Tripod Data Systems, Inc.

ST Micro STLC2500C in Eagle

July 03, 2007

Report No. TRPO0034.1

Report Prepared By

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

EMC Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: July 03, 2007
Tripod Data Systems, Inc.
Model: ST Micro STLC2500C in Eagle

Emissions				
Test Description	**Specification**	**Test Method**	**Pass**	**Fail**
AC Powerline Conducted Emissions	FCC 15.207:2006	ANSI C63.4:2003	☒	☐
Occupied Bandwidth	FCC 15.247(DTS):2006	ANSI C63.4:2003 KDB No. 558074	☒	☐
Output Power	FCC 15.247(DTS):2006	ANSI C63.4:2003 KDB No. 558074	☒	☐
Band Edge Compliance	FCC 15.247(DTS):2006	ANSI C63.4:2003 KDB No. 558074	☒	☐
Spurious Conducted Emissions	FCC 15.247(DTS):2006	ANSI C63.4:2003 KDB No. 558074	☒	☐
Power Spectral Density	FCC 15.247(DTS):2006	ANSI C63.4:2003 KDB No. 558074	☒	☐
Spurious Radiated Emissions	FCC 15.247(DTS):2006	ANSI C63.4:2003 KDB No. 558074	☒	☐

Modifications made to the product
See the Modifications section of this report

Test Facility

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

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

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

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:

Don Facteau, IS Manager

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		

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 89/336/EEC, 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

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 212, Issue 1 (Provisional) 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.

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.

TÜV Product Service: Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories, available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0604C.

TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.

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).

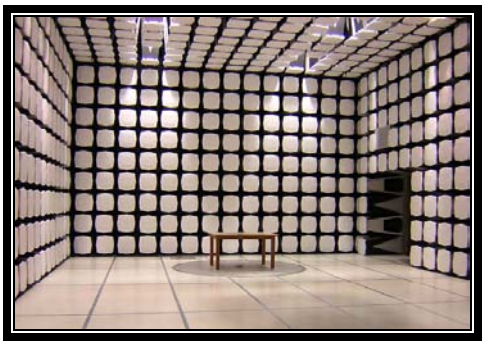
VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, C-2687, T-289, and R-2318, Irvine: R-1943, C-2766, and T-298, Sultan: R-871, C-1784, and T-294).*

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. 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

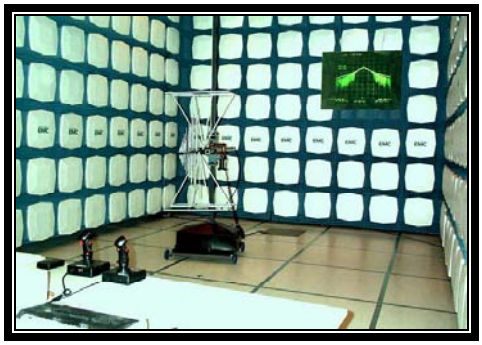
SCOPE

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



California – Orange County Facility
Labs OC01 – OC13

41 Tesla Ave. Irvine, CA 92618
(888) 364-2378 Fax: (503) 844-3826



Oregon – Evergreen Facility
Labs EV01 – EV11

22975 NW Evergreen Pkwy. Suite 400 Hillsboro, OR 97124
(503) 844-4066 Fax: (503) 844-3826

Washington – Sultan Facility
Labs SU01 – SU07

14128 339th Ave. SE Sultan, WA 98294
(888) 364-2378

Party Requesting the Test

Company Name:	Tripod Data Systems, Inc.
Address:	345 SW Avery Ave
City, State, Zip:	Corvallis, OR 97333
Test Requested By:	Bob Grant
Model:	ST Micro STLC2500C in Eagle
First Date of Test:	June 5, 2007
Last Date of Test:	June 28, 2007
Receipt Date of Samples:	June 5, 2007
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
The Eagle is a PDA that contains 802.11b/g and Bluetooth radios.

Testing Objective:
To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

CONFIGURATION 1 TRPO0034

Software/Firmware Running during test	
Description	**Version**
BTEagleTestMod	Unknown

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Host PDA	Tripod Data Systems, Inc.	Eagle LP3	ETL3A00343
EUT - Bluetooth Radio	ST Micro	STLC2500C	Unknown

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Cincon Electronics Co., LTD.	TR30R050	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Lead	PA	1.8m	Yes	Host PDA	AC Mains
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 4 TRPO0034

Software/Firmware Running during test	
Description	**Version**
BTEagleTestMod	Unknown

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT - Bluetooth Radio	ST Micro	STLC2500C	Unknown
Host PDA	Tripod Data Systems, Inc.	Eagle LP3	ETL4A00444

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
AC Adapter	Cincon Electronics Co., LTD.	TR30R050	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Lead	PA	1.8m	Yes	Host PDA	AC Mains
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	6/4/2007	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.
2	6/4/2007	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.
3	6/4/2007	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.
4	6/4/2007	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	6/7/2007	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	6/25/2007	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	6/28/2007	AC Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

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	E4407B	AAU	12/8/2006	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/7/2006	13
Power Meter	Gigatronics	8651A	SPM	9/19/2006	12
Power Sensor	Gigatronics	80701A	SPL	9/19/2006	12

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The 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 2007.03.30

EUT:	**ST Micro STLC2500C in Eagle**			**Work Order:**	**TRPO0034**
Serial Number:	**Unknown**			**Date:**	**06/04/07**
Customer:	**Tripod Data Systems, Inc.**			**Temperature:**	**24°C**
Attendees:	**None**			**Humidity:**	**43%**
Project:	**None**			**Barometric Pres.:**	**29.96**
Tested by:	**Rod Peloquin**	**Power:**	**120VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2006	ANSI C63.4:2003 KDB No. 558074

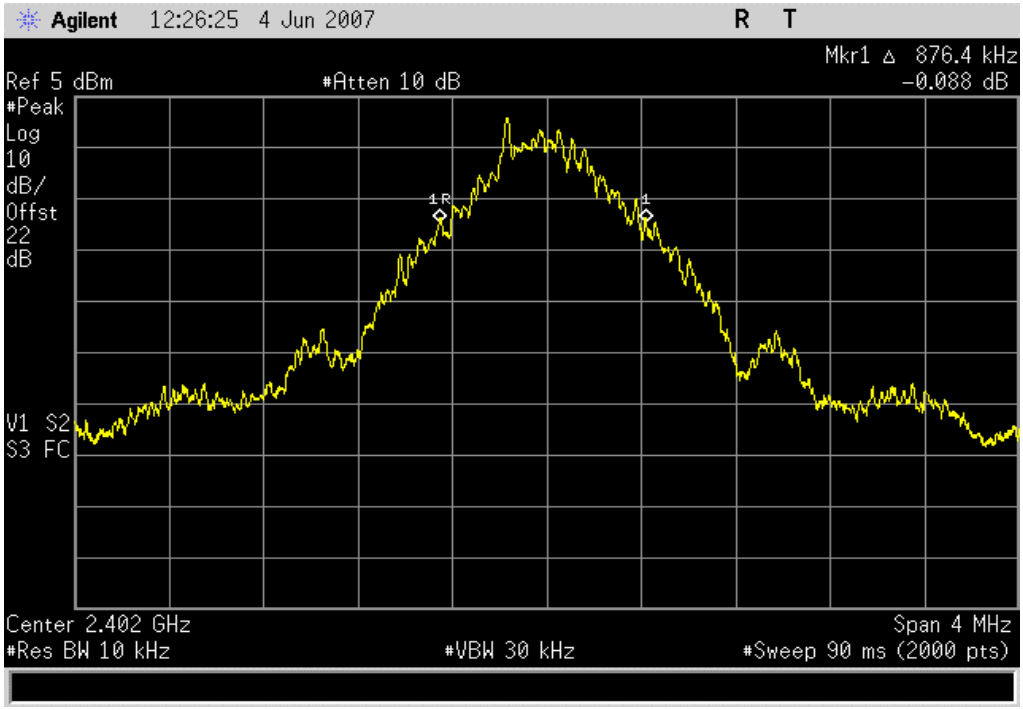
COMMENTS

DEVIATIONS FROM TEST STANDARD

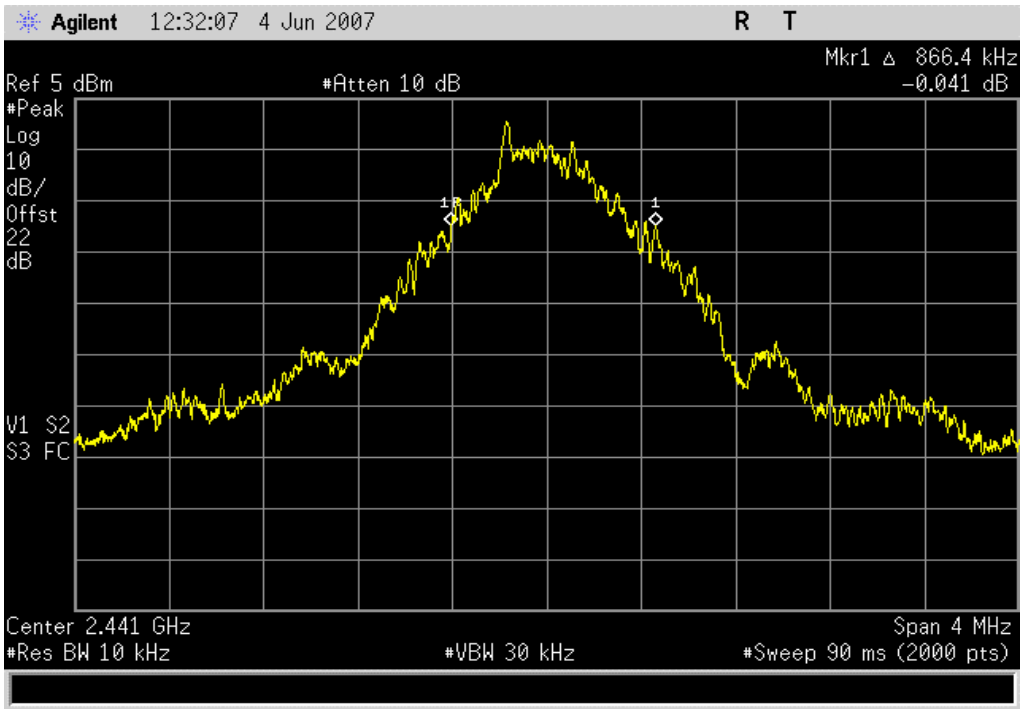
Configuration #	**1**	*Signature*

		Value	Limit	Results
DH5, GFSK				
	Low Channel	876 kHz	1.5 MHz	Pass
	Mid Channel	866 kHz	1.5 MHz	Pass
	High Channel	870 kHz	1.5 MHz	Pass
2DH5, 4-DQPSK				
	Low Channel	1.181 MHz	1.5 MHz	Pass
	Mid Channel	1.178 MHz	1.5 MHz	Pass
	High Channel	1.185 MHz	1.5 MHz	Pass
3DH5 8-DPSK				
	Low Channel	1.189 MHz	1.5 MHz	Pass
	Mid Channel	1.213 MHz	1.5 MHz	Pass
	High Channel	1.195 MHz	1.5 MHz	Pass

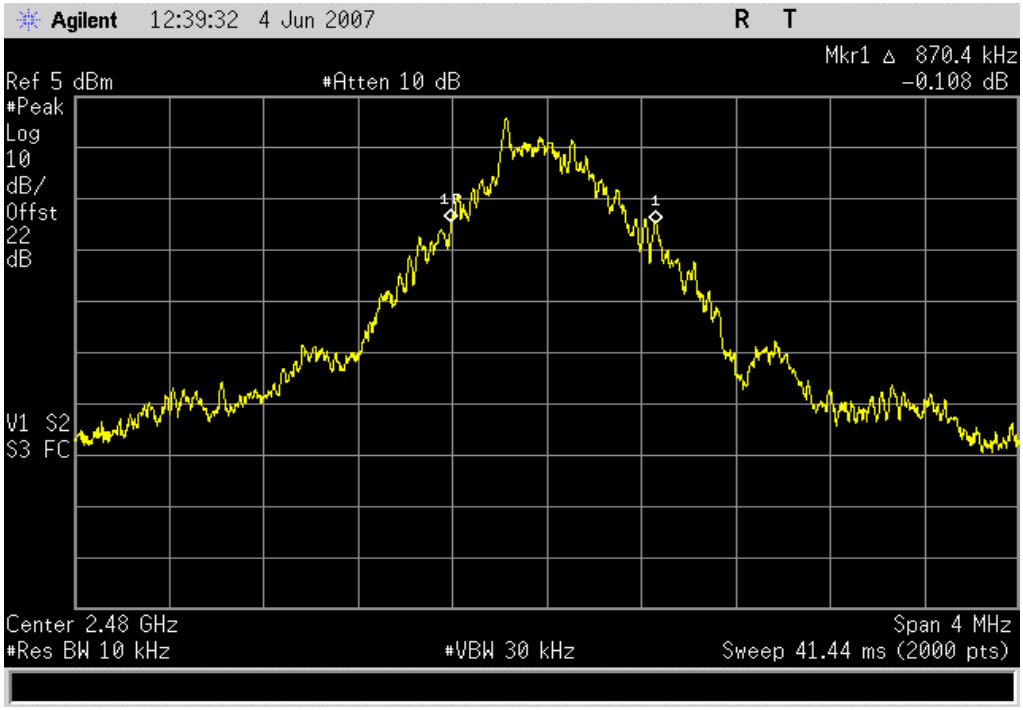
DH5, GFSK, Low Channel					
Result:	Pass	**Value:**	876 kHz	**Limit:**	1.5 MHz



