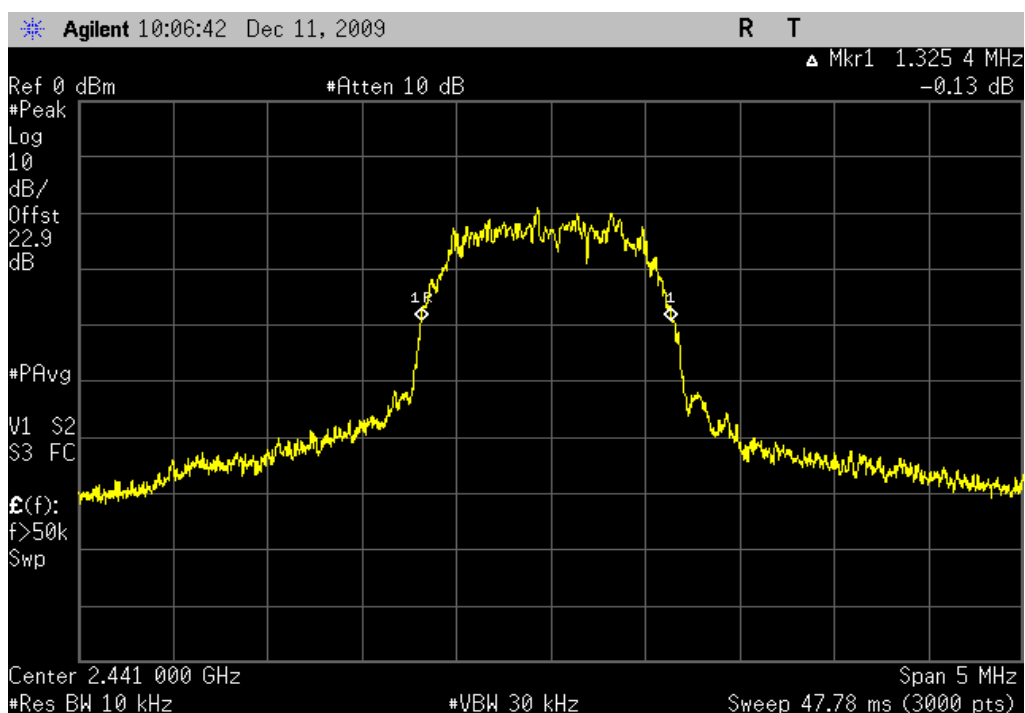


8-DPSK, 3DH5, Mid Channel, 2441 MHz

Result: Pass

Value: 1.325 MHz

Limit: 1.5 MHz



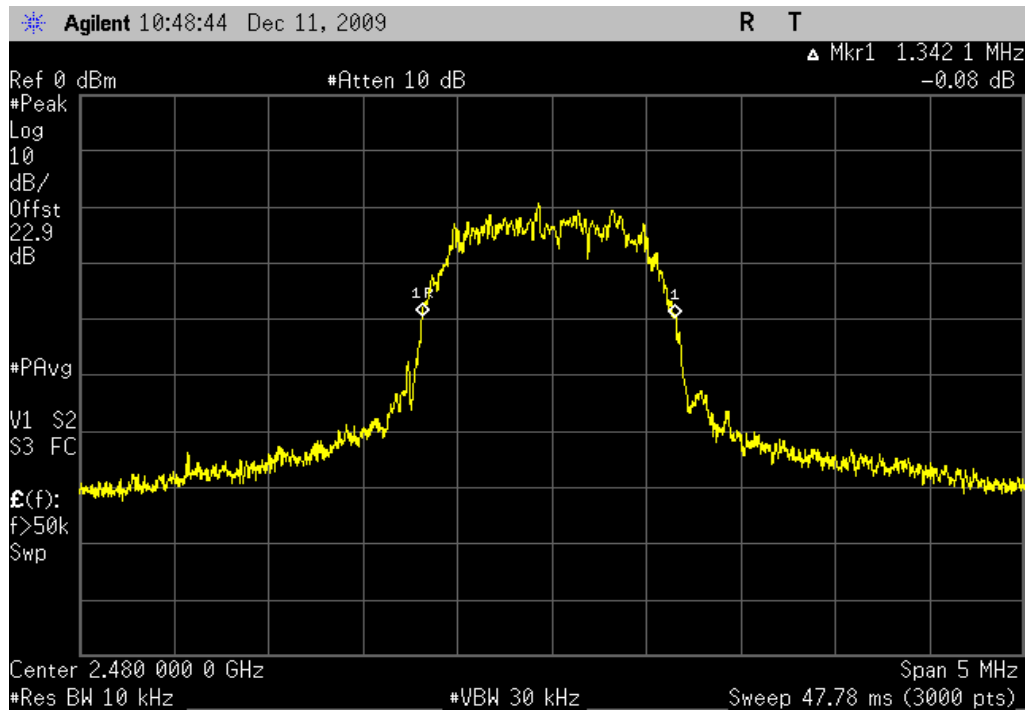
OCCUPIED BANDWIDTH

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
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26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
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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.

EMC

OUTPUT POWER

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 
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		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

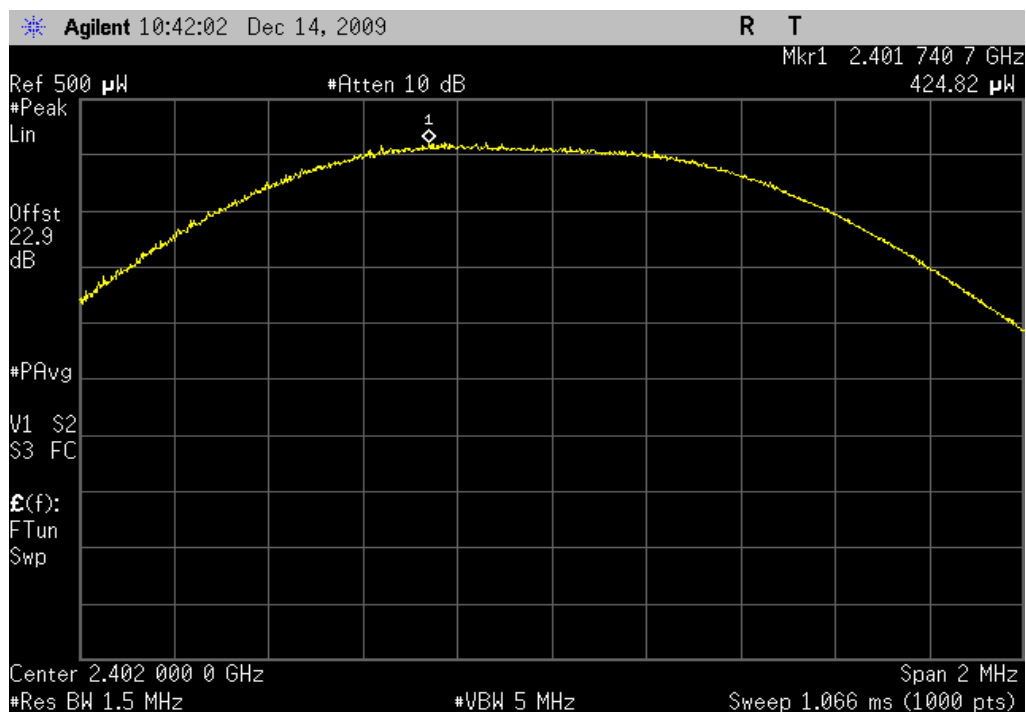
OUTPUT POWER

DH5, GFSK, Low Channel

Result: Pass

Value: 0.425 mW

Limit: 1 W

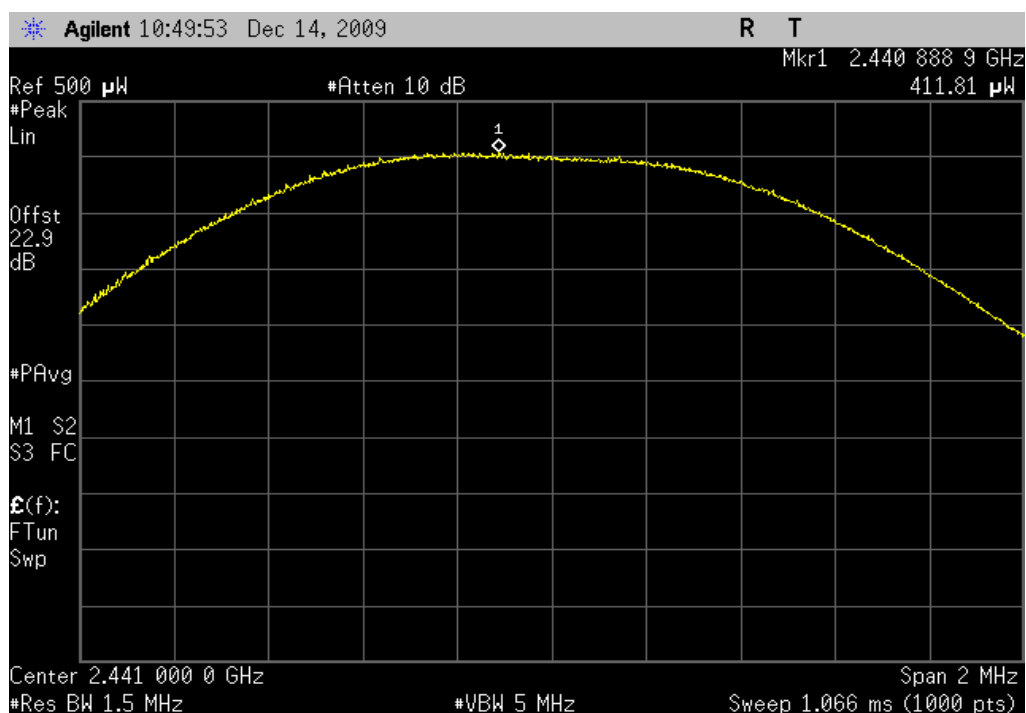


DH5, GFSK, Mid Channel

Result: Pass

Value: 0.412 mW

Limit: 1 W



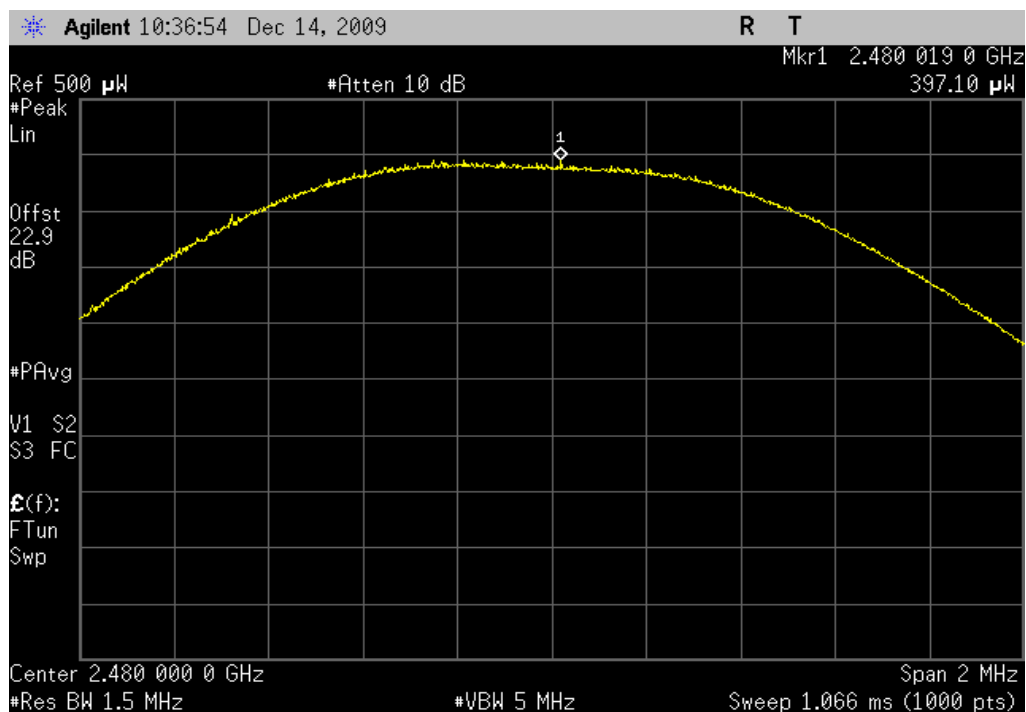
OUTPUT POWER

DH5, GFSK, High Channel

Result: Pass

Value: 0.397 mW

Limit: 1 W

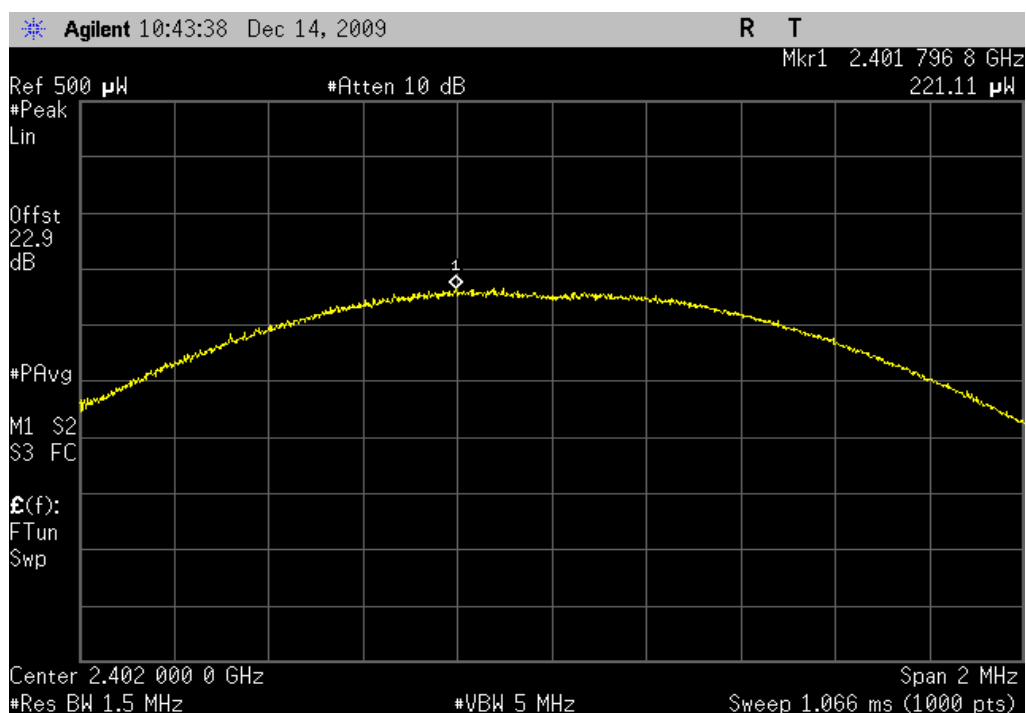


2DH5, 4-DQPSK, Low Channel

Result: Pass

Value: 0.221 mW

Limit: 1 W

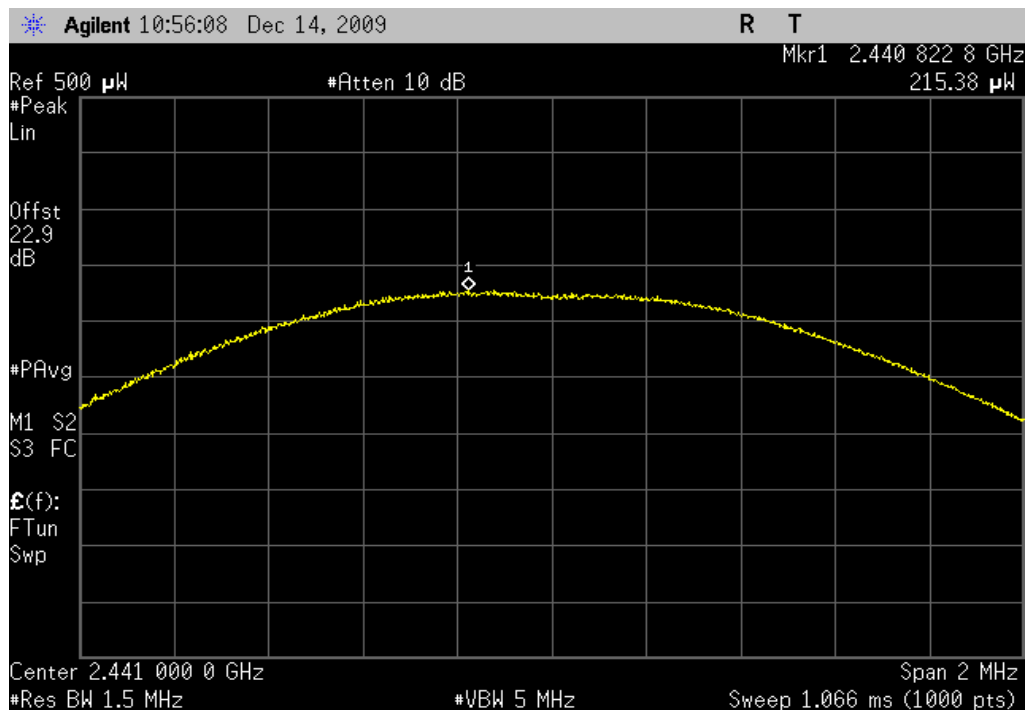


2DH5, 4-DQPSK, Mid Channel

Result: Pass

Value: 0.215 mW

Limit: 1 W

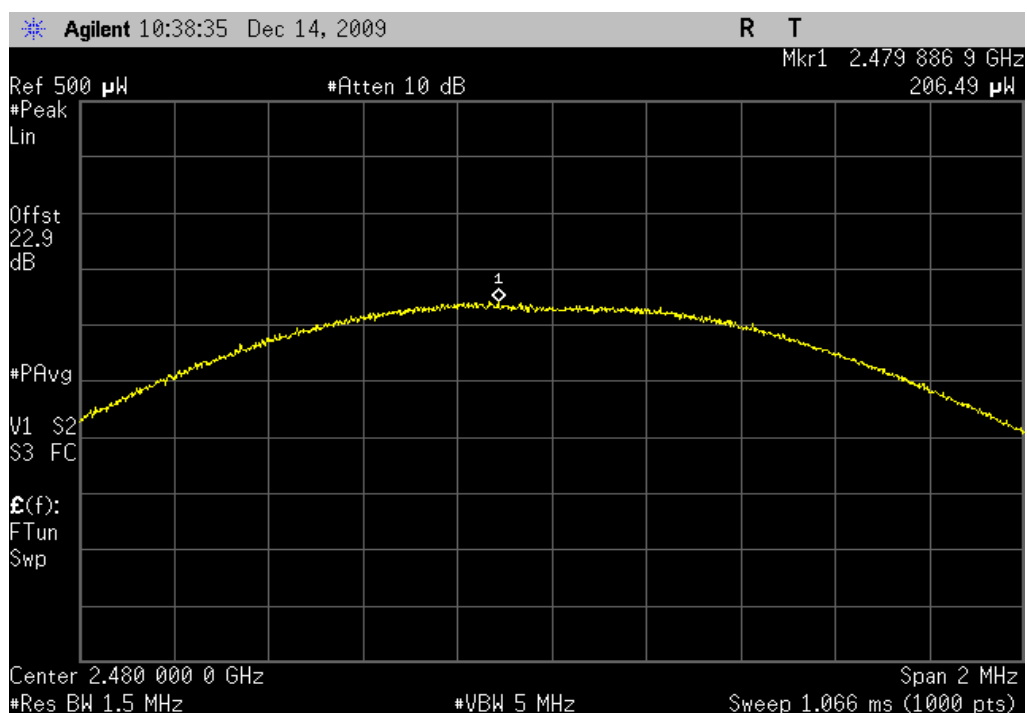


2DH5, 4-DQPSK, High Channel

Result: Pass

Value: 0.206 mW

Limit: 1 W



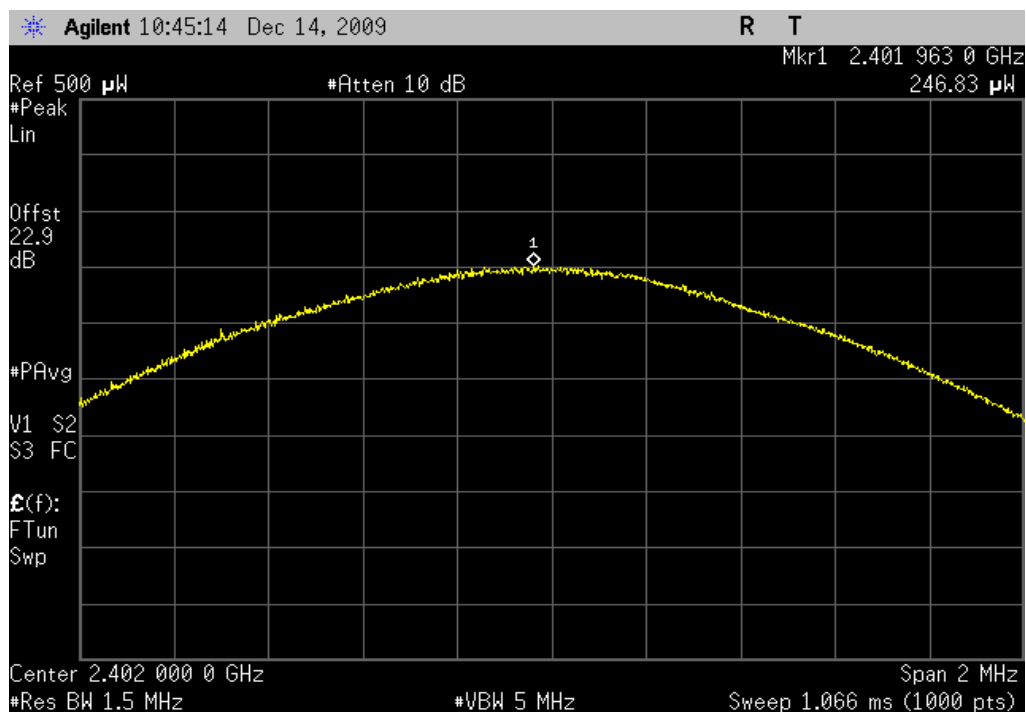
OUTPUT POWER

3DH5, 8-DPSK, Low Channel

Result: Pass

Value: 0.247 mW

Limit: 1 W

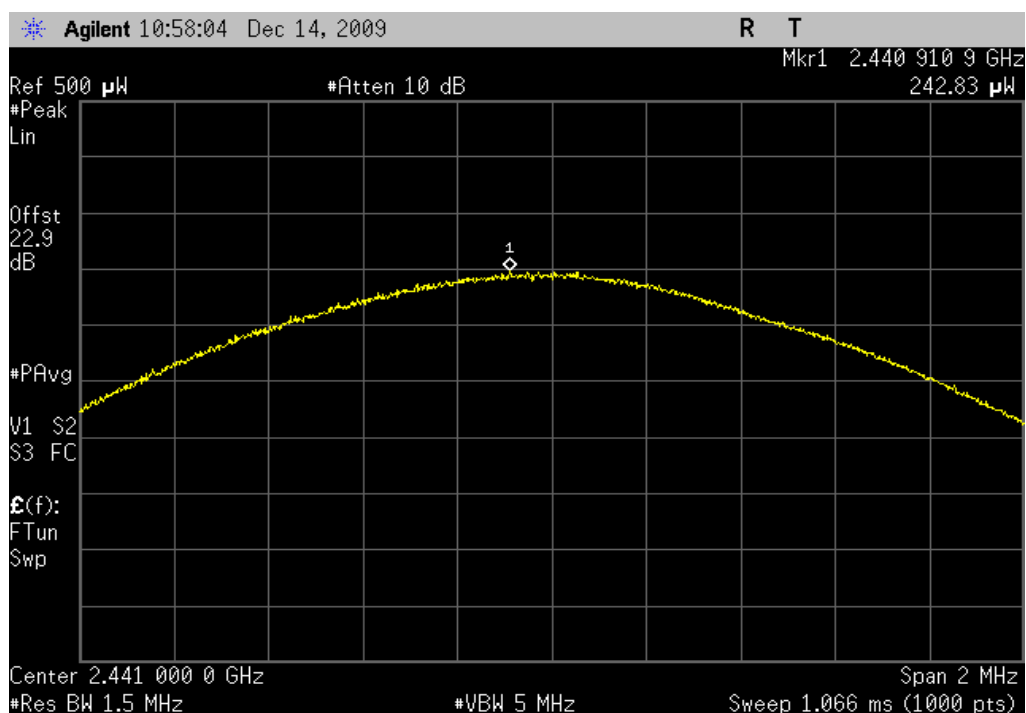


3DH5, 8-DPSK, Mid Channel

Result: Pass

Value: 0.243 mW

Limit: 1 W



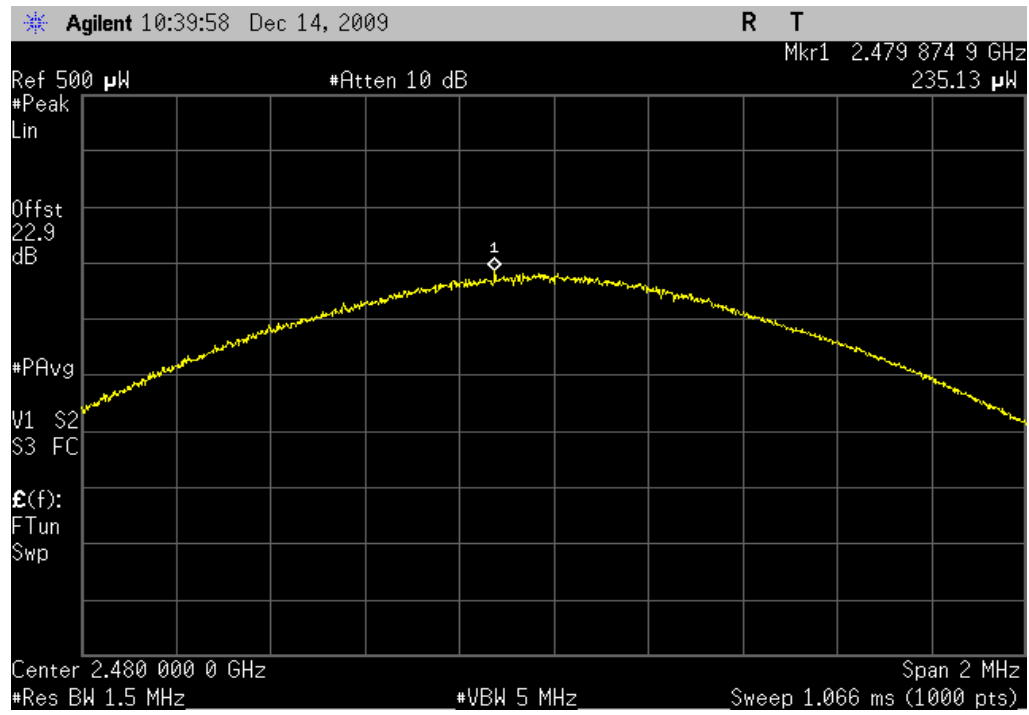
OUTPUT POWER

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.

EMC

BAND EDGE COMPLIANCE

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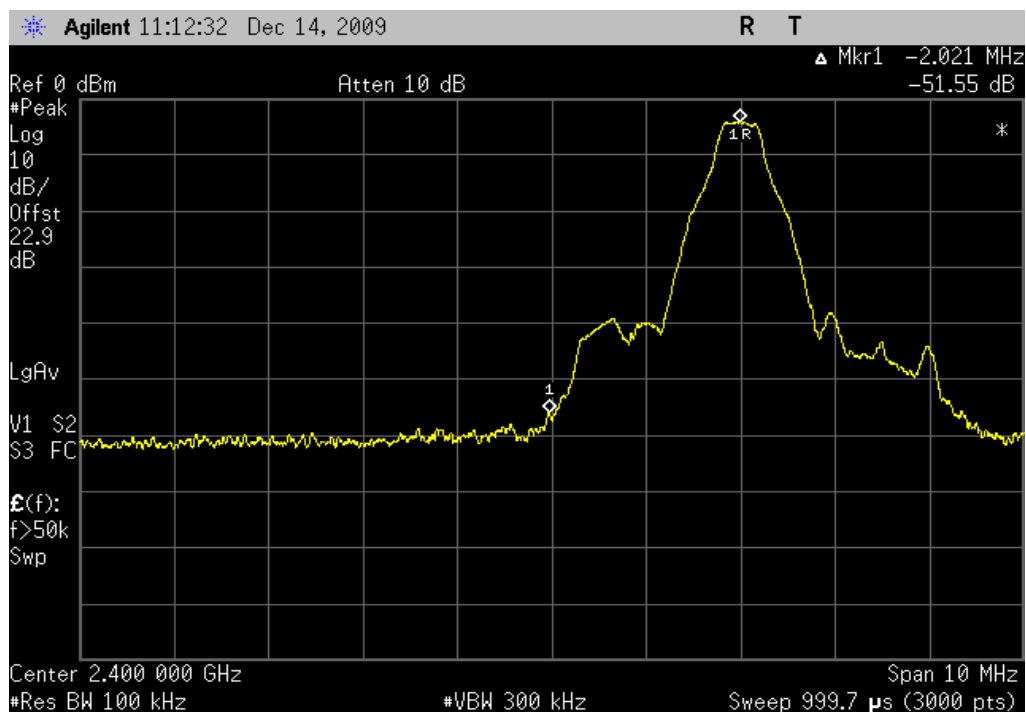
		Value	Limit	Results
GFSK, DH5				
	Low Channel	-51.6 dBc	≤ -20 dBc	Pass
	High Channel	-53.0 dBc	≤ -20 dBc	Pass
pi/4-DQPSK, 2DH5				
	Low Channel	-42.8 dBc	≤ -20 dBc	Pass
	High Channel	-48.1 dBc	≤ -20 dBc	Pass
8-DPSK, 3DH5				
	Low Channel	-43.8 dBc	≤ -20 dBc	Pass
	High Channel	-47.7 dBc	≤ -20 dBc	Pass