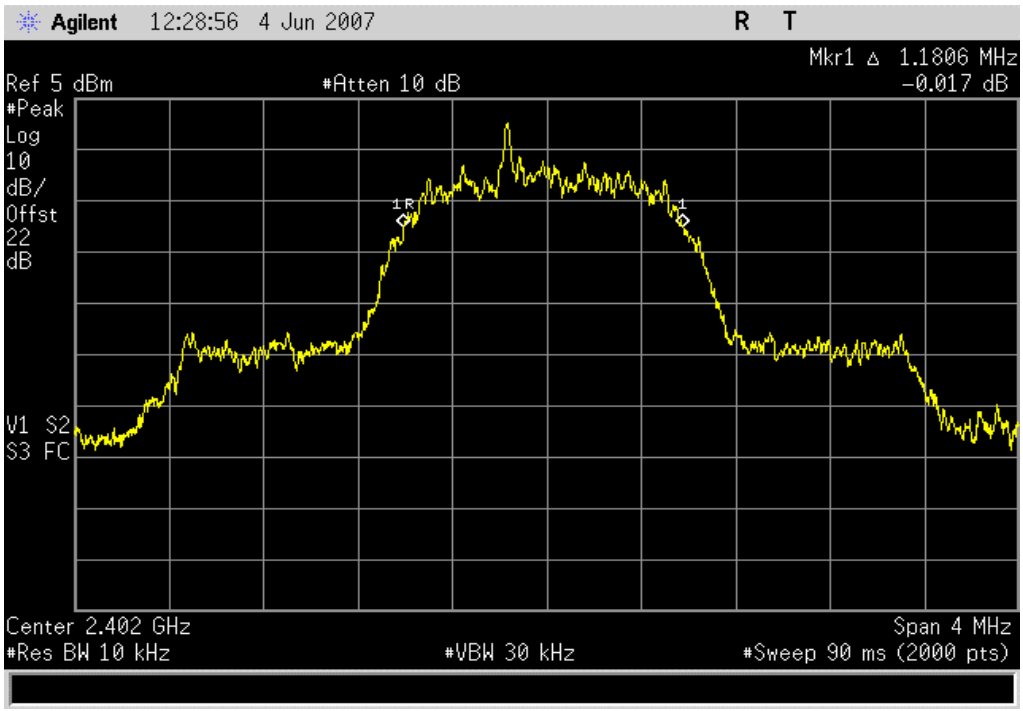
DH5, GFSK, Mid Channel					
Result:	Pass	**Value:**	866 kHz	**Limit:**	1.5 MHz



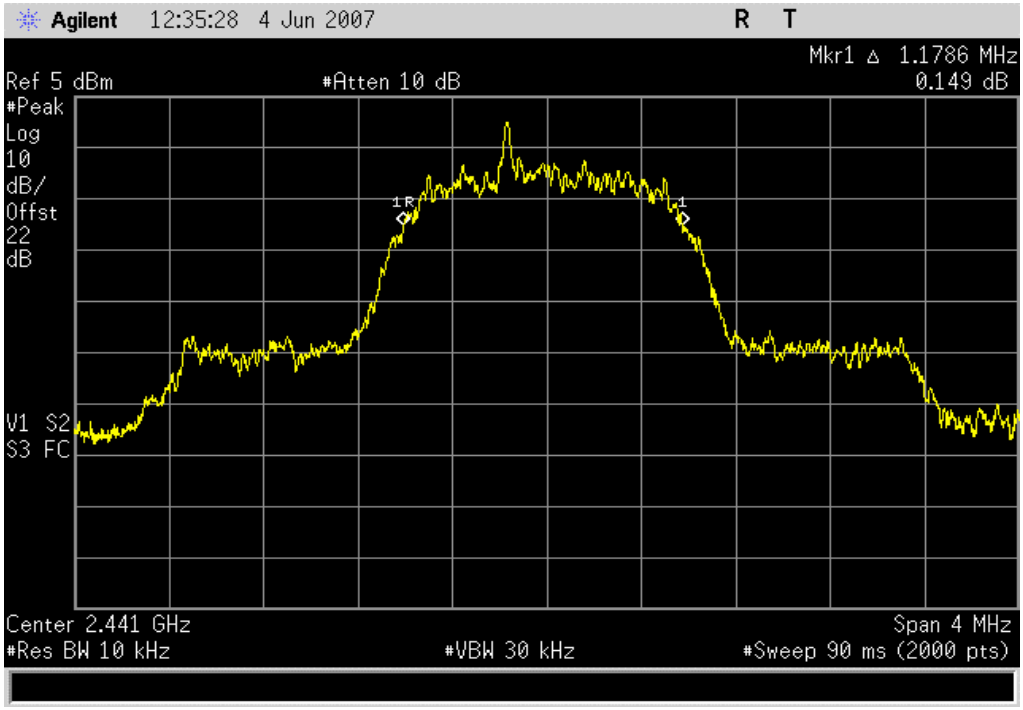
DH5, GFSK, High Channel					
Result:	Pass	**Value:**	870 kHz	**Limit:**	1.5 MHz



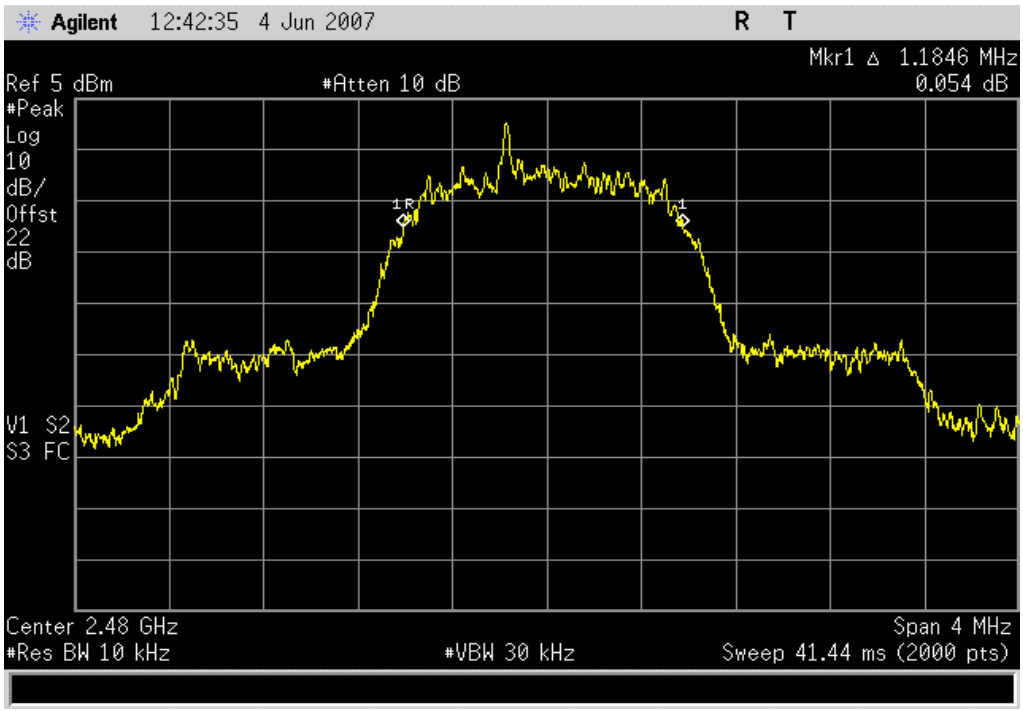
2DH5, 4-DQPSK, Low Channel					
Result:	Pass	**Value:**	1.181 MHz	**Limit:**	1.5 MHz



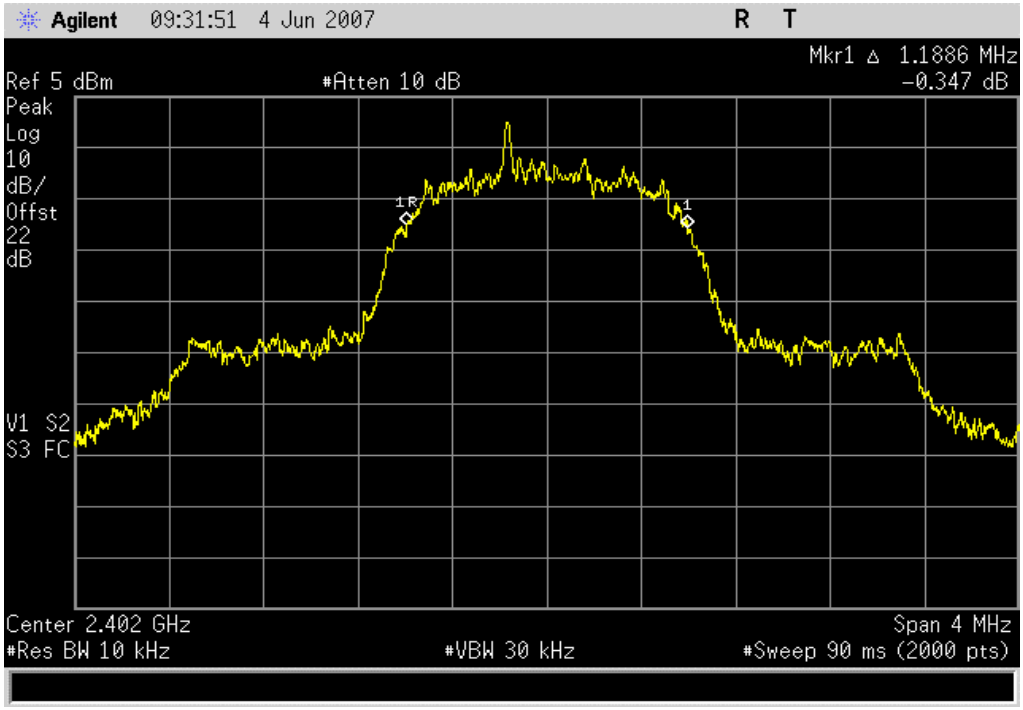
2DH5, 4-DQPSK, Mid Channel					
Result:	Pass	**Value:**	1.178 MHz	**Limit:**	1.5 MHz



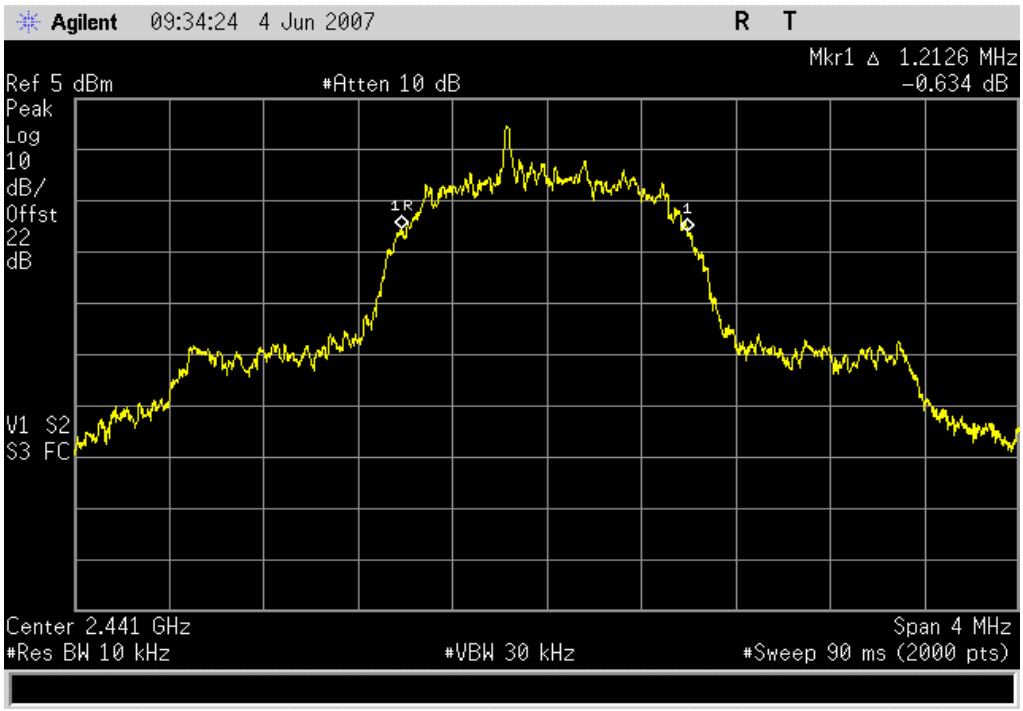
2DH5, 4-DQPSK, High Channel					
Result:	Pass	**Value:**	1.185 MHz	**Limit:**	1.5 MHz



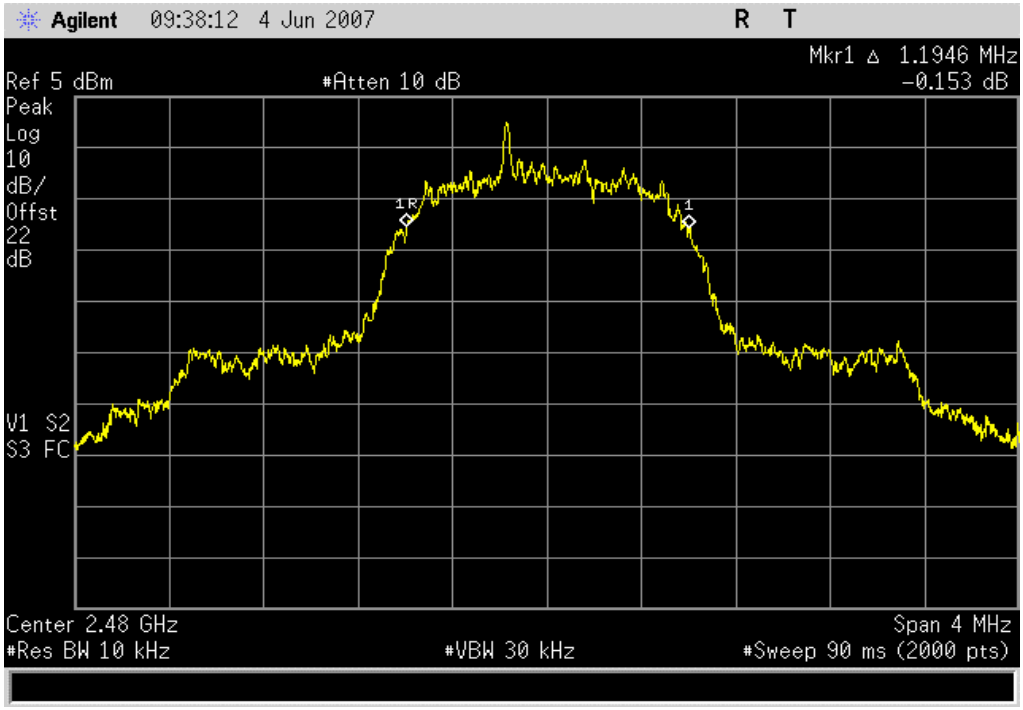
3DH5 8-DPSK, Low Channel					
Result:	Pass	**Value:**	1.189 MHz	**Limit:**	1.5 MHz



3DH5 8-DPSK, Mid Channel					
Result:	Pass	**Value:**	1.213 MHz	**Limit:**	1.5 MHz



3DH5 8-DPSK, High Channel					
Result:	Pass	**Value:**	1.195 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	E4407B	AAU	12/8/2006	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/7/2006	13
Power Meter	Gigatronics	8651A	SPM	9/19/2006	12
Power Sensor	Gigatronics	80701A	SPL	9/19/2006	12

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is 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 2007.03.30

EUT:	ST Micro STLC2500C in Eagle			**Work Order:**	TRPO0034
Serial Number:	Unknown			**Date:**	06/04/07
Customer:	Tripod Data Systems, Inc.			**Temperature:**	24°C
Attendees:	None			**Humidity:**	43%
Project:	None			**Barometric Pres.:**	29.96
Tested by:	Rod Peloquin	**Power:**	120VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2006	ANSI C63.4:2003 KDB No. 558074

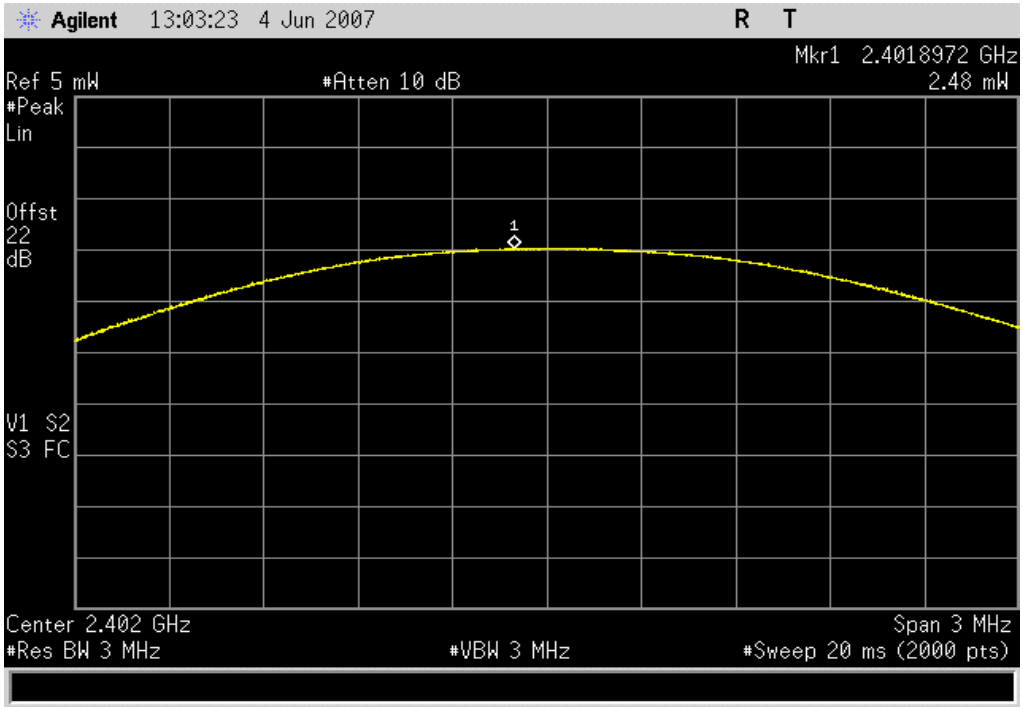
COMMENTS

DEVIATIONS FROM TEST STANDARD

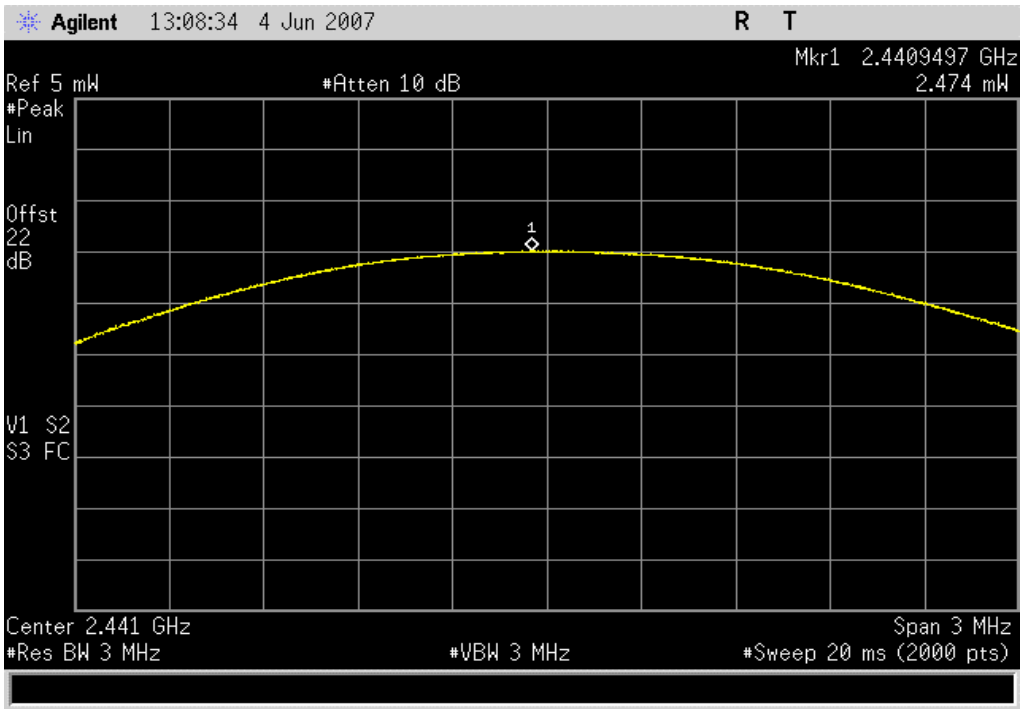
Configuration #	1	Signature

		Value	Limit	Results
DH5, GFSK				
	Low Channel	2.48 mW	1 W	Pass
	Mid Channel	2.47 mW	1 W	Pass
	High Channel	2.39 mW	1 W	Pass
2DH5, 4-DQPSK				
	Low Channel	2.42 mW	1 W	Pass
	Mid Channel	2.42 mW	1 W	Pass
	High Channel	2.34 mW	1 W	Pass
3DH5 8-DPSK				
	Low Channel	2.50 mW	1 W	Pass
	Mid Channel	2.50 mW	1 W	Pass
	High Channel	2.44 mW	1 W	Pass

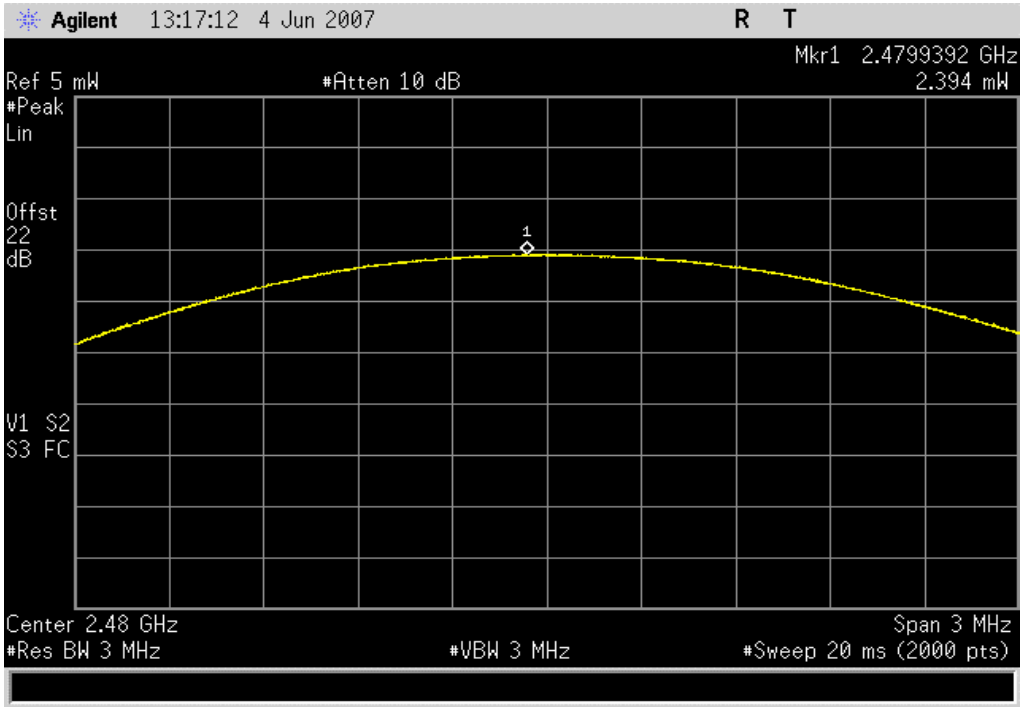
DH5, GFSK, Low Channel					
Result:	Pass	**Value:**	2.48 mW	**Limit:**	1 W



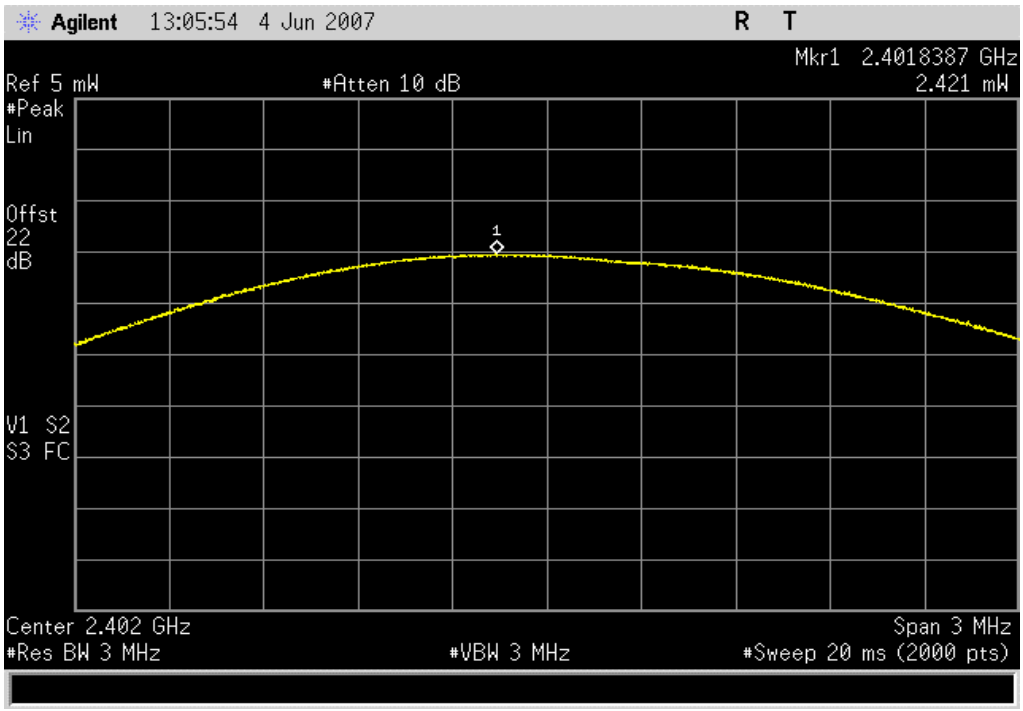
DH5, GFSK, Mid Channel					
Result:	Pass	**Value:**	2.47 mW	**Limit:**	1 W