BAND EDGE COMPLIANCE

GFSK, DH5, Low Channel

Result: Pass

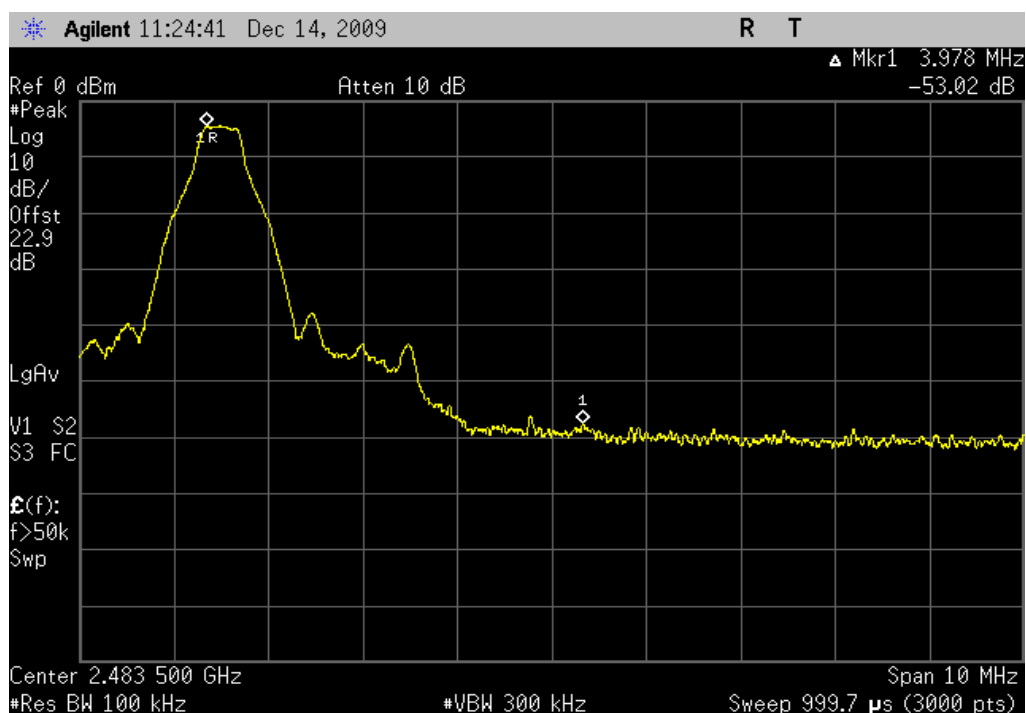
Value: -51.6 dBc

Limit: ≤ -20 dBc

GFSK, DH5, High Channel

Result: Pass

Value: -53.0 dBc

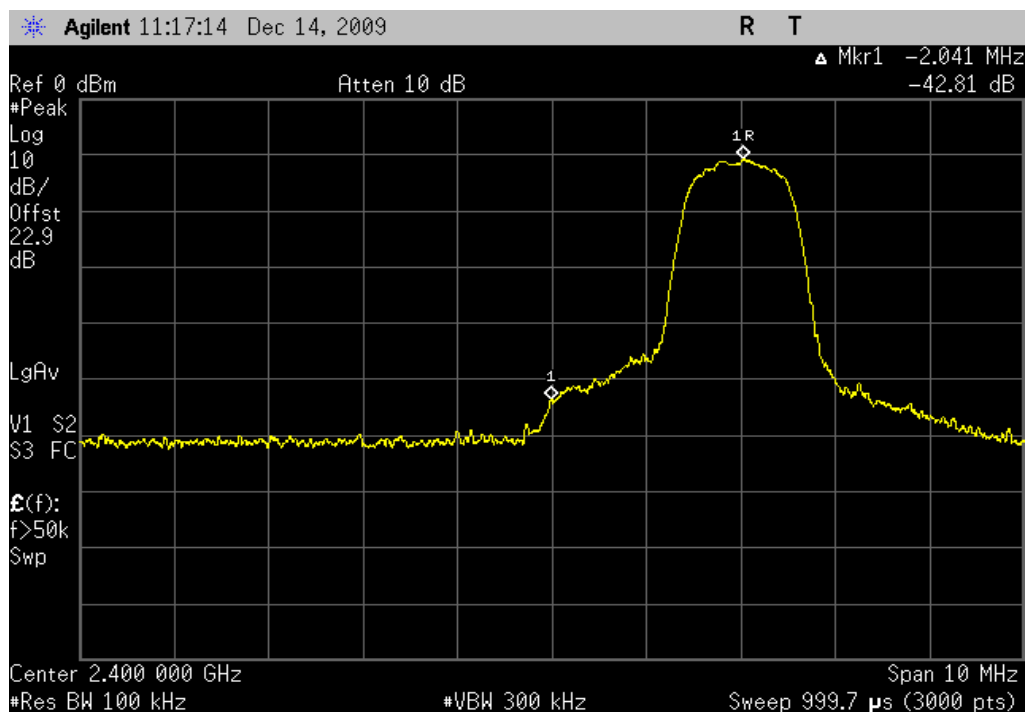
Limit: ≤ -20 dBc

BAND EDGE COMPLIANCE

pi/4-DQPSK, 2DH5, Low Channel

Result: Pass

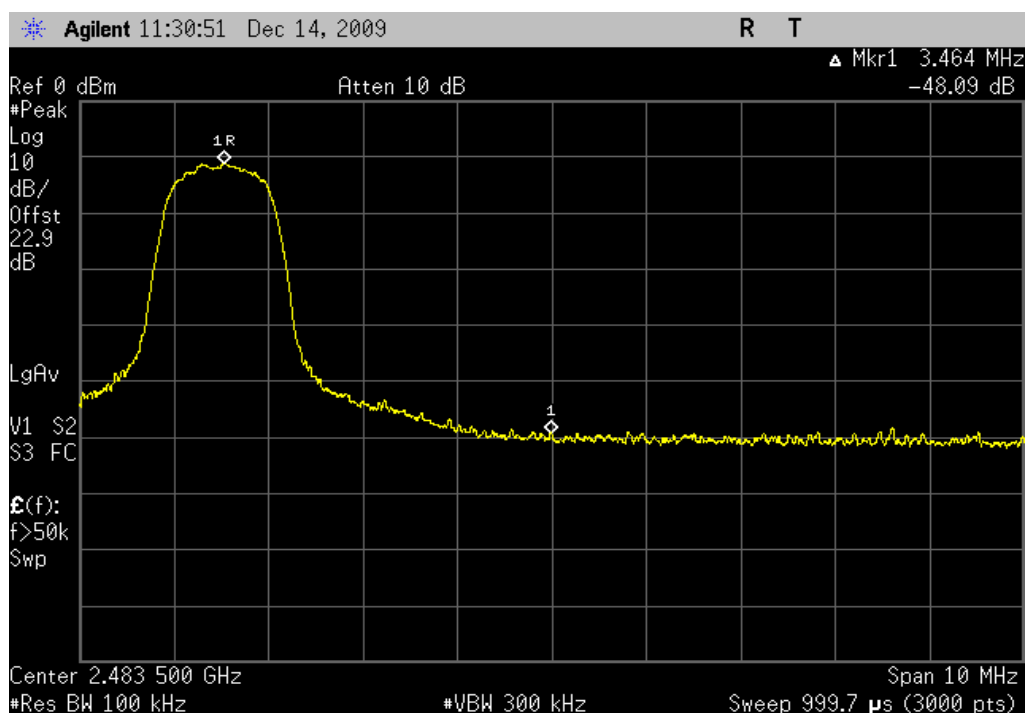
Value: -42.8 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, High Channel

Result: Pass

Value: -48.1 dBc

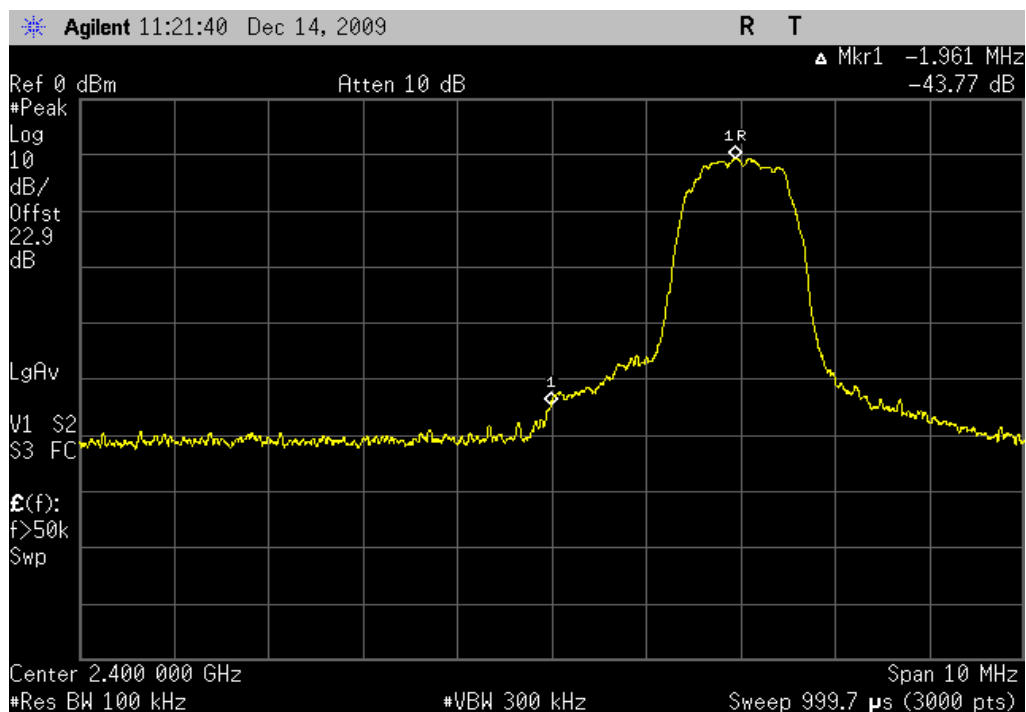
Limit: ≤ -20 dBc

BAND EDGE COMPLIANCE

8-DPSK, 3DH5, Low Channel

Result: Pass

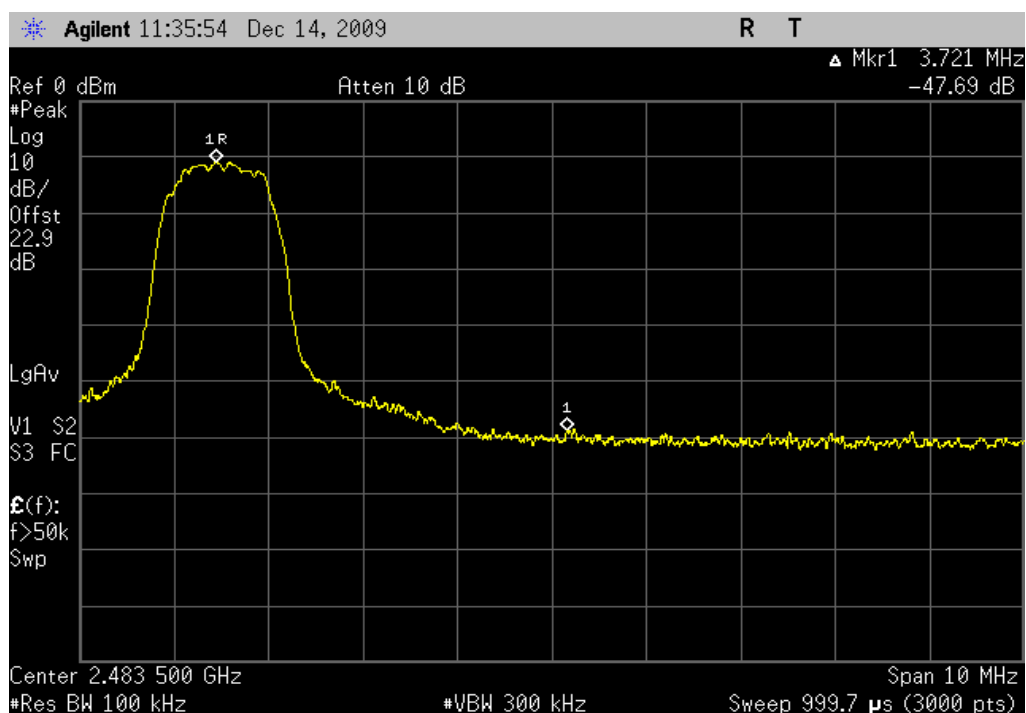
Value: -43.8 dBc

Limit: ≤ -20 dBc

8-DPSK, 3DH5, High Channel

Result: Pass

Value: -47.7 dBc

Limit: ≤ -20 dBc

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.

EMC

SPURIOUS CONDUCTED EMISSIONS

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
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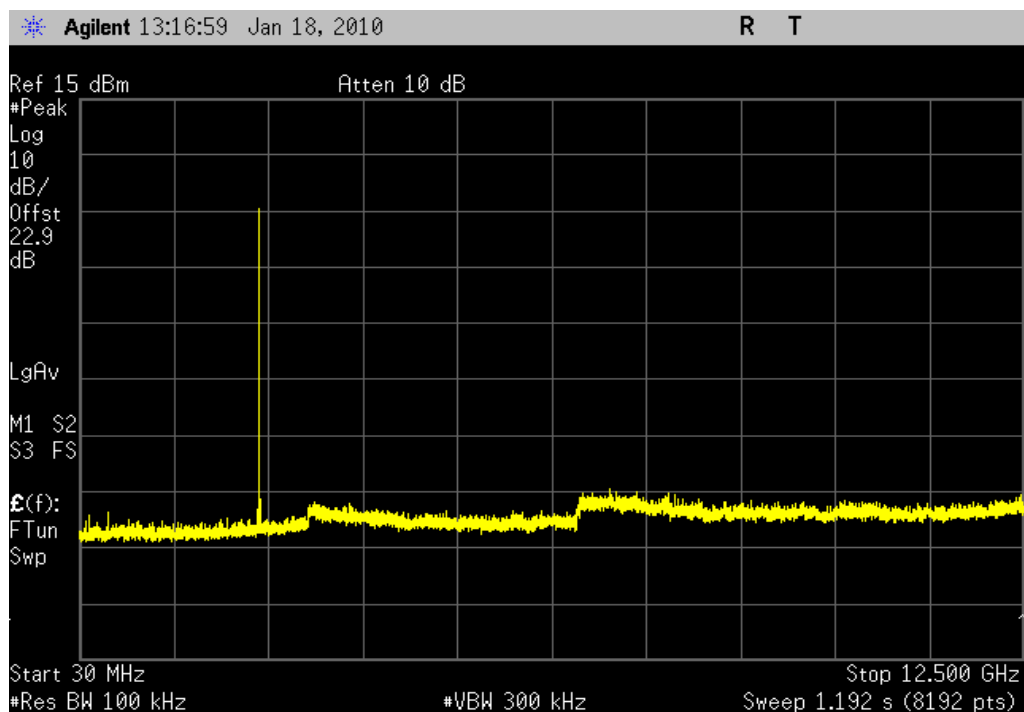
		Value	Limit	Results
GFSK, DH5				
	Low Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -20 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -20 dBc	Pass
	Mid Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -20 dBc	Pass
	12.4GHz-25GHz	< -40 dBc	≤ -20 dBc	Pass
	High Channel			
	30MHz - 12.5GHz	< -40 dBc	≤ -20 dBc	Pass
	12.4GHz-25GHz	< -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

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

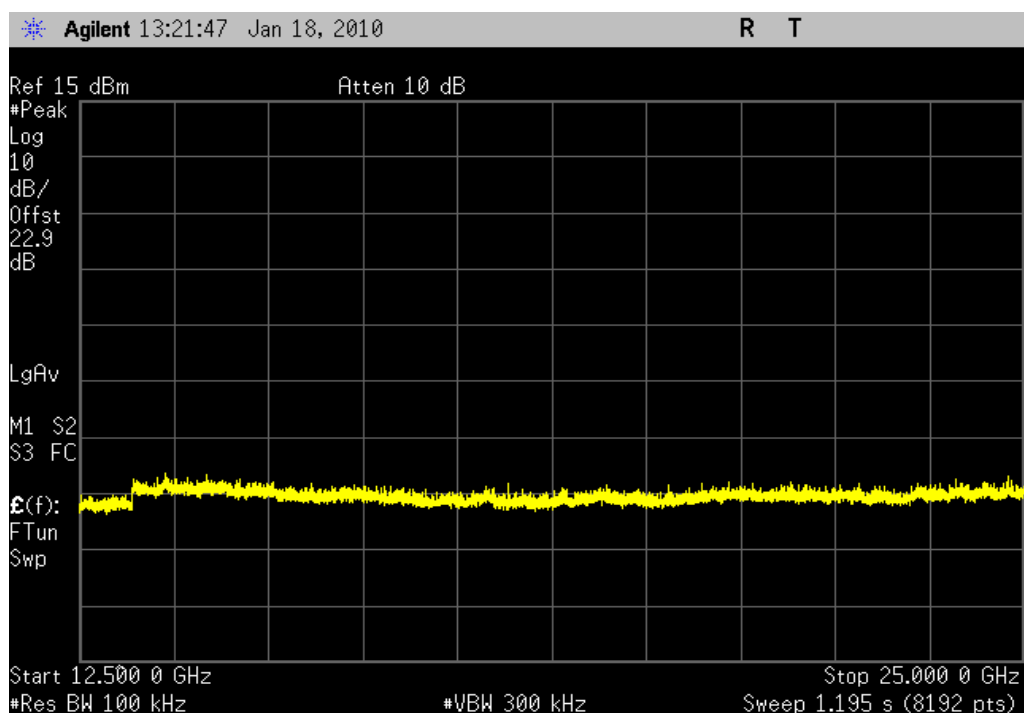
Value: < -40 dBc

Limit: ≤ -20 dBc

GFSK, DH5, Low Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

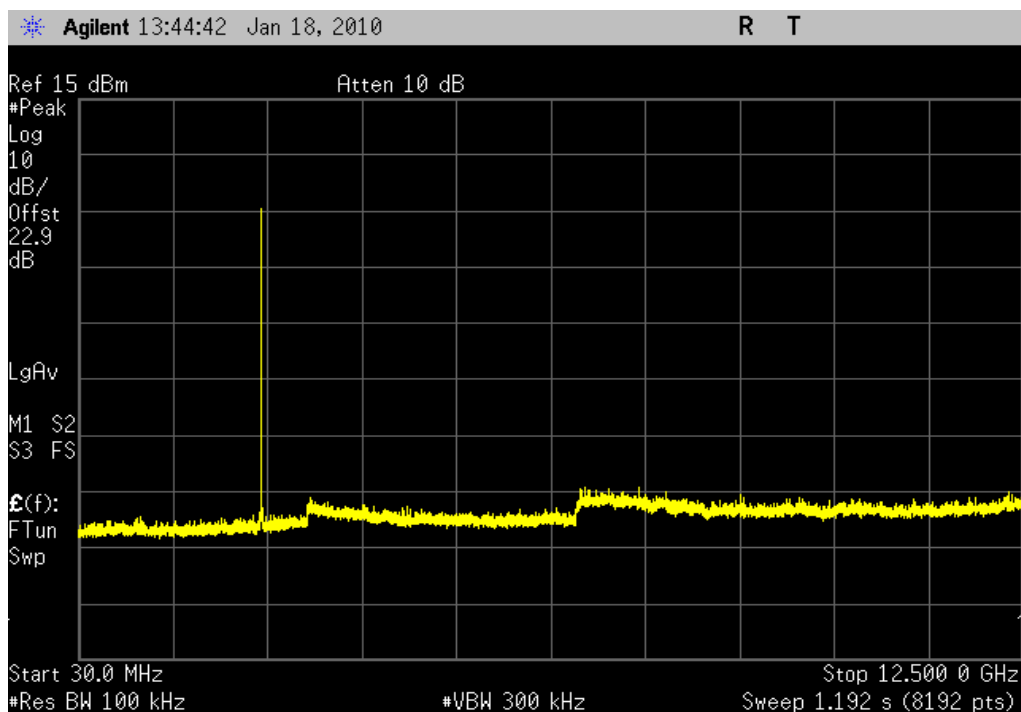
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

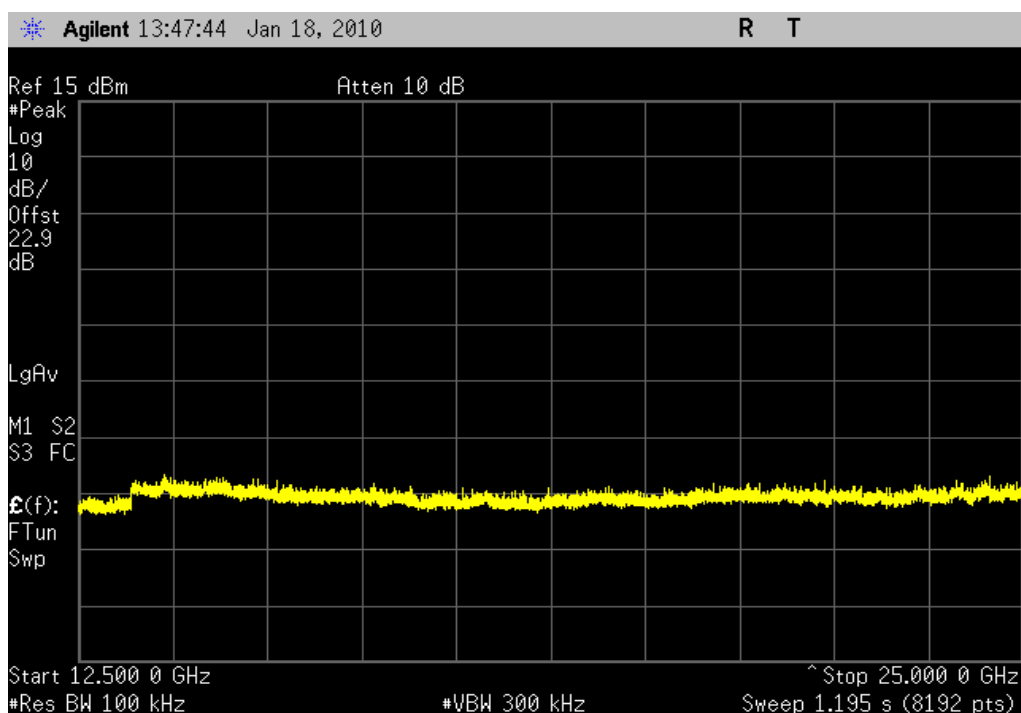
Value: < -40 dBc

Limit: ≤ -20 dBc

GFSK, DH5, Mid Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

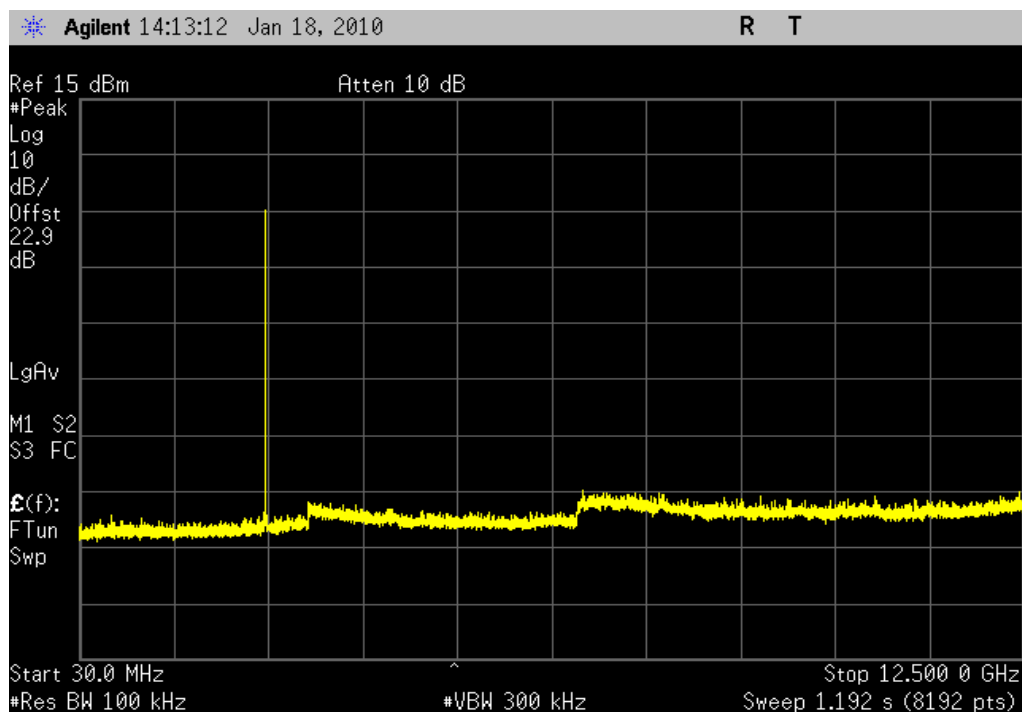
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

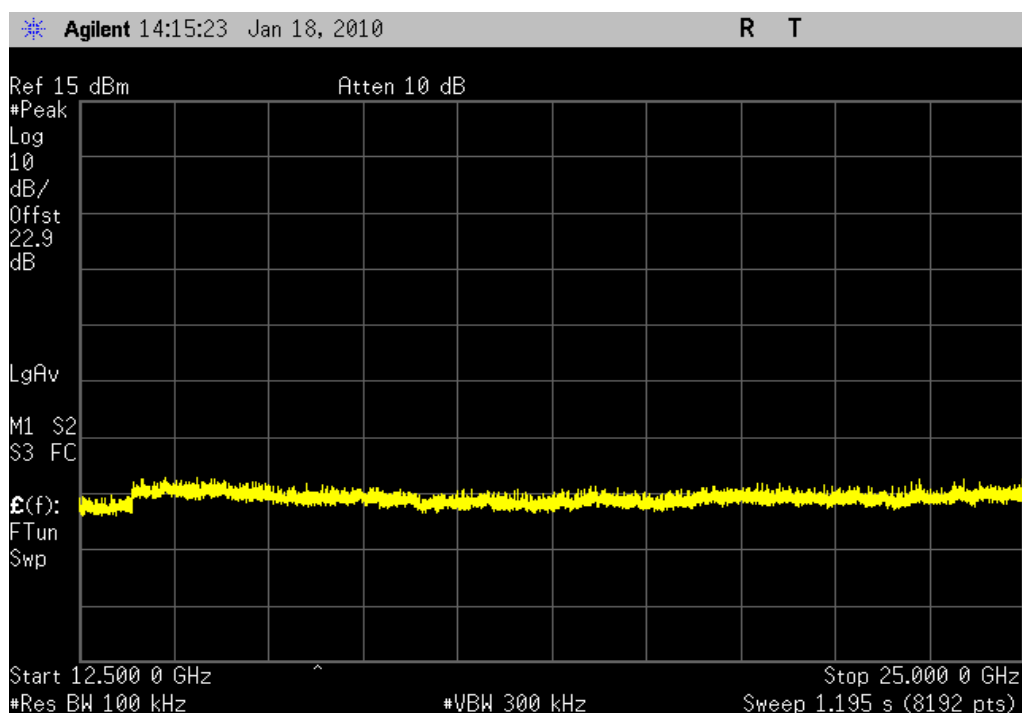
Value: < -40 dBc

Limit: ≤ -20 dBc

GFSK, DH5, High Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

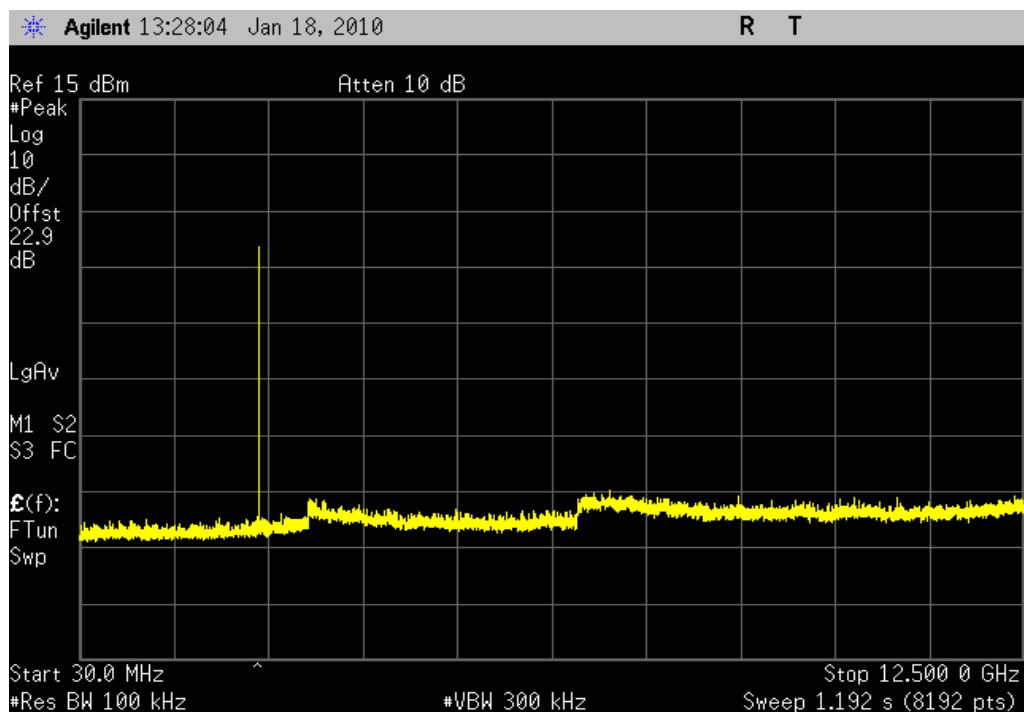
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

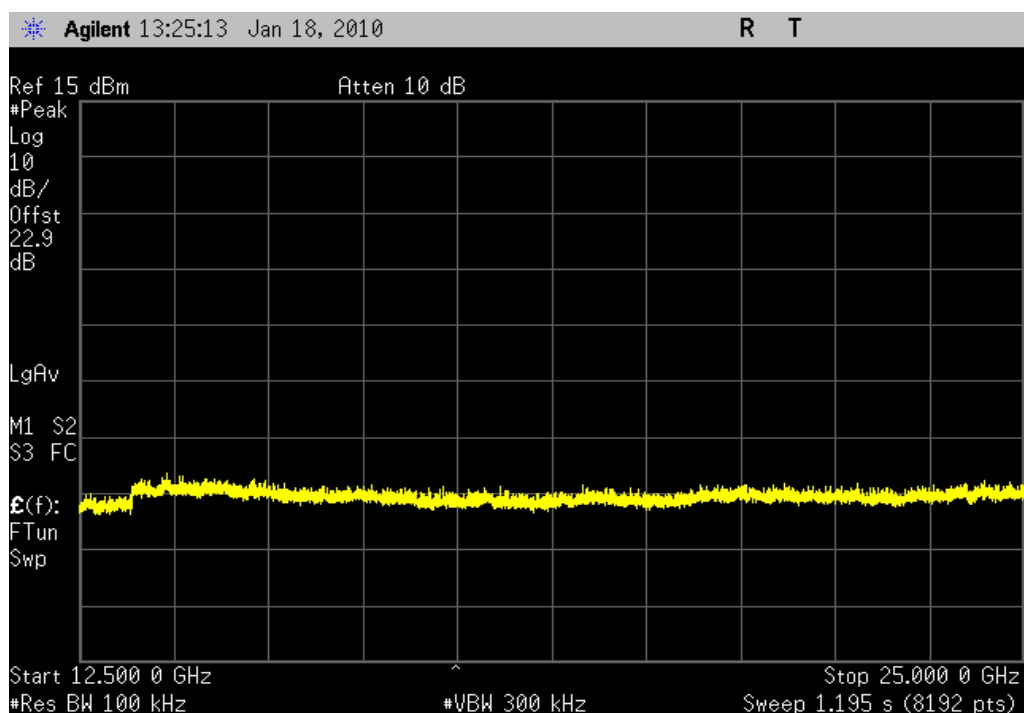
Value: < -40 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, Low Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