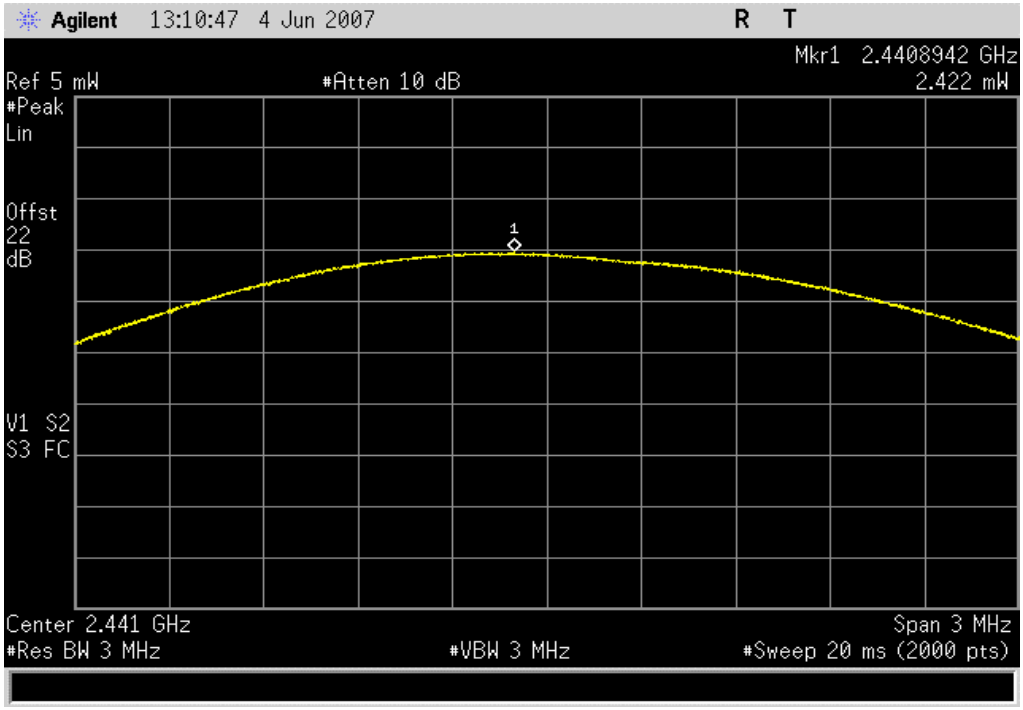
DH5, GFSK, High Channel					
Result:	Pass	**Value:**	2.39 mW	**Limit:**	1 W



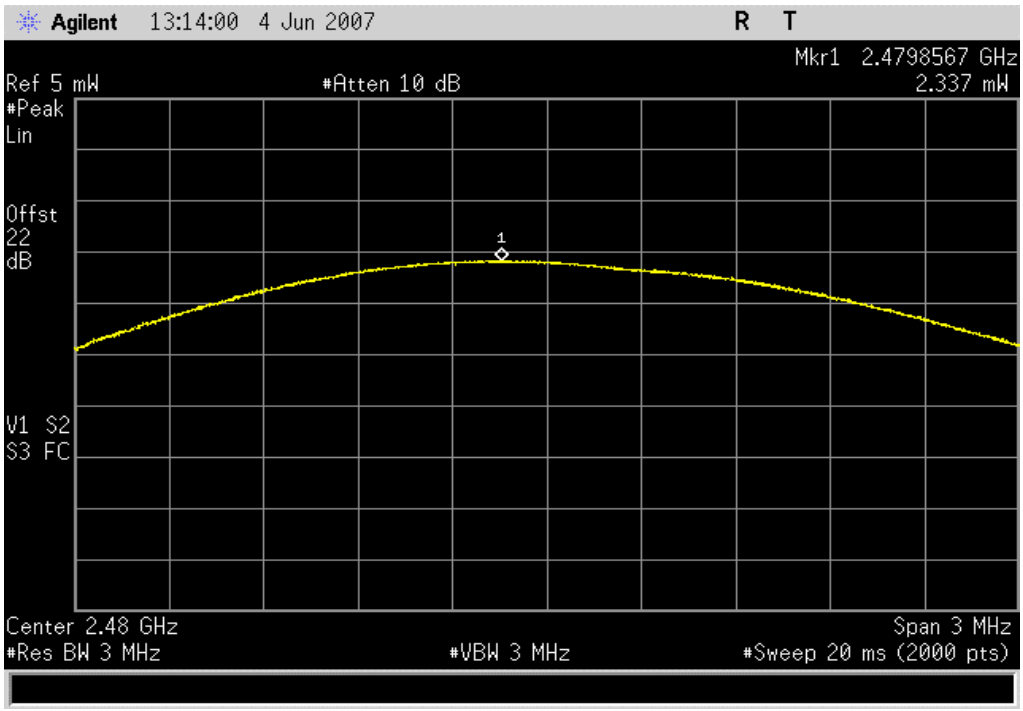
2DH5, 4-DQPSK, Low Channel					
Result:	Pass	**Value:**	2.42 mW	**Limit:**	1 W



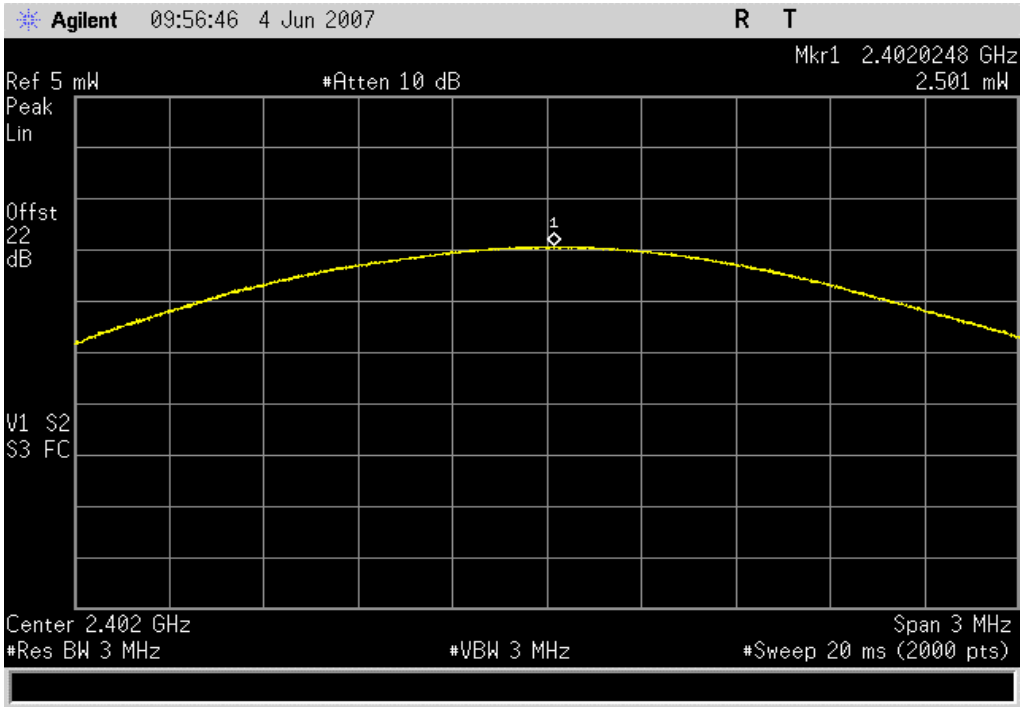
2DH5, 4-DQPSK, Mid Channel					
Result:	Pass	**Value:**	2.42 mW	**Limit:**	1 W



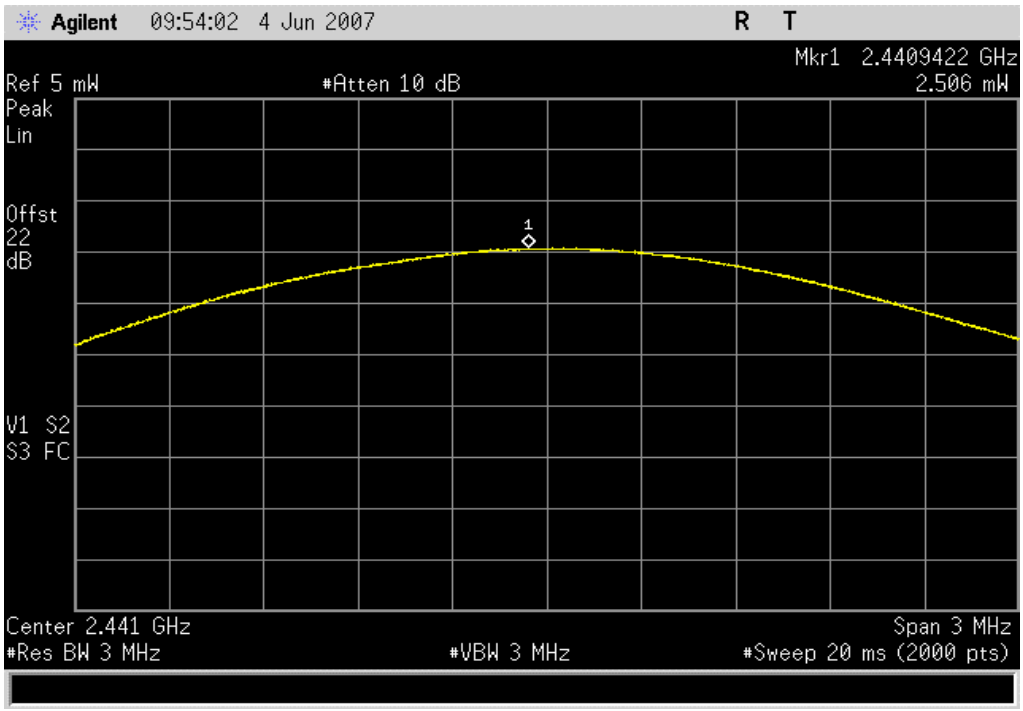
2DH5, 4-DQPSK, High Channel					
Result:	Pass	**Value:**	2.34 mW	**Limit:**	1 W



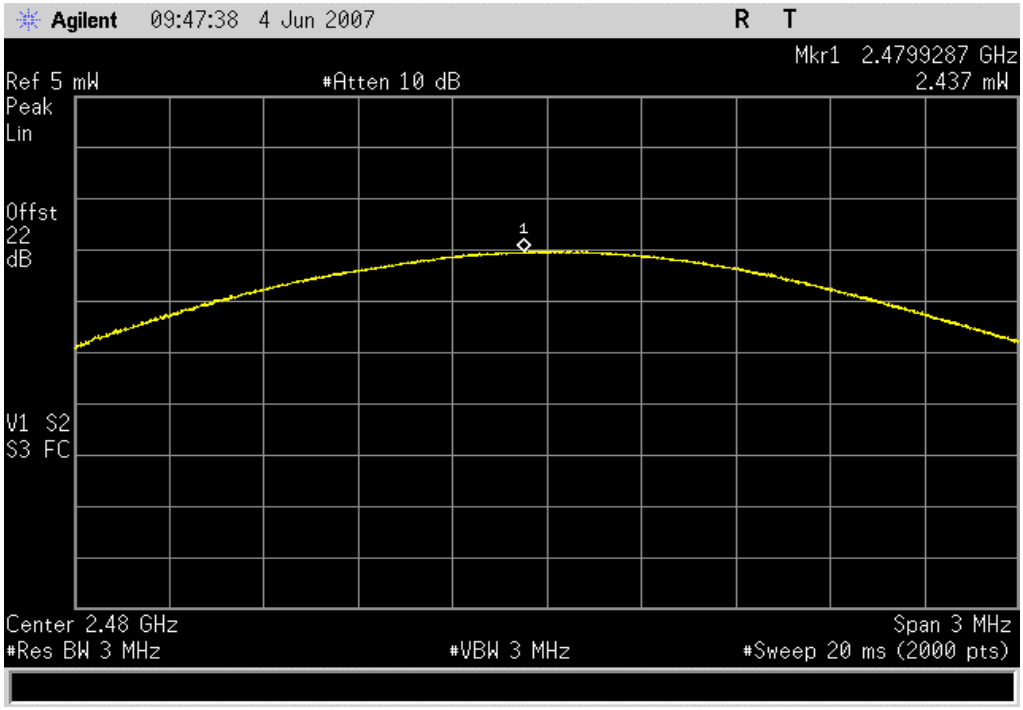
3DH5 8-DPSK, Low Channel					
Result:	Pass	**Value:**	2.50 mW	**Limit:**	1 W