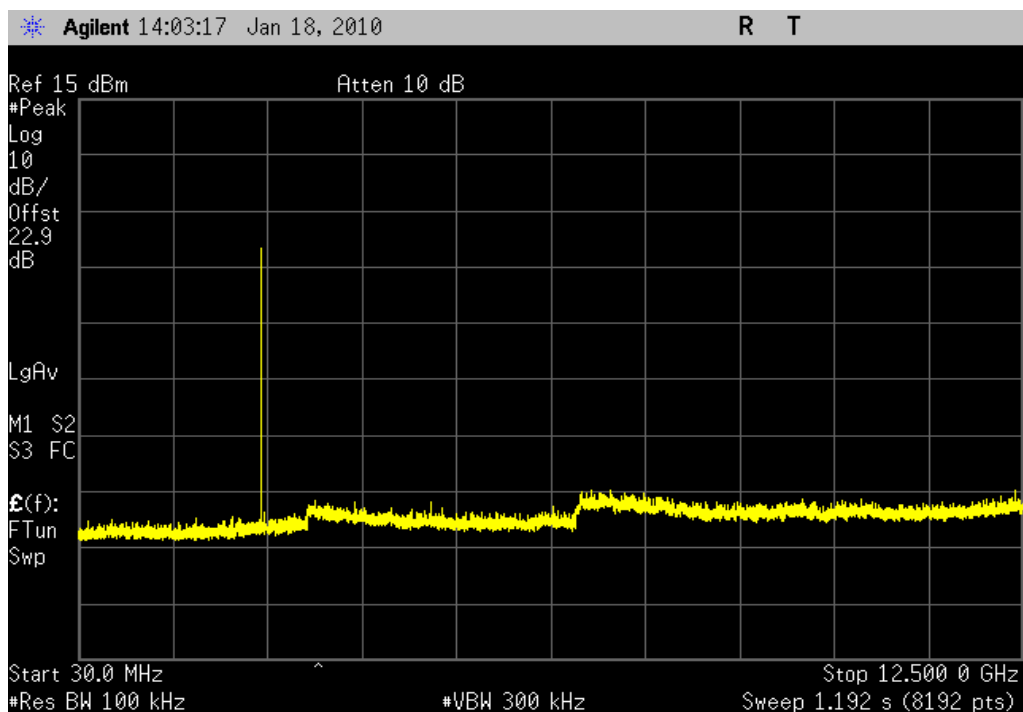
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

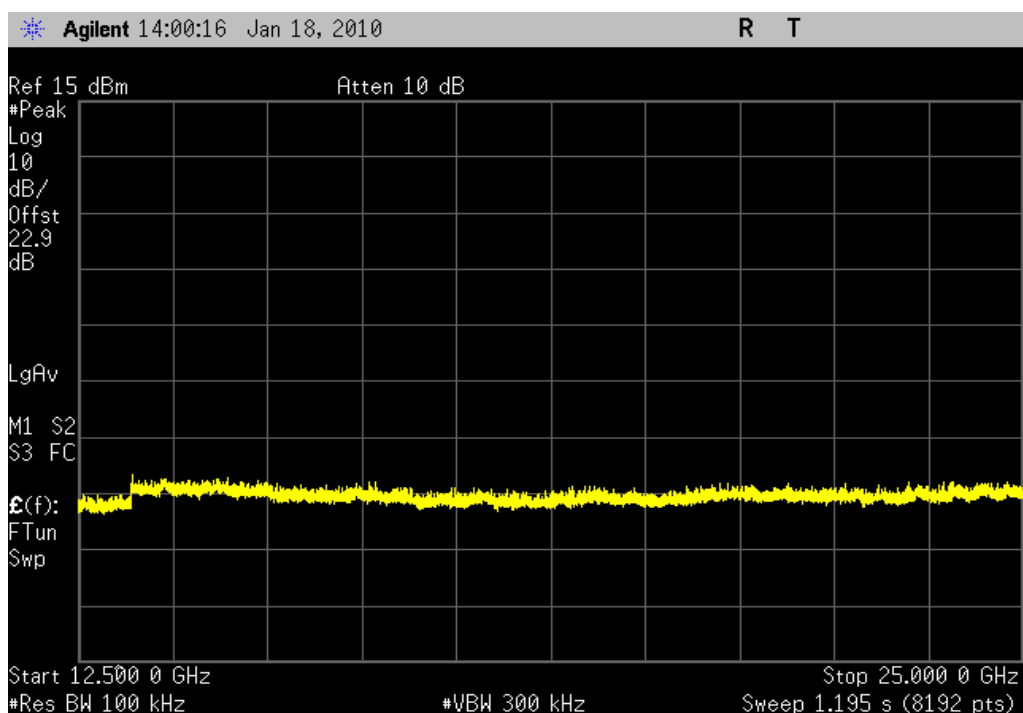
Value: < -40 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, Mid Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

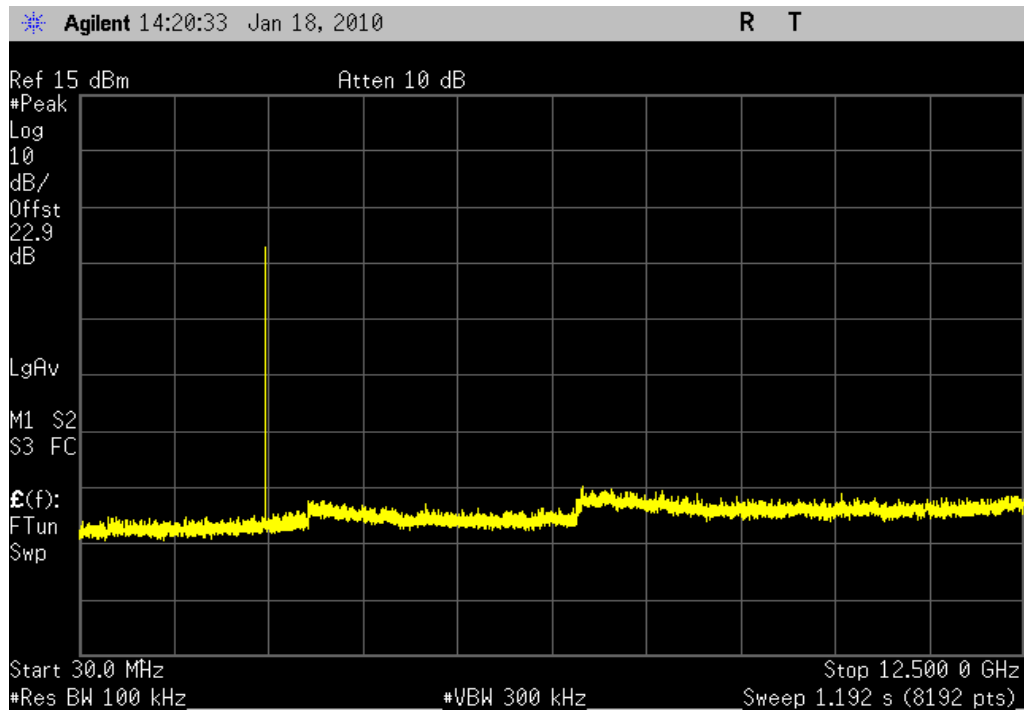
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

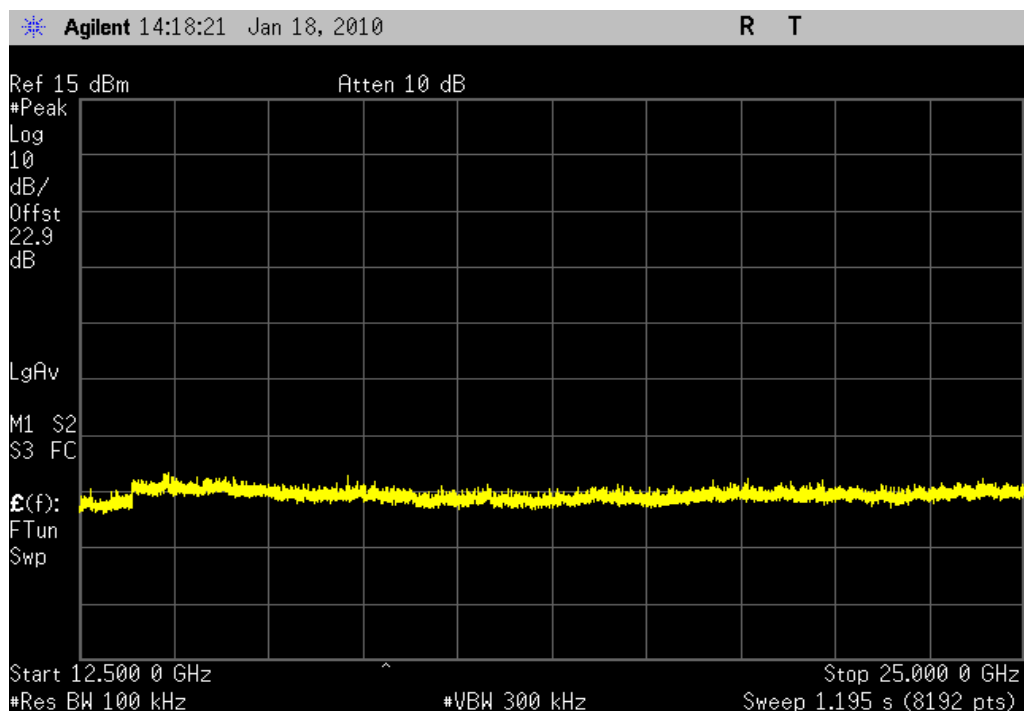
Value: < -40 dBc

Limit: ≤ -20 dBc

pi/4-DQPSK, 2DH5, High Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

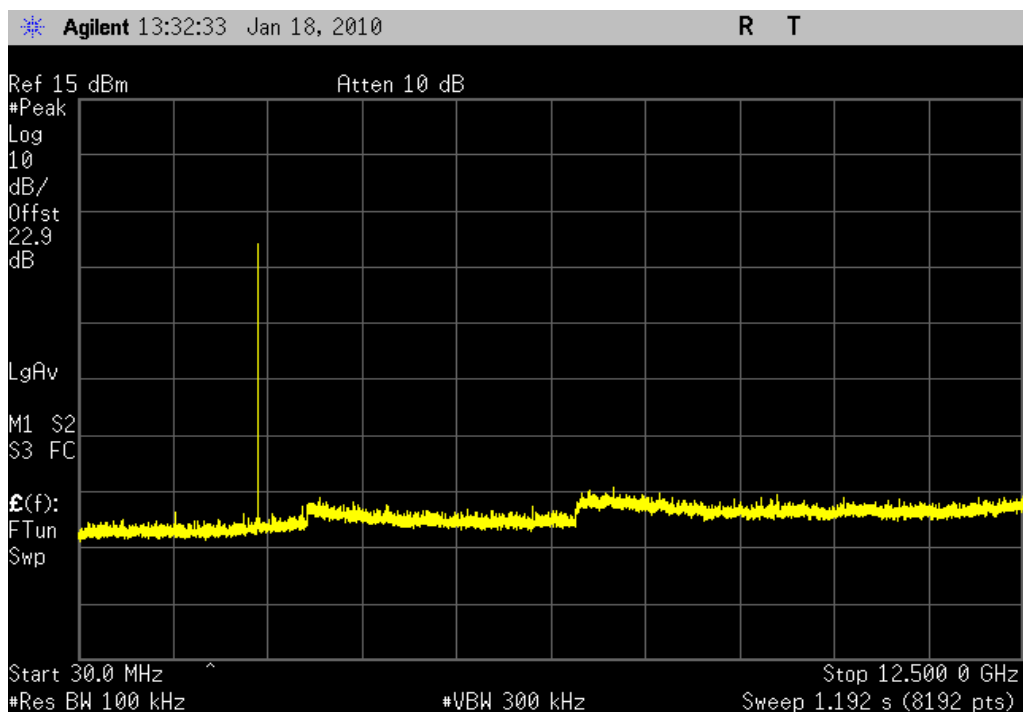
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

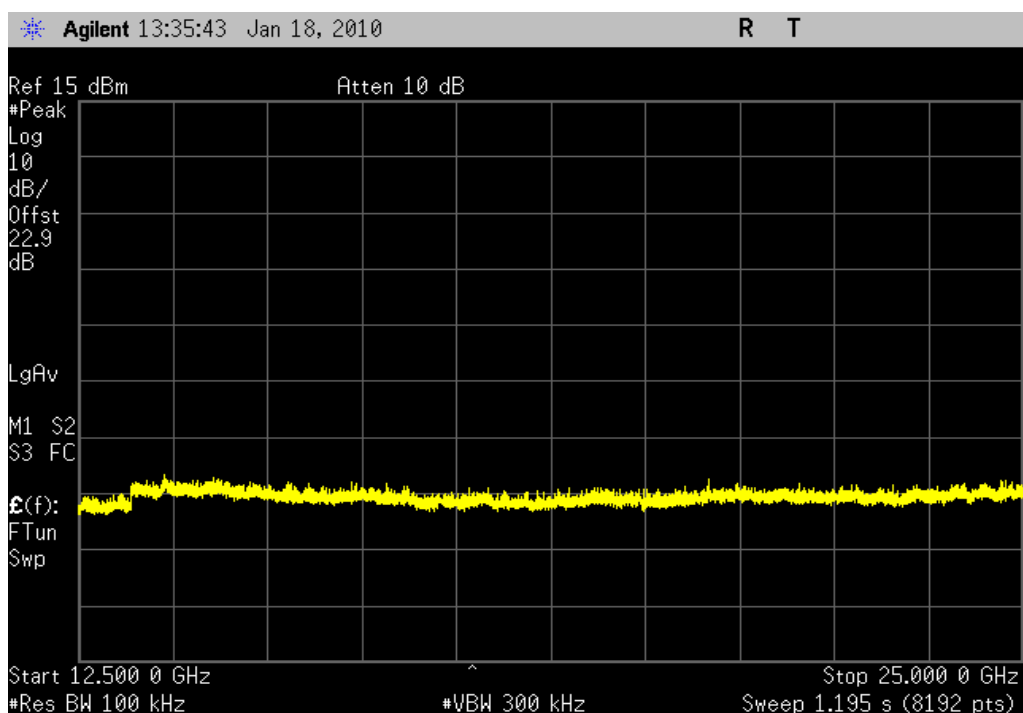
Value: < -40 dBc

Limit: ≤ -20 dBc

8DPSK, 3DH5, Low Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

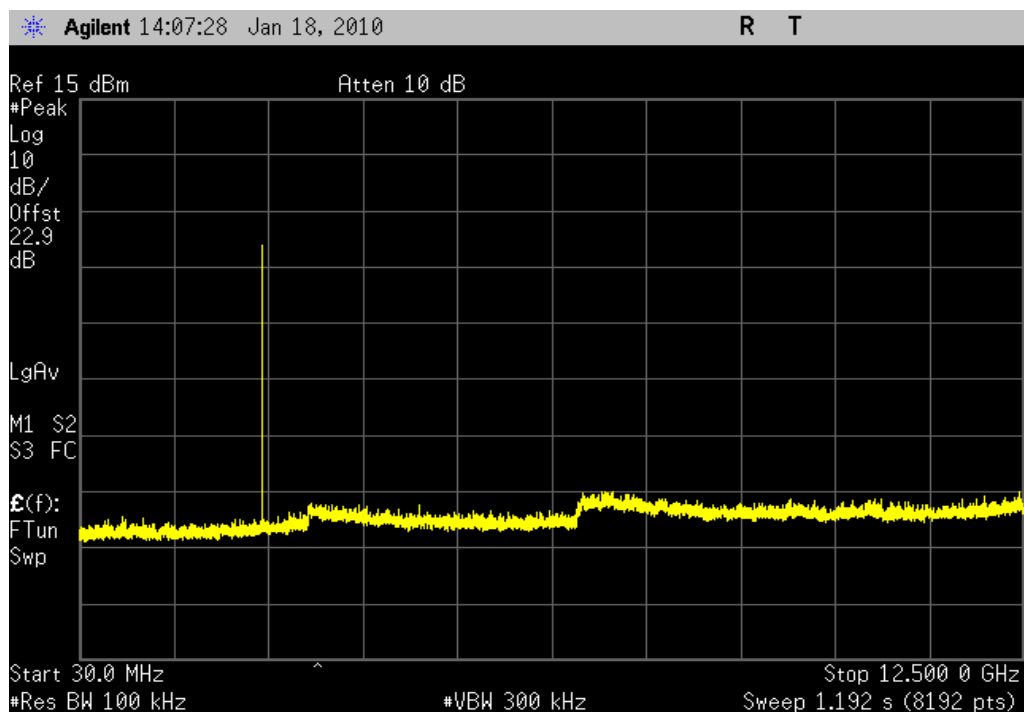
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

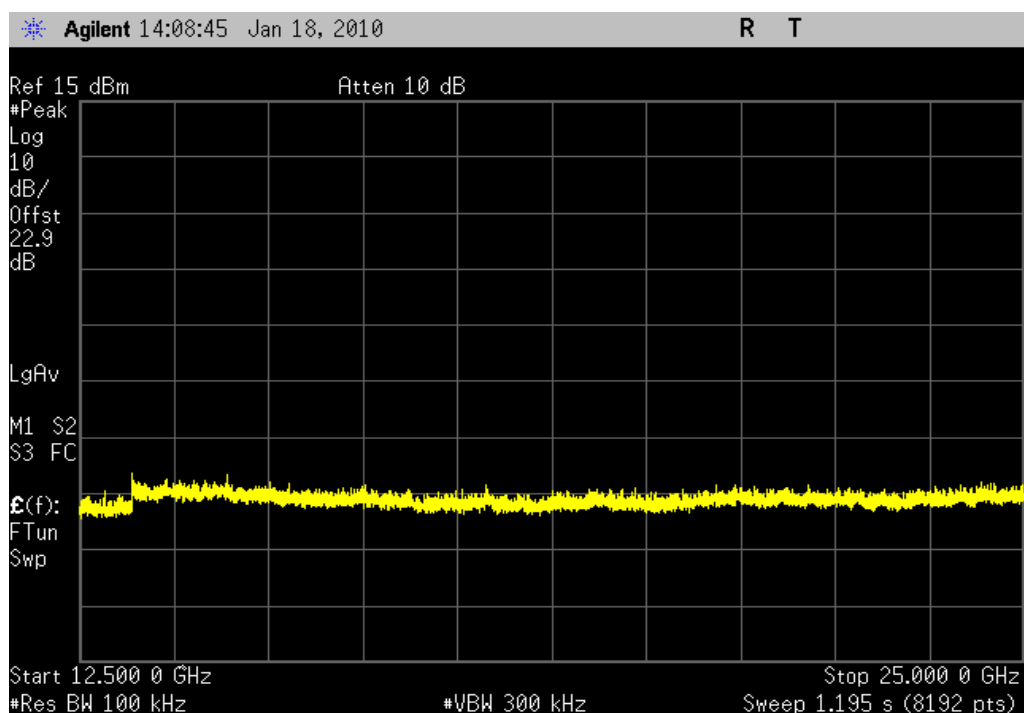
Value: < -40 dBc

Limit: ≤ -20 dBc

8DPSK, 3DH5, Mid Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

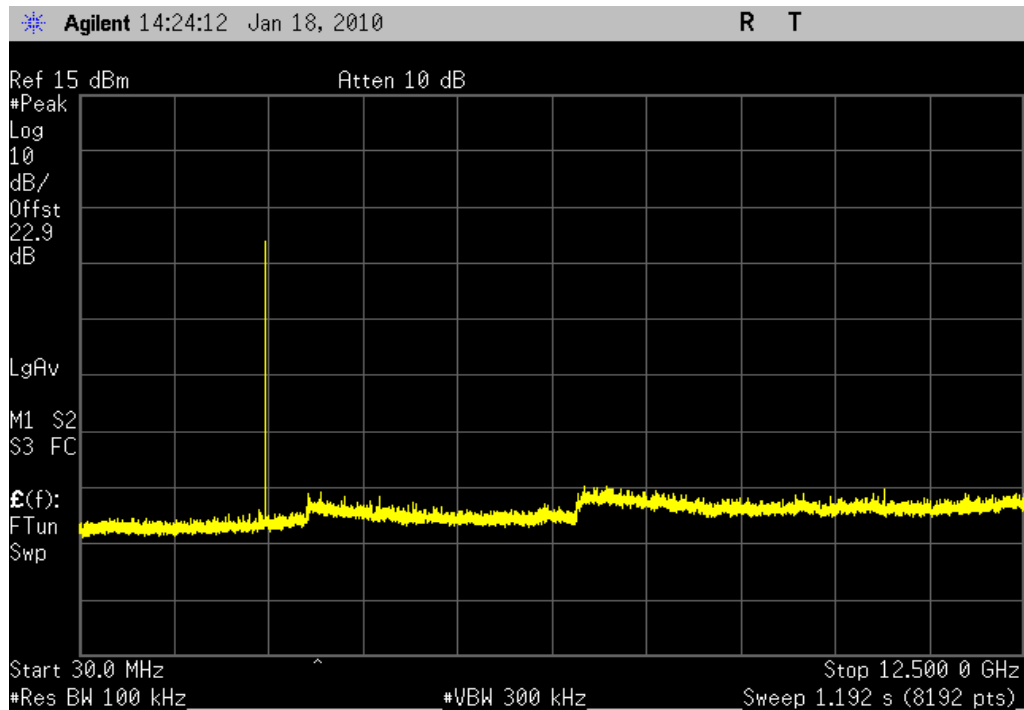
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

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

Result: Pass

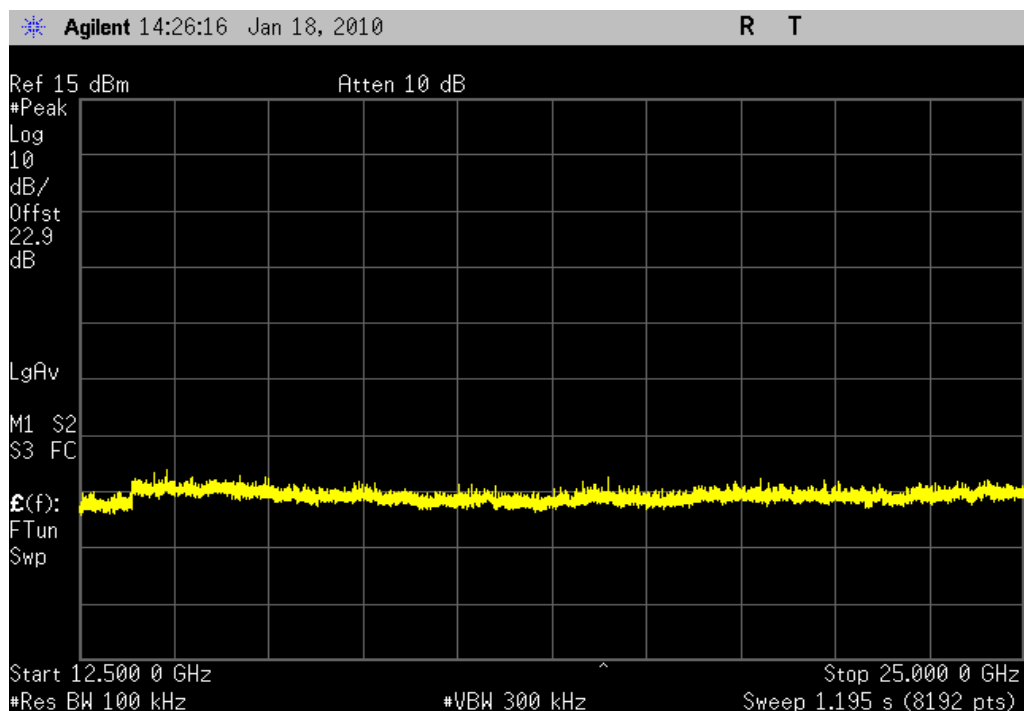
Value: < -40 dBc

Limit: ≤ -20 dBc

8DPSK, 3DH5, High Channel, 12.4GHz-25GHz

Result: Pass

Value: < -40 dBc

Limit: ≤ -20 dBc

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 $1.5 \times 10^6 \div 3 \times 10^3 = 500$ 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."

EMC

POWER SPECTRAL DENSITY

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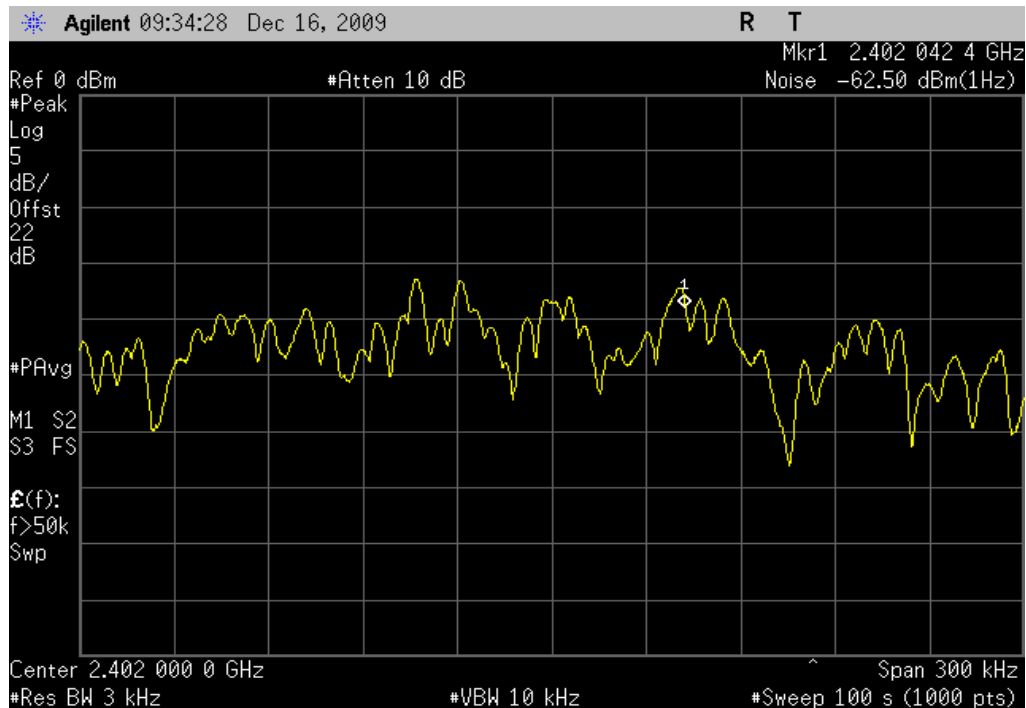
		Value	Limit	Results
DH5, GFSK				
	Low Channel, 2402 MHz	-27.7 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel, 2441 MHz	-27.8 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel, 2480 MHz	-28.3 dBm / 3 kHz	8 dBm / 3 kHz	Pass
2-DH5, Pi/4-DQPSK				
	Low Channel, 2402 MHz	-37.0 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid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