3DH5 8-DPSK, Mid Channel					
Result:	Pass	**Value:**	2.50 mW	**Limit:**	1 W



3DH5 8-DPSK, High Channel					
Result:	Pass	**Value:**	2.44 mW	**Limit:**	1 W



BAND EDGE COMPLIANCE

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	E4407B	AAU	12/8/2006	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/7/2006	13
Power Meter	Gigatronics	8651A	SPM	9/19/2006	12
Power Sensor	Gigatronics	80701A	SPL	9/19/2006	12

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is 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 2007.03.30

EUT:	ST Micro STLC2500C in Eagle			Work Order:	TRPO0034
Serial Number:	Unknown			Date:	06/04/07
Customer:	Tripod Data Systems, Inc.			Temperature:	24°C
Attendees:	None			Humidity:	43%
Project:	None			Barometric Pres.:	29.96
Tested by:	Rod Peloquin	Power:	120VAC/60Hz	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2006	ANSI C63.4:2003 KDB No. 558074

COMMENTS

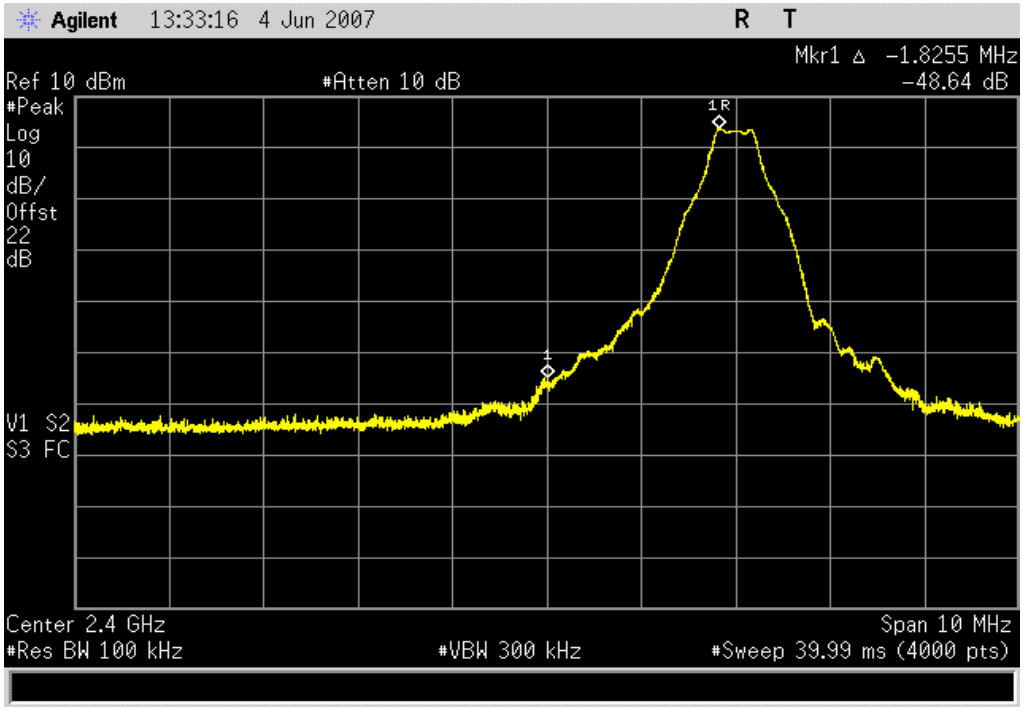
Operating in PRBS9 pattern with modulation called out in data sheets.

DEVIATIONS FROM TEST STANDARD

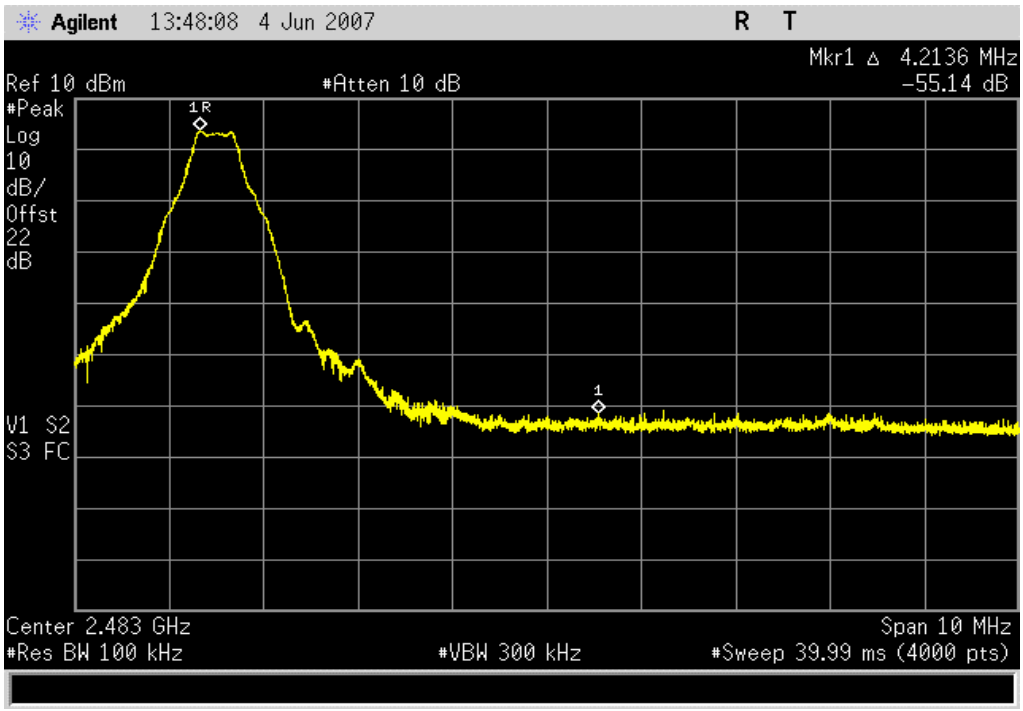
Configuration #	1	Signature

		Value	Limit	Results
DH5, GFSK				
	Low Channel	-48.6 dBc	≤ -20 dBc	Pass
	High Channel	-55.1 dBc	≤ -20 dBc	Pass
2DH5, 4-DQPSK				
	Low Channel	-45.5 dBc	≤ -20 dBc	Pass
	High Channel	-54.1 dBc	≤ -20 dBc	Pass
3DH5, 8-DPSK				
	Low Channel	-47.5 dBc	≤ -20 dBc	Pass
	High Channel	-54.8 dBc	≤ -20 dBc	Pass

DH5, GFSK, Low Channel					
Result:	Pass	**Value:**	-48.6 dBc	**Limit:**	≤ -20 dBc

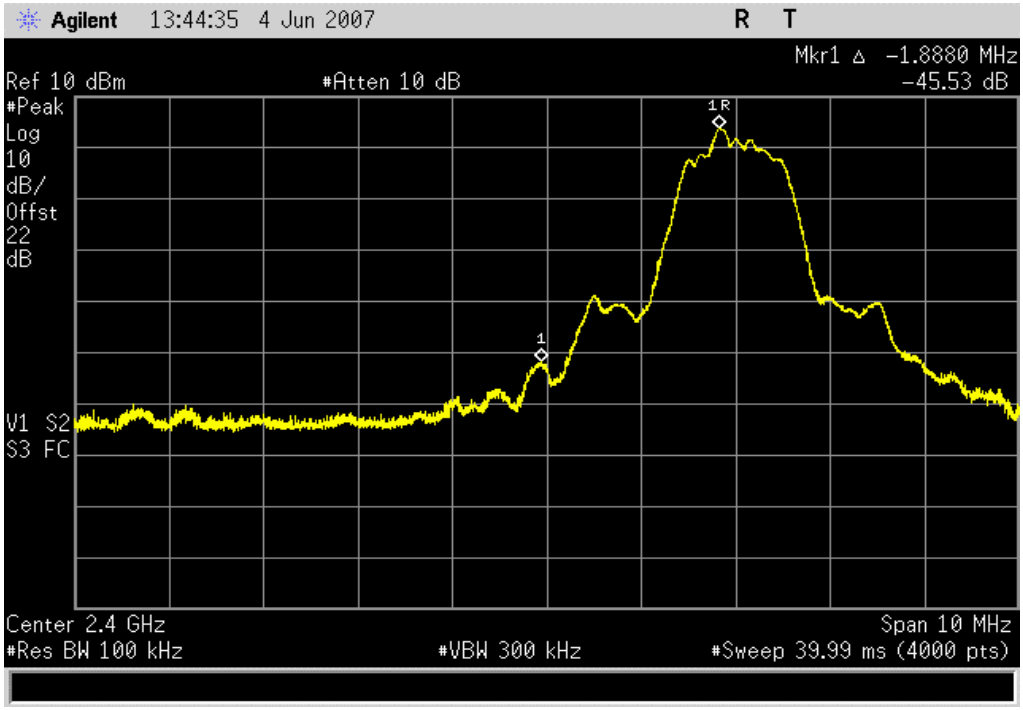


DH5, GFSK, High Channel					
Result:	Pass	**Value:**	-55.1 dBc	**Limit:**	≤ -20 dBc

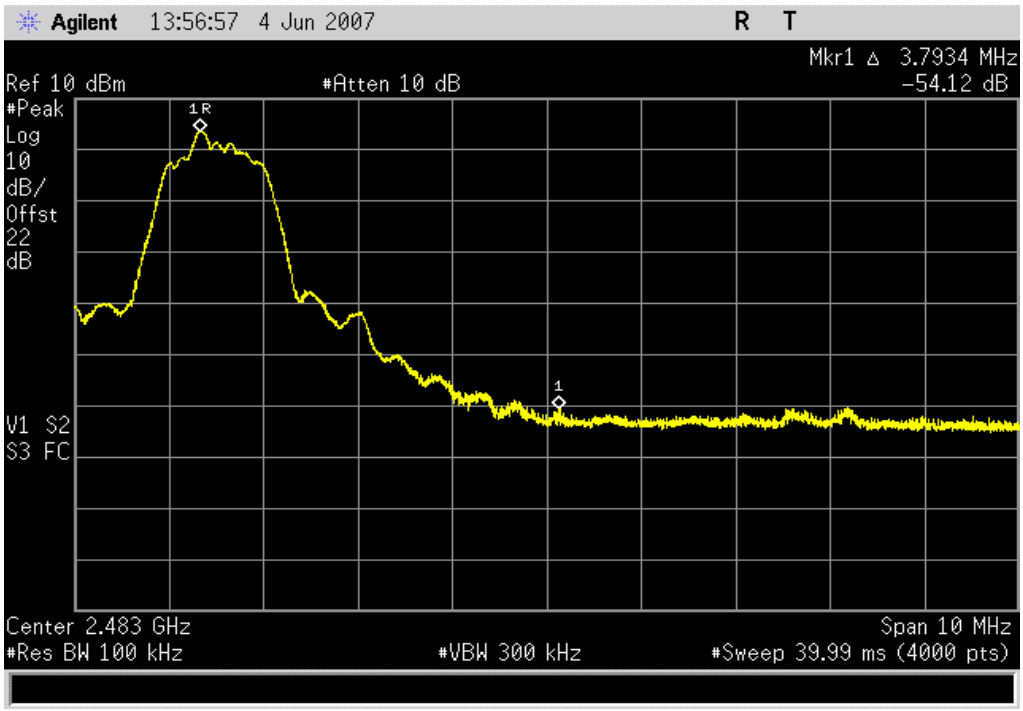


BAND EDGE COMPLIANCE

2DH5, 4-DQPSK, Low Channel					
Result:	Pass	**Value:**	-45.5 dBc	**Limit:**	≤ -20 dBc

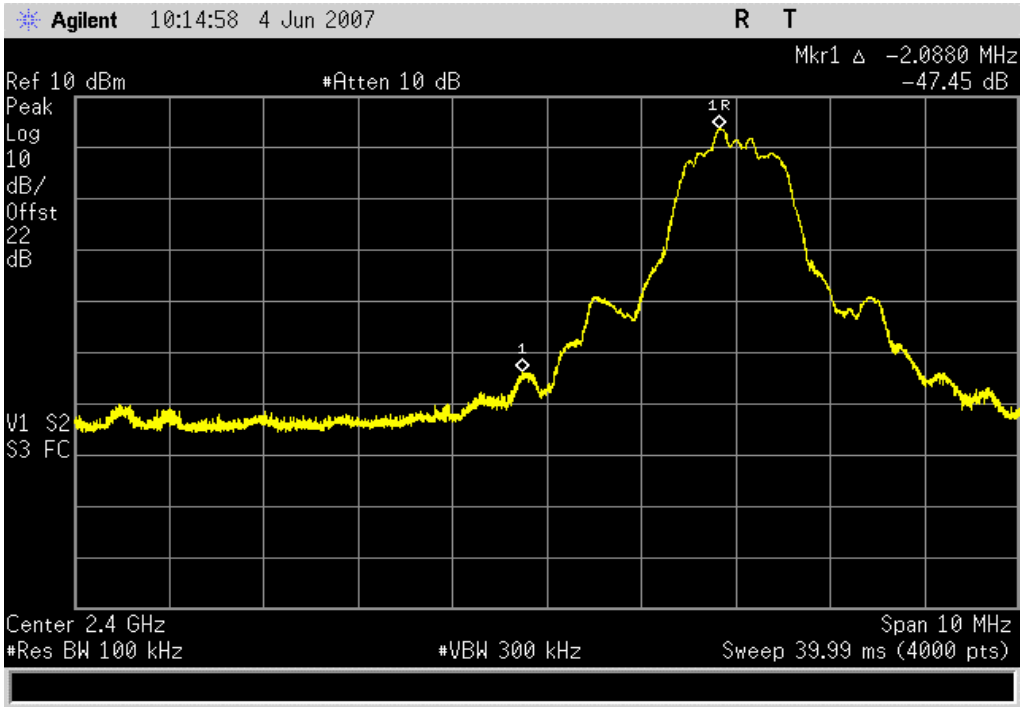


2DH5, 4-DQPSK, High Channel					
Result:	Pass	**Value:**	-54.1 dBc	**Limit:**	≤ -20 dBc

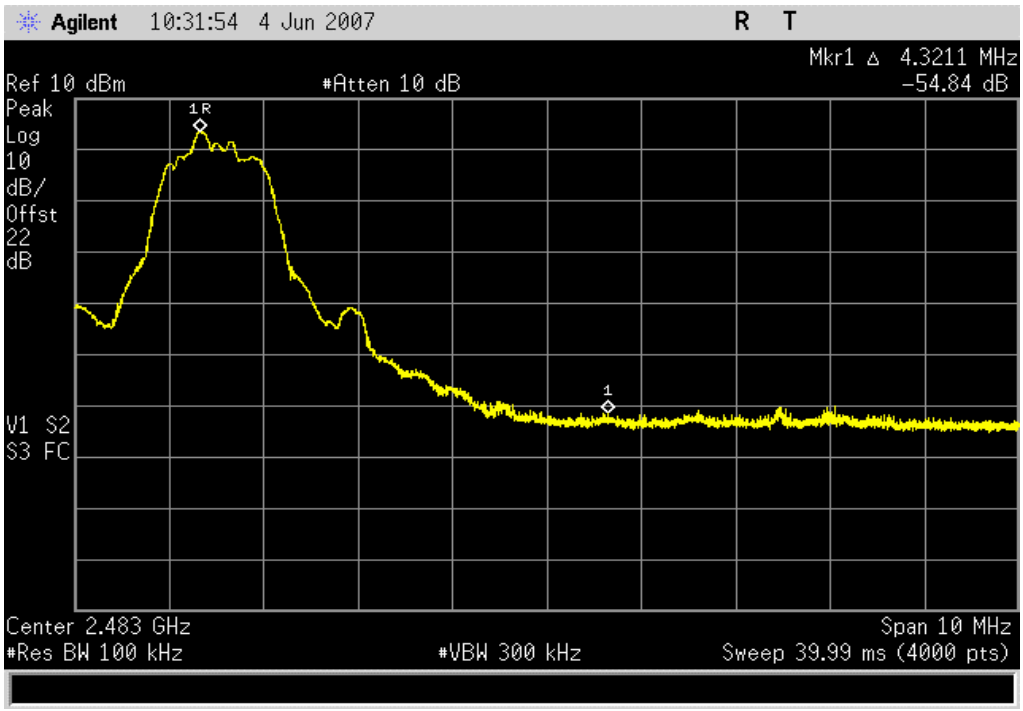


BAND EDGE COMPLIANCE

3DH5, 8-DPSK, Low Channel					
Result:	Pass	**Value:**	-47.5 dBc	**Limit:**	≤ -20 dBc



3DH5, 8-DPSK, High Channel					
Result:	Pass	**Value:**	-54.8 dBc	**Limit:**	≤ -20 dBc



BAND EDGE COMPLIANCE

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	E4407B	AAU	12/8/2006	13

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is 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 2006.08.24

EUT:	ST Micro STLC2500C in Eagle			**Work Order:**	TRPO0034
Serial Number:	Unknown			**Date:**	06/07/07
Customer:	Tripod Data Systems, Inc.			**Temperature:**	23°C
Attendees:	None			**Humidity:**	32%
Project:	None			**Barometric Pres.:**	30.17
Tested by:	Holly Ashkannejhad	**Power:**	120VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247(DTS):2006	ANSI C63.4:2003, KDB No. 558074

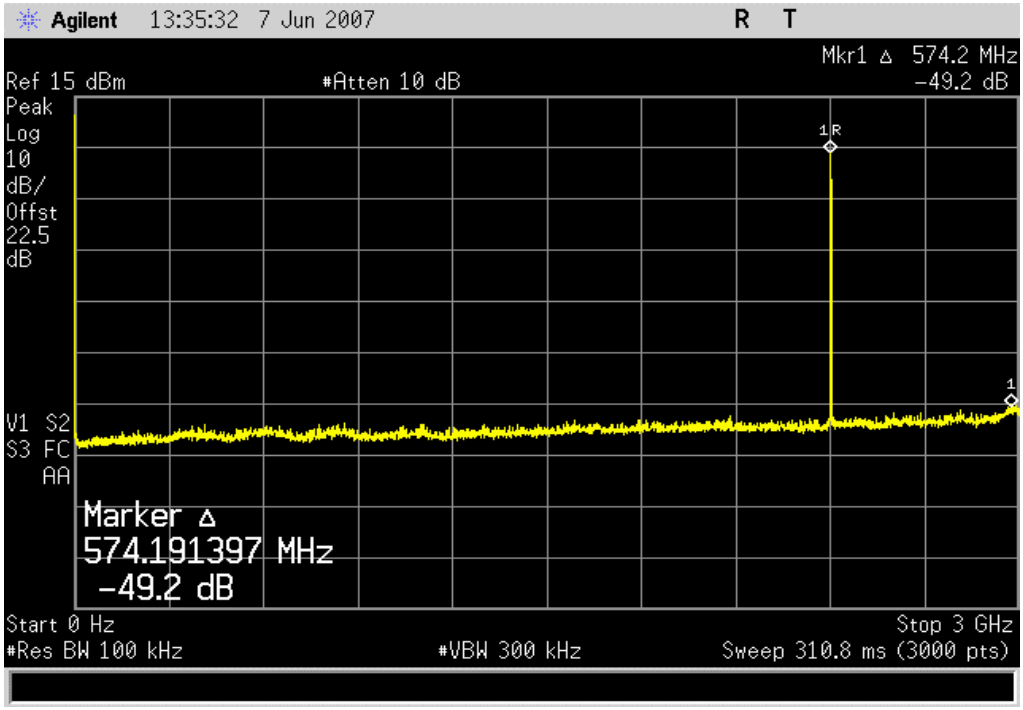
COMMENTS

DEVIATIONS FROM TEST STANDARD

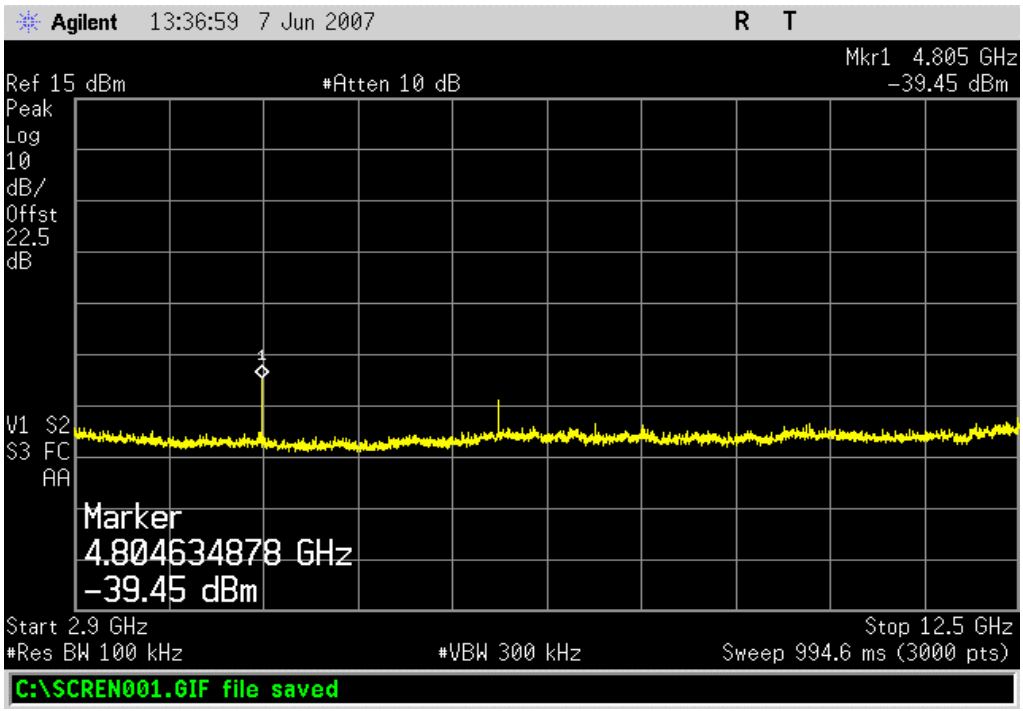
Configuration #	1	Signature Holly Ashkannejhad

		Value	Limit	Results
DH5, GFSK				
	Low channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	Mid channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	High channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
2DH5, 4-DQPSK				
	Low channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	Mid channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	High channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
3DH5, 8DPSK				
	Low channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	Mid channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	High channel			
	0 Hz - 3 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	2.9 GHz - 12.5 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass
	12.4 GHz - 25 GHz	≤ - 40 dBc	≤ - 20 dBc	Pass

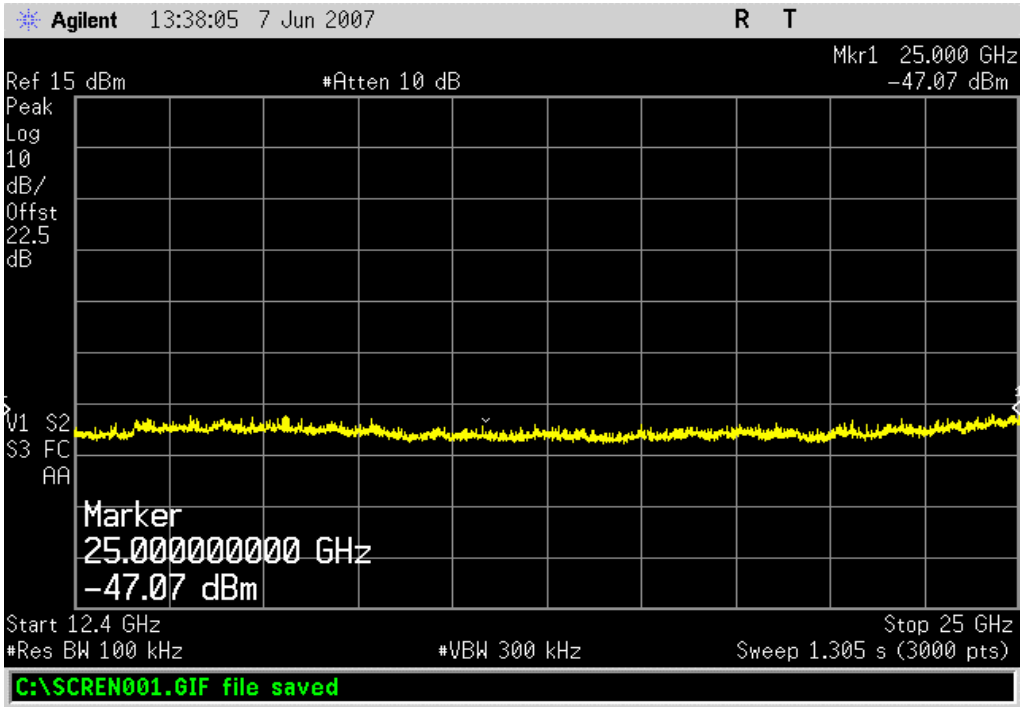
DH5, GFSK, Low channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