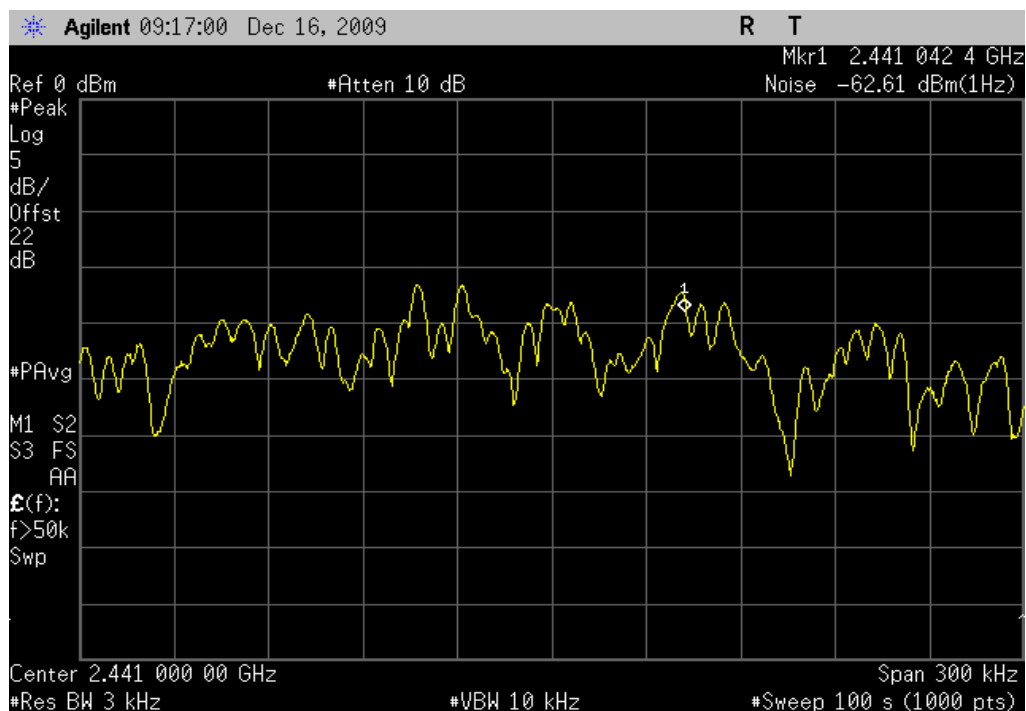


DH5, GFSK, Mid Channel, 2441 MHz

Result: Pass

Value: -27.8 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



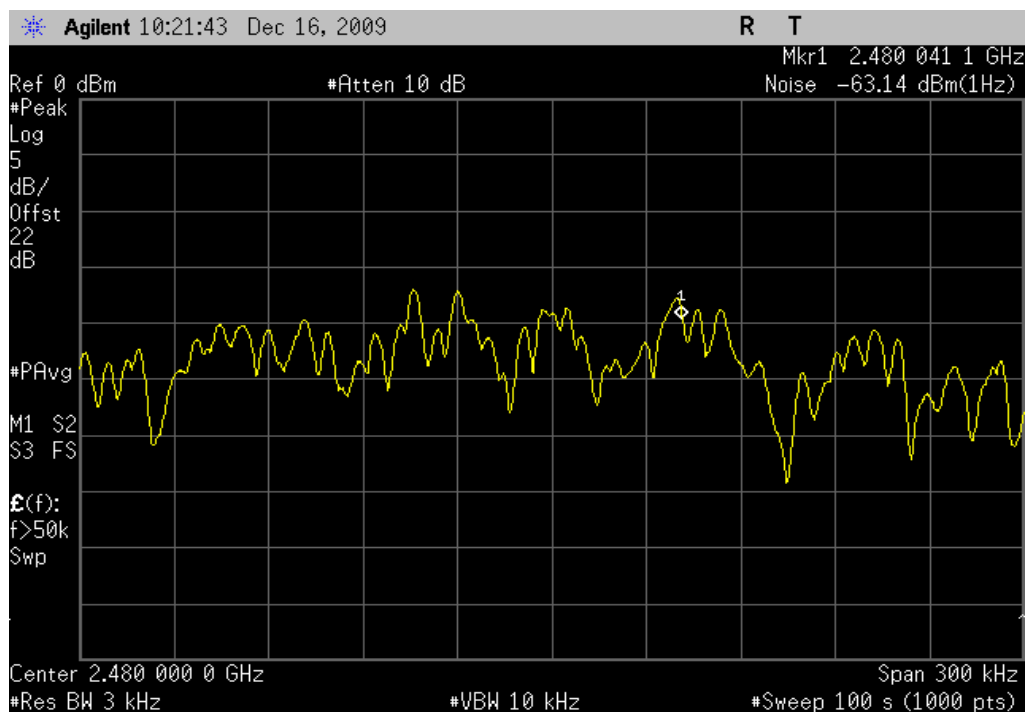
POWER SPECTRAL DENSITY

DH5, GFSK, High Channel, 2480 MHz

Result: Pass

Value: -28.3 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

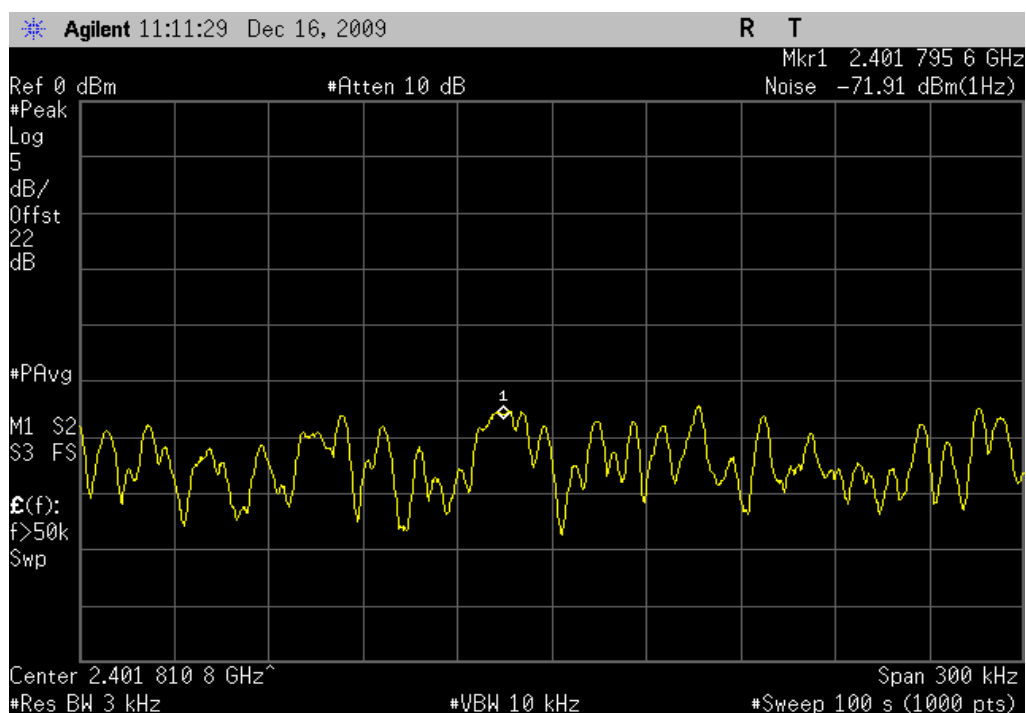


2-DH5, Pi/4-DQPSK, Low Channel, 2402 MHz

Result: Pass

Value: -37.0 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



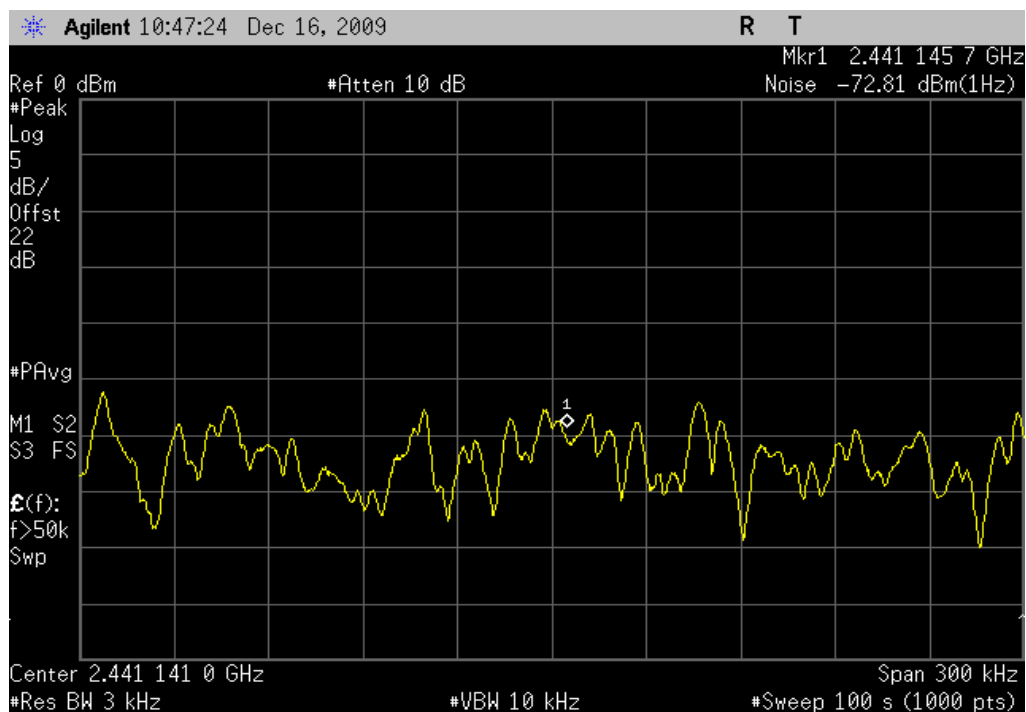
POWER SPECTRAL DENSITY

2-DH5, Pi/4-DQPSK, Mid Channel, 2441 MHz

Result: Pass

Value: -38.0 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

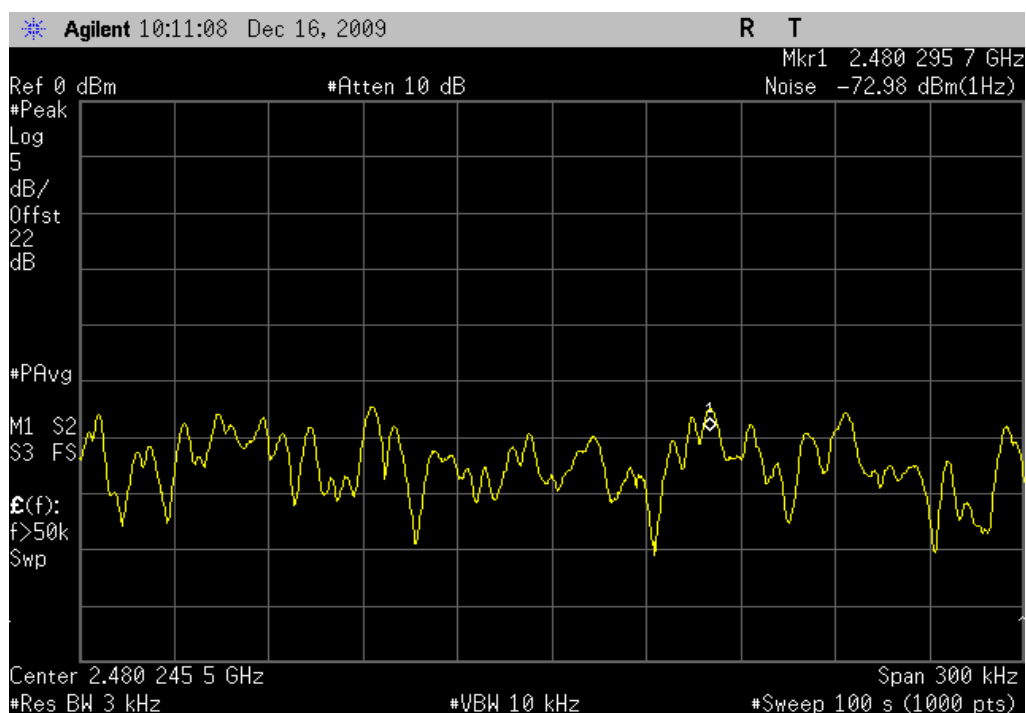


2-DH5, Pi/4-DQPSK, High Channel, 2480 MHz

Result: Pass

Value: -38.2 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

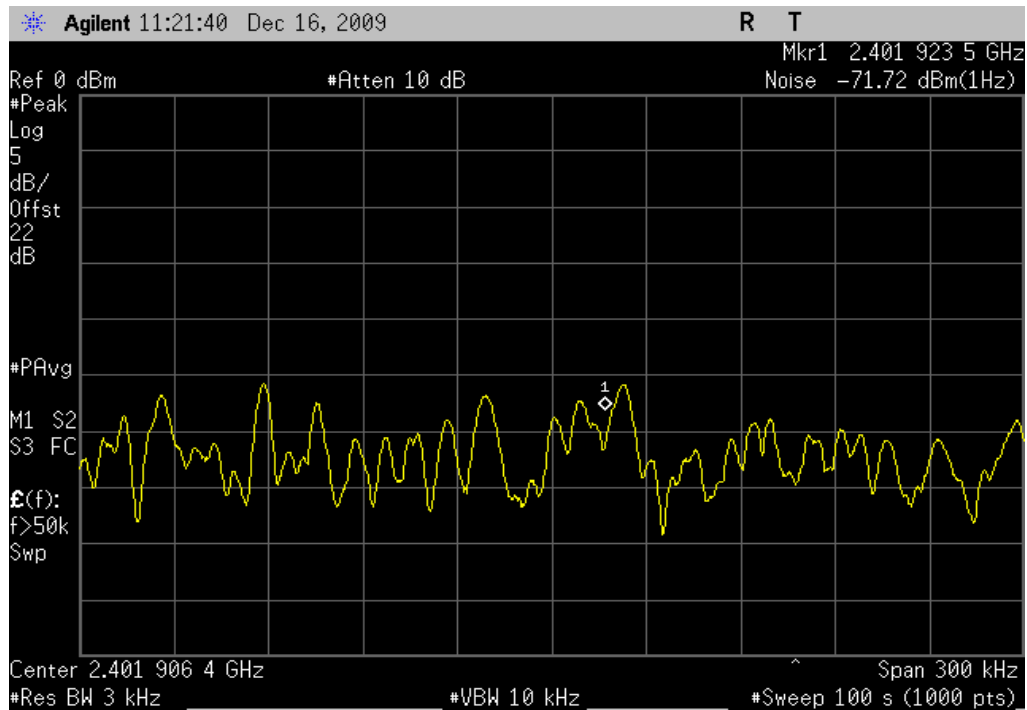


3-DH5, 8-DPSK, Low Channel, 2402 MHz

Result: Pass

Value: -36.9 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

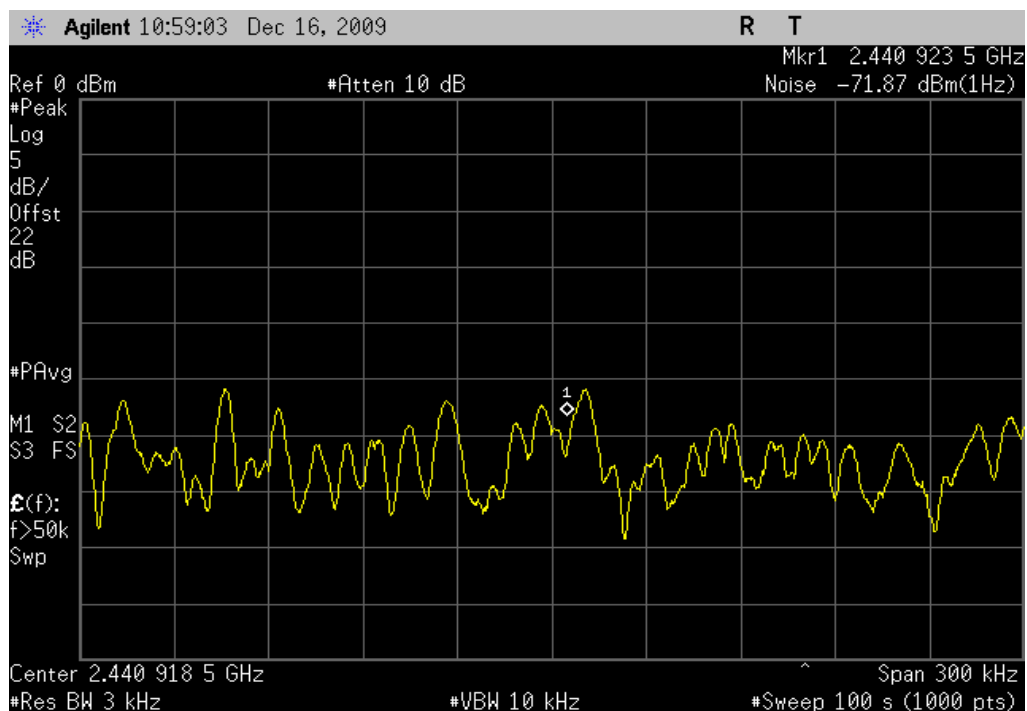


3-DH5, 8-DPSK, Mid Channel, 2441 MHz

Result: Pass

Value: -37.1 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



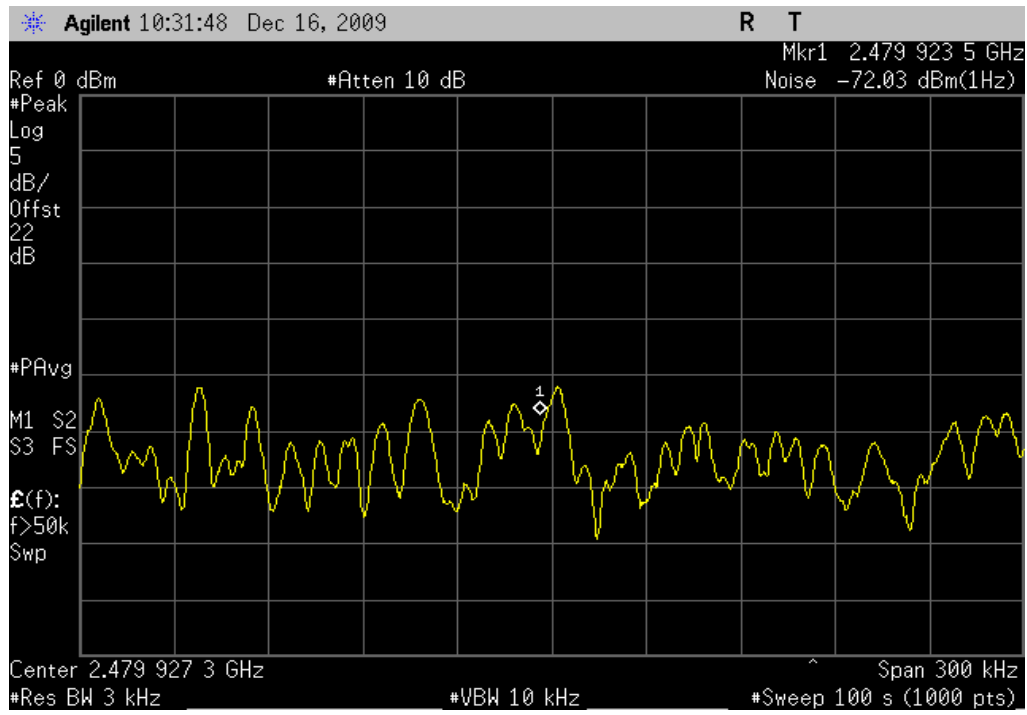
POWER SPECTRAL DENSITY

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

Result: Pass

Value: -37.2 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



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

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

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). 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

FCC 15.247 (DTS):2010

Test Method

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	Signature <i>Rodry Le Pellegry</i>
Configuration #	1	
Results	Pass	

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

2400.000

2410.000

2420.000

2430.000

2440.000

2450.000

2460.000

2470.000

2480.000

2490.000

2500.000

dBuV/m

MHz

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

FCC 15.247 (DTS):2010

Test Method

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	Signature <i>Roddy Le Pelley</i>
Configuration #	1	
Results	Pass	

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

3000.000

4000.000

5000.000

6000.000

7000.000

8000.000

dBuV/m

MHz

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

FCC 15.247 (DTS):2010

Test Method
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	Signature <i>Rodney Le Pelley</i>
Configuration #	1	
Results	Pass	

The graph displays the spurious radiated emissions. The y-axis represents the field strength in dBuV/m, ranging from 0.0 to 80.0. The x-axis represents the frequency in MHz, ranging from 8200.000 to 12200.000. A solid blue horizontal line at approximately 54 dBuV/m indicates the FCC limit. Several green diamond-shaped data points are plotted, mostly between 12060 MHz and 12185 MHz, with values ranging from approximately 26.2 to 40.2 dBuV/m. All measured values are well below the limit line.