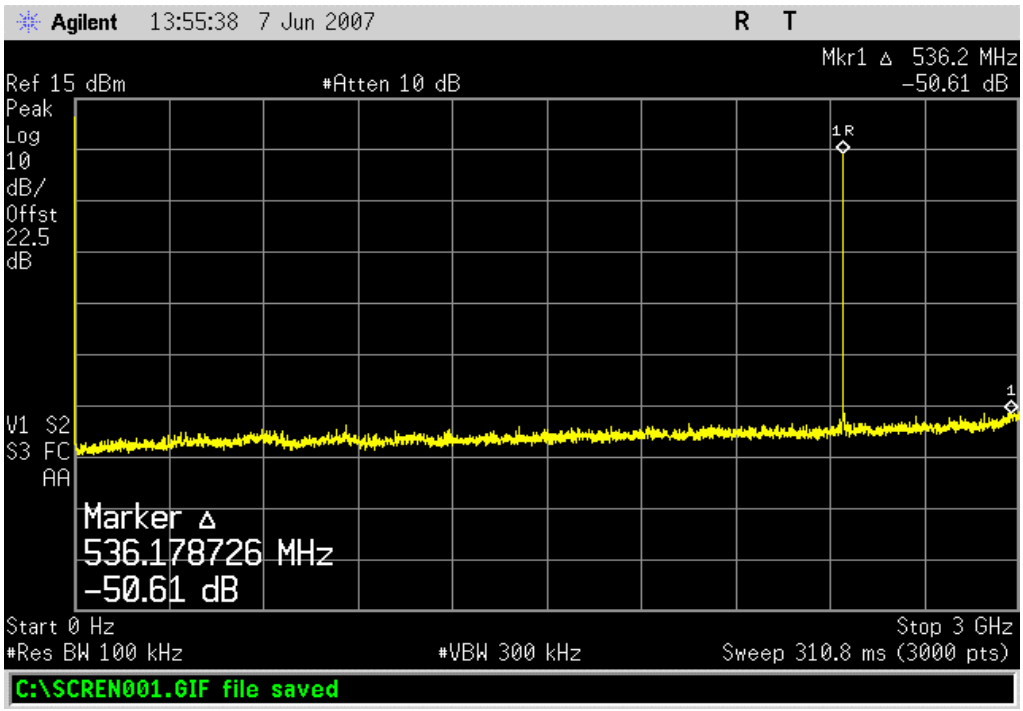
DH5, GFSK, Low channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



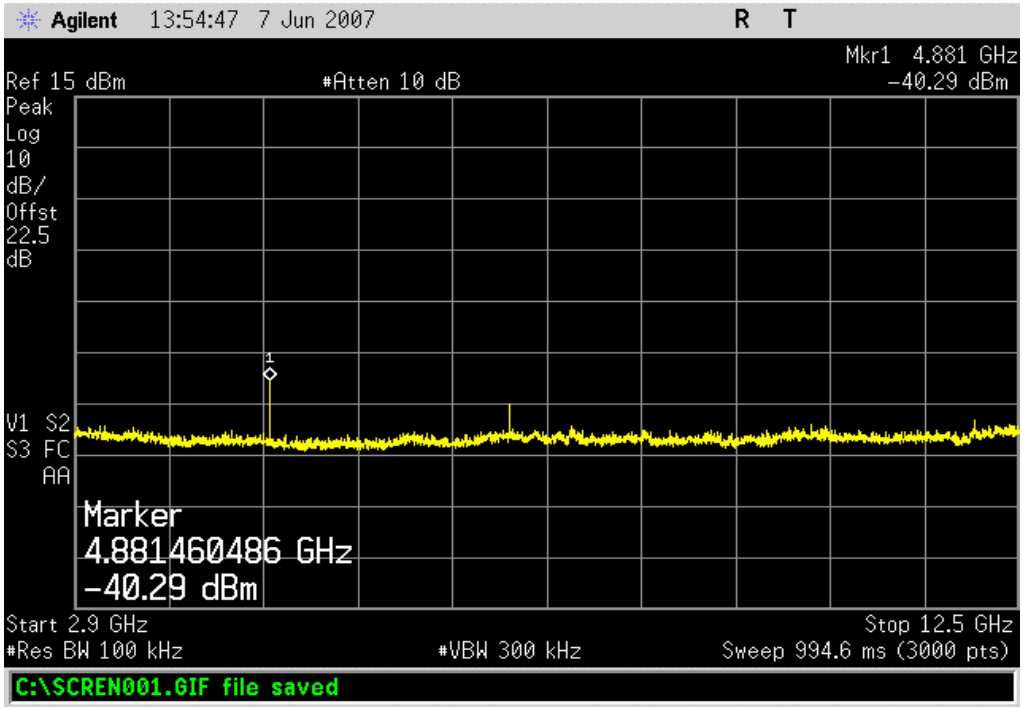
DH5, GFSK, Low channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



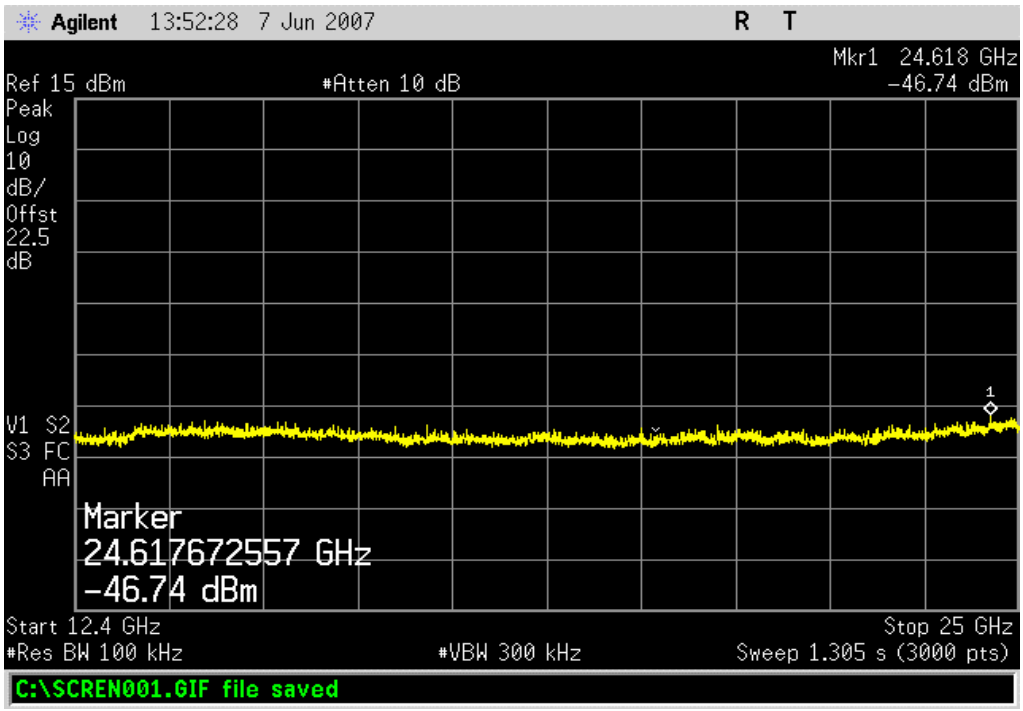
DH5, GFSK, Mid channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



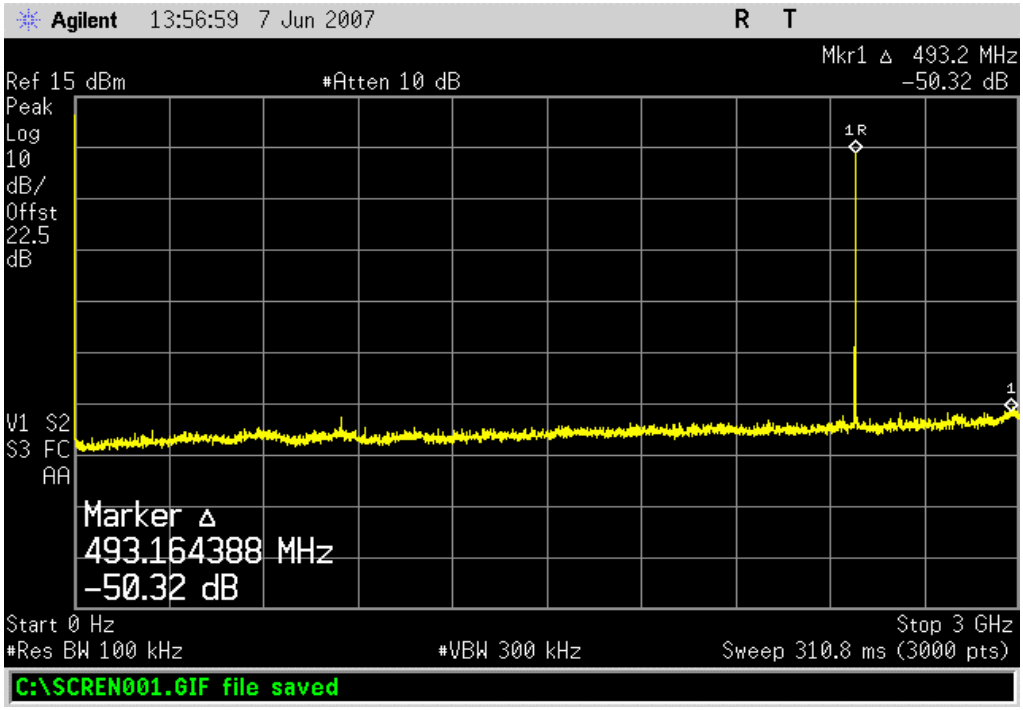
DH5, GFSK, Mid channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



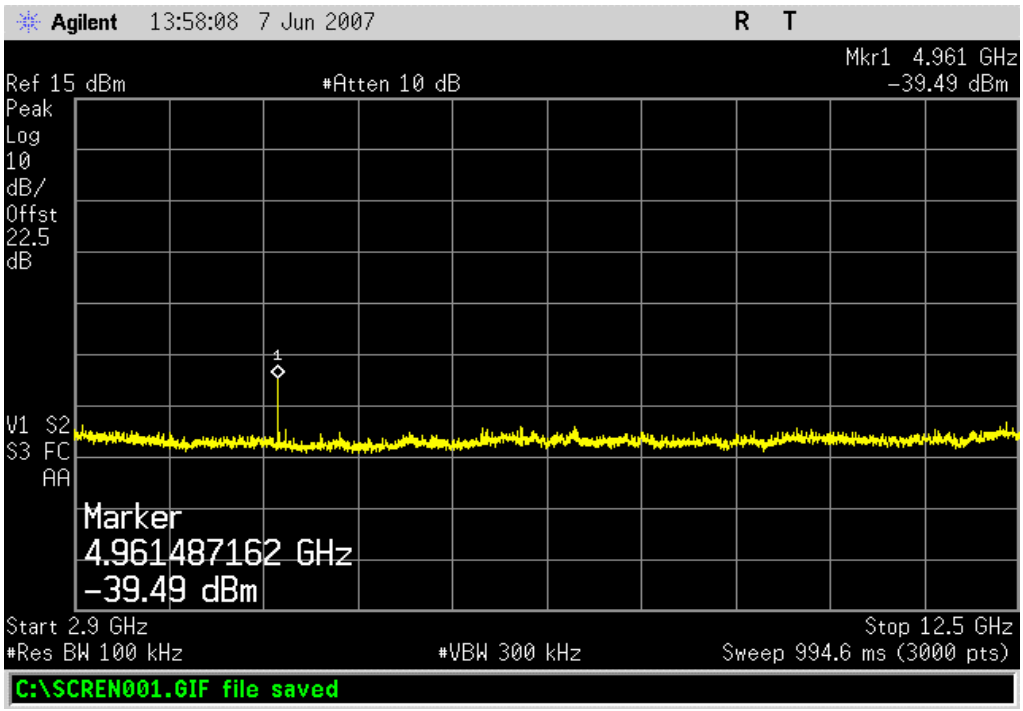
DH5, GFSK, Mid channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



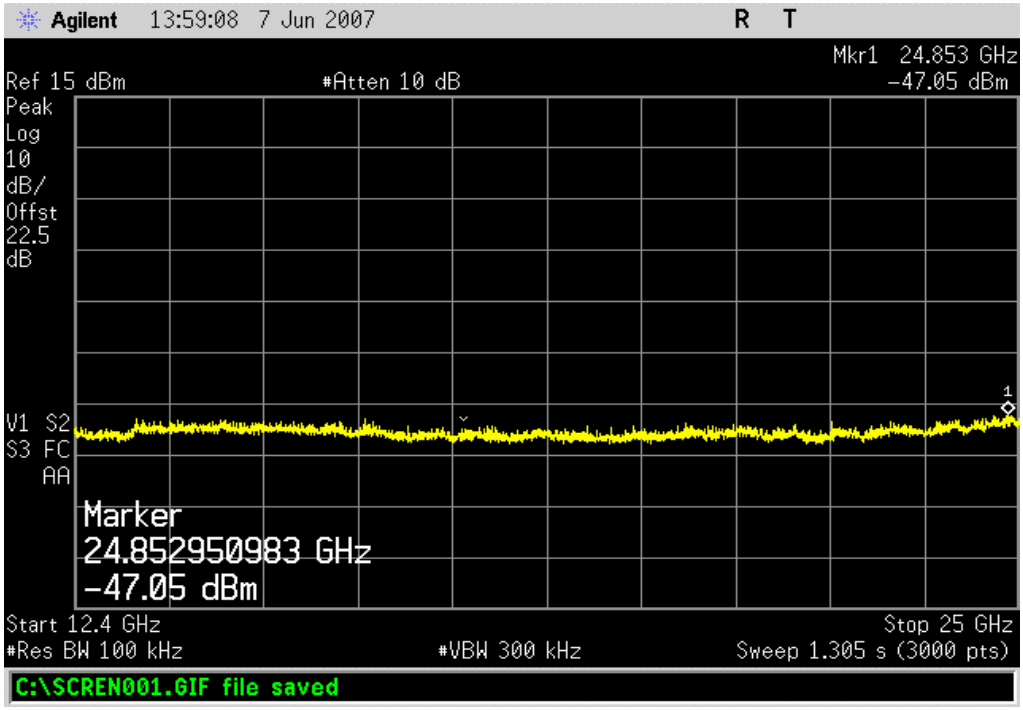
DH5, GFSK, High channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