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.
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MEASUREMENT UNCERTAINTY

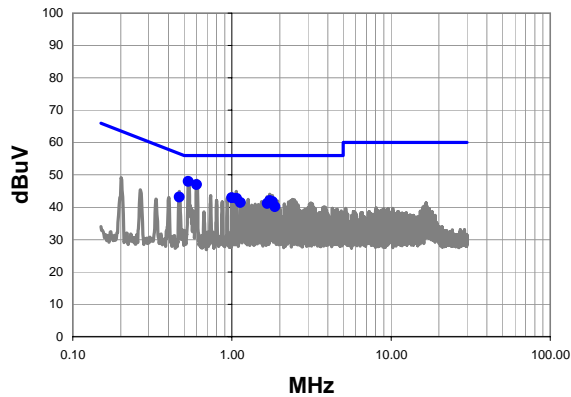
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 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

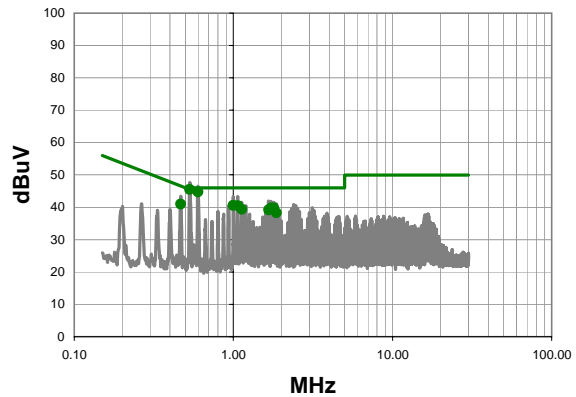
Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 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.

Work Order:	TRPO0054	Date:	01/05/10	<i>Roddy Le Pelouin</i>			
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 FCC 15.207:2010			Test Method ANSI C63.10:2009				
Run #	7	Line:	High Line	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

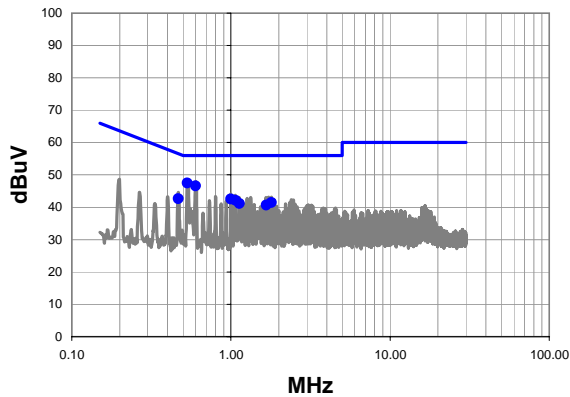
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	27.5	20.5	48.0	56.0	-8.0
0.599	26.5	20.5	47.0	56.0	-9.0
1.000	22.5	20.4	42.9	56.0	-13.1
1.068	22.3	20.4	42.7	56.0	-13.3
0.468	22.7	20.5	43.2	56.5	-13.4
1.732	21.6	20.4	42.0	56.0	-14.0
1.800	21.3	20.4	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

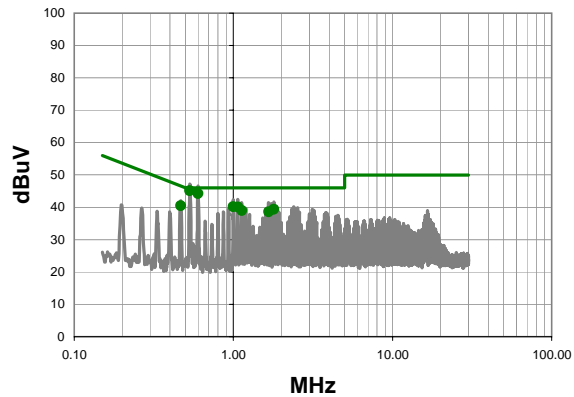
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	25.0	20.5	45.5	46.0	-0.5
0.599	24.2	20.5	44.7	46.0	-1.3
1.000	20.2	20.4	40.6	46.0	-5.4
1.068	20.1	20.4	40.5	46.0	-5.5
0.468	20.5	20.5	41.0	46.5	-5.6
1.732	19.4	20.4	39.8	46.0	-6.2
1.800	19.4	20.4	39.8	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

Work Order:	TRPO0054	Date:	01/05/10	<i>Roddy Le Pellego</i>			
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 FCC 15.207:2010			Test Method ANSI C63.10:2009				
Run #	8	Line:	Neutral	Ext. Attenuation:	20	Results	Pass

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



Quasi Peak Data - vs - Quasi Peak Limit

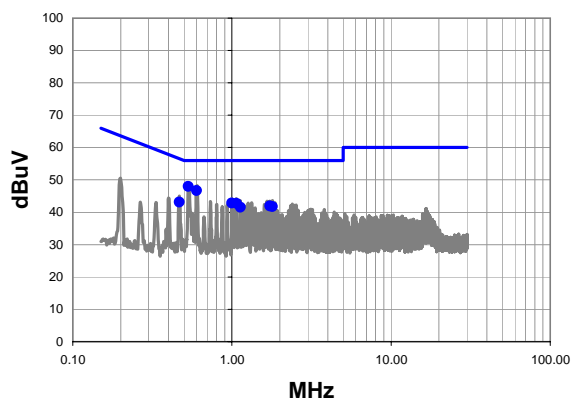
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	27.0	20.5	47.5	56.0	-8.5
0.599	26.1	20.5	46.6	56.0	-9.4
1.000	22.1	20.4	42.5	56.0	-13.5
1.068	21.8	20.4	42.2	56.0	-13.8
0.468	22.2	20.5	42.7	56.5	-13.9
1.800	21.0	20.4	41.4	56.0	-14.6
1.132	20.8	20.4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

Average Data - vs - Average Limit

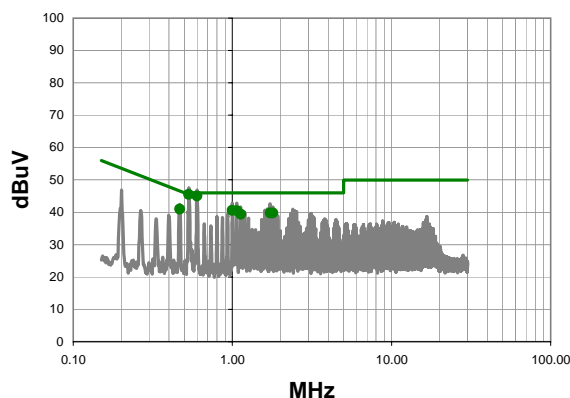
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	24.6	20.5	45.1	46.0	-0.9
0.599	23.7	20.5	44.2	46.0	-1.8
1.000	19.8	20.4	40.2	46.0	-5.8
1.068	19.7	20.4	40.1	46.0	-5.9
0.468	20.0	20.5	40.5	46.5	-6.1
1.800	19.0	20.4	39.4	46.0	-6.6
1.132	18.6	20.4	39.0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

Work Order:	TRPO0054	Date:	01/05/10	<i>Roddy to Roddy</i>			
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 FCC 15.207:2010			Test Method 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

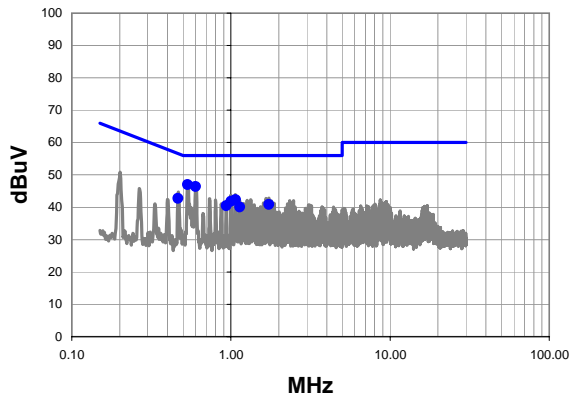
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	27.5	20.5	48.0	56.0	-8.0
0.601	26.2	20.5	46.7	56.0	-9.3
1.000	22.4	20.4	42.8	56.0	-13.2
1.068	22.3	20.4	42.7	56.0	-13.3
0.468	22.7	20.5	43.2	56.5	-13.4
1.732	21.5	20.4	41.9	56.0	-14.1
1.800	21.3	20.4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

Average Data - vs - Average Limit

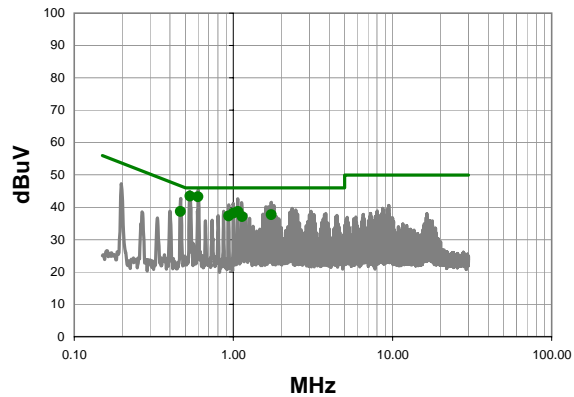
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	25.0	20.5	45.5	46.0	-0.5
0.601	24.5	20.5	45.0	46.0	-1.0
1.000	20.2	20.4	40.6	46.0	-5.4
1.068	20.1	20.4	40.5	46.0	-5.5
0.468	20.5	20.5	41.0	46.5	-5.6
1.732	19.4	20.4	39.8	46.0	-6.2
1.800	19.4	20.4	39.8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

Work Order:	TRPO0054	Date:	01/05/10	<i>Roddy Le Pelouin</i>			
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 FCC 15.207:2010			Test Method 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

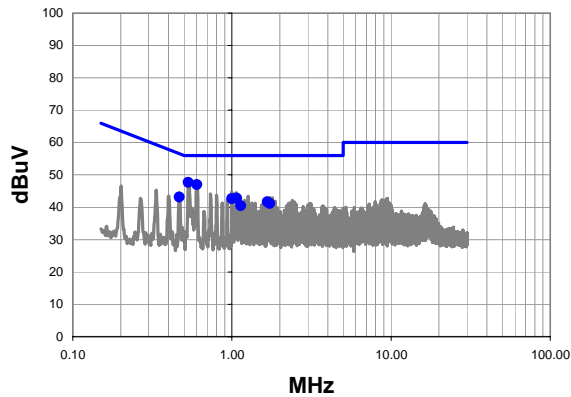
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.535	26.5	20.5	47.0	56.0	-9.0
0.601	25.9	20.5	46.4	56.0	-9.6
1.068	22.0	20.4	42.4	56.0	-13.6
0.466	22.3	20.5	42.8	56.6	-13.8
1.002	21.5	20.4	41.9	56.0	-14.1
1.736	20.5	20.4	40.9	56.0	-15.1
0.934	20.1	20.4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

Average Data - vs - Average Limit

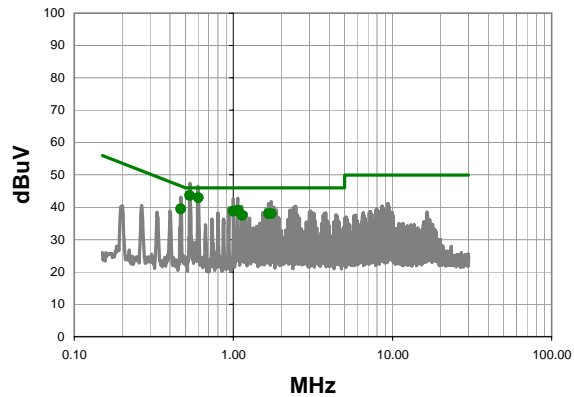
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.535	22.9	20.5	43.4	46.0	-2.6
0.601	22.7	20.5	43.2	46.0	-2.8
1.068	18.3	20.4	38.7	46.0	-7.3
1.002	17.8	20.4	38.2	46.0	-7.8
0.466	18.2	20.5	38.7	46.6	-7.9
1.736	17.3	20.4	37.7	46.0	-8.3
0.934	16.9	20.4	37.3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

Work Order:	TRPO0054	Date:	01/05/10	<i>Rod Peloquin</i>			
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 FCC 15.207:2010			Test Method 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

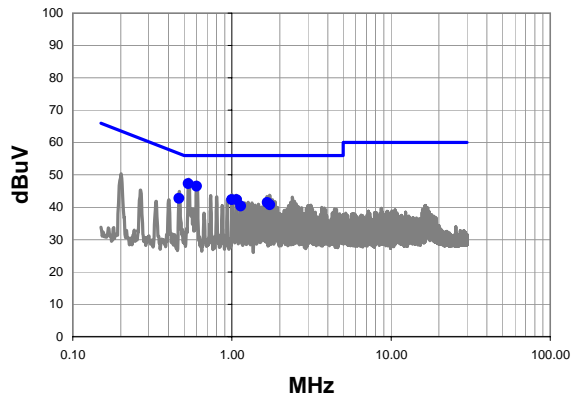
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	27.2	20.5	47.7	56.0	-8.3
0.603	26.5	20.5	47.0	56.0	-9.0
1.068	22.4	20.4	42.8	56.0	-13.2
0.468	22.7	20.5	43.2	56.5	-13.4
1.000	22.2	20.4	42.6	56.0	-13.4
1.668	21.2	20.4	41.6	56.0	-14.4
1.736	20.7	20.4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

Average Data - vs - Average Limit

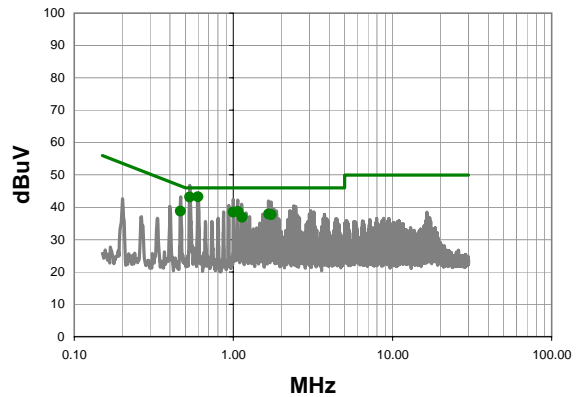
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.533	23.1	20.5	43.6	46.0	-2.4
0.603	22.4	20.5	42.9	46.0	-3.1
1.068	18.7	20.4	39.1	46.0	-6.9
0.468	19.0	20.5	39.5	46.5	-7.1
1.000	18.4	20.4	38.8	46.0	-7.2
1.736	17.6	20.4	38.0	46.0	-8.0
1.668	17.6	20.4	38.0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

Work Order:	TRPO0054	Date:	01/05/10	<i>Roddy to Roddy</i>			
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 FCC 15.207:2010			Test Method 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