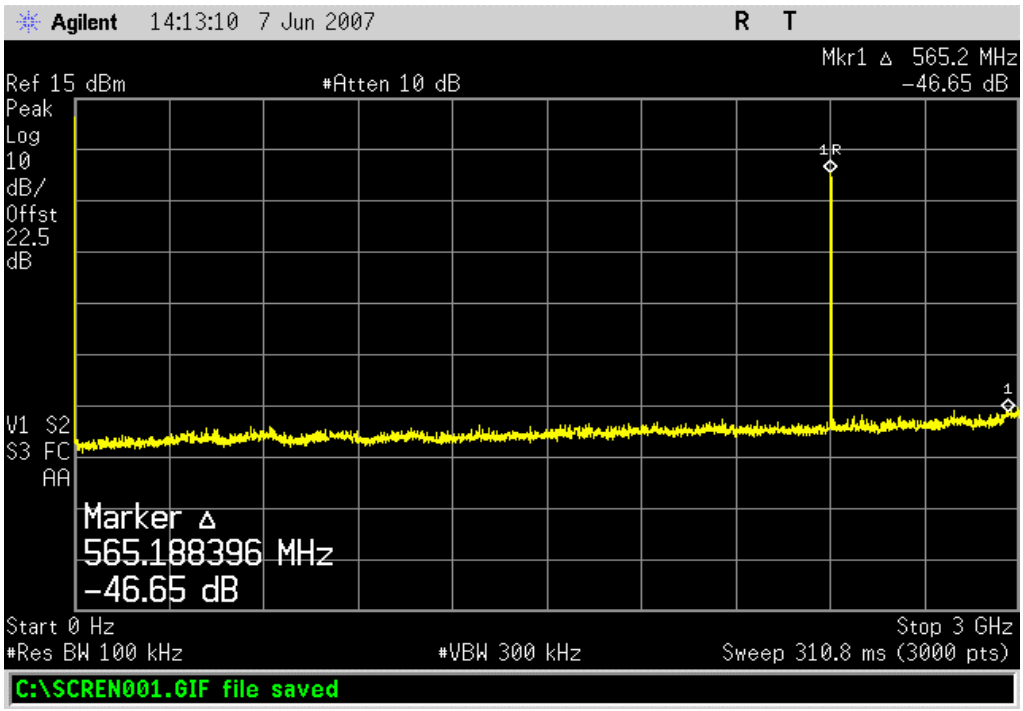
DH5, GFSK, High channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



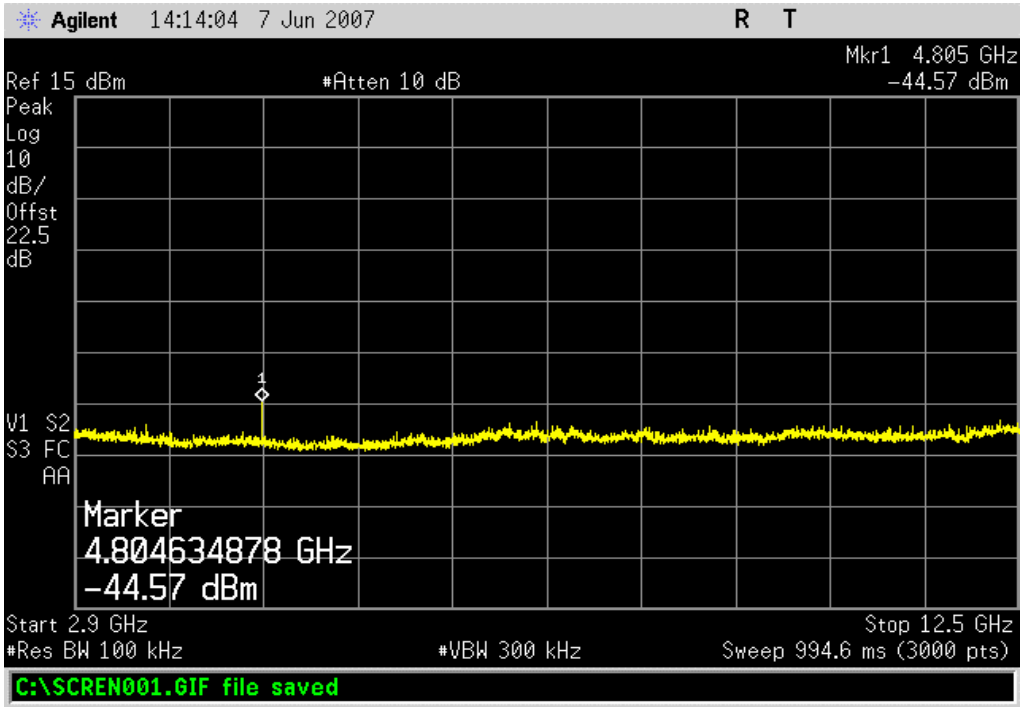
DH5, GFSK, High channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



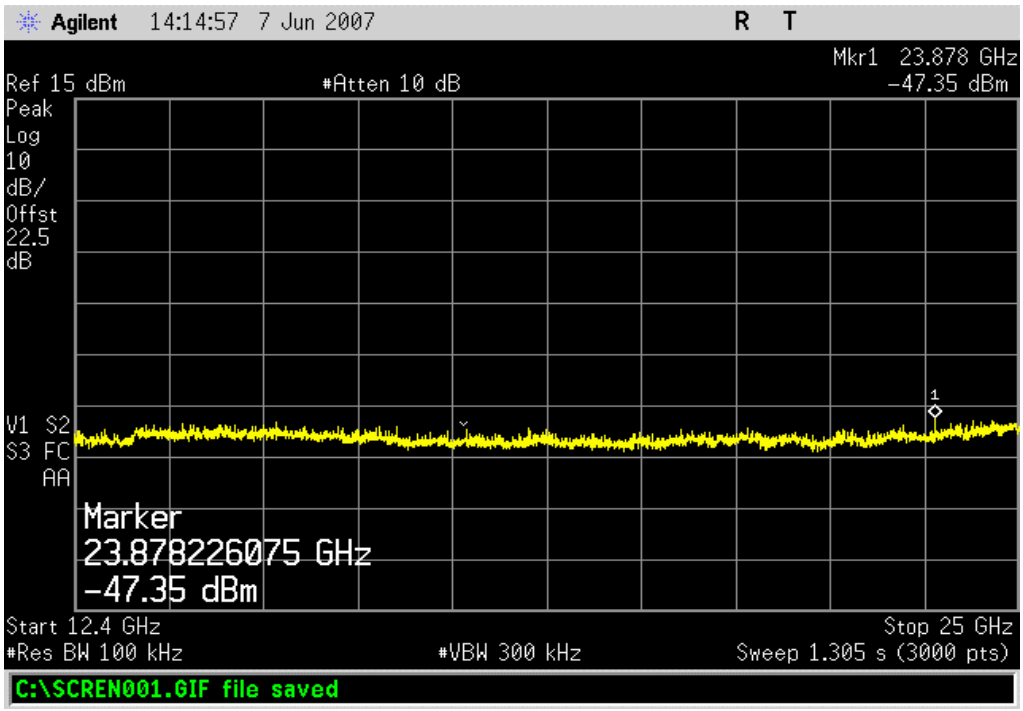
2DH5, 4-DQPSK, Low channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



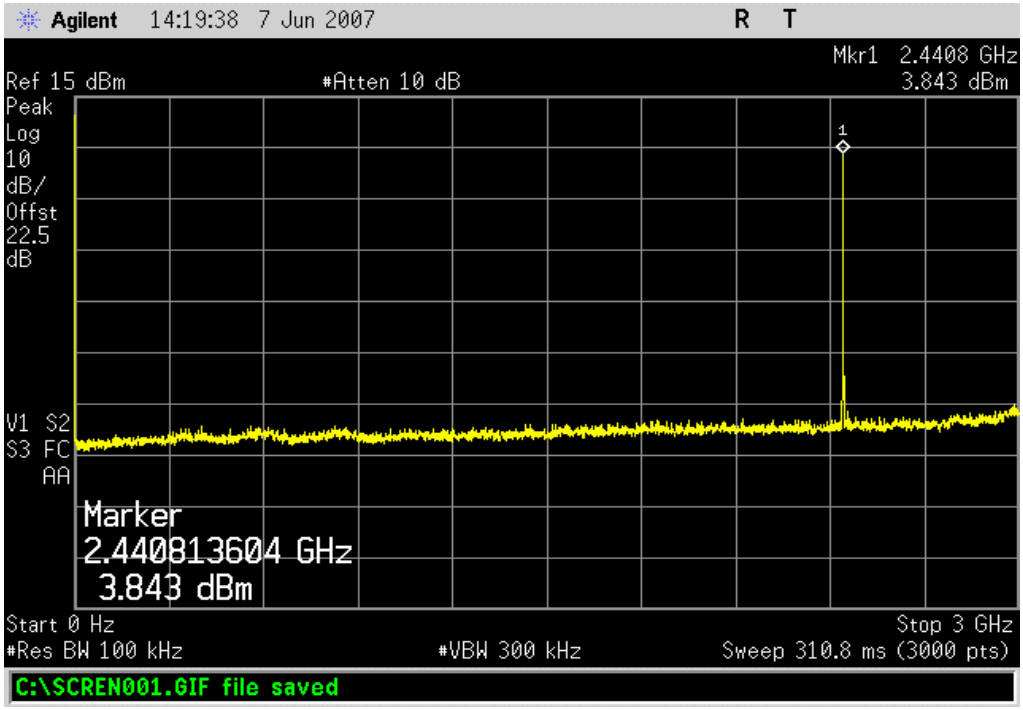
2DH5, 4-DQPSK, Low channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



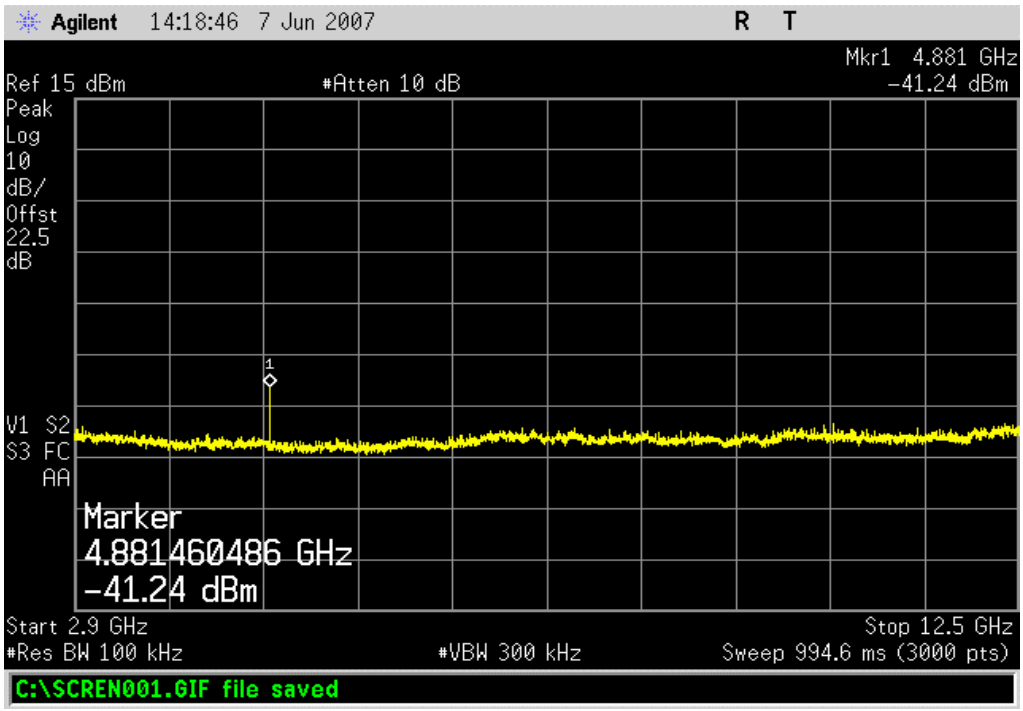
2DH5, 4-DQPSK, Low channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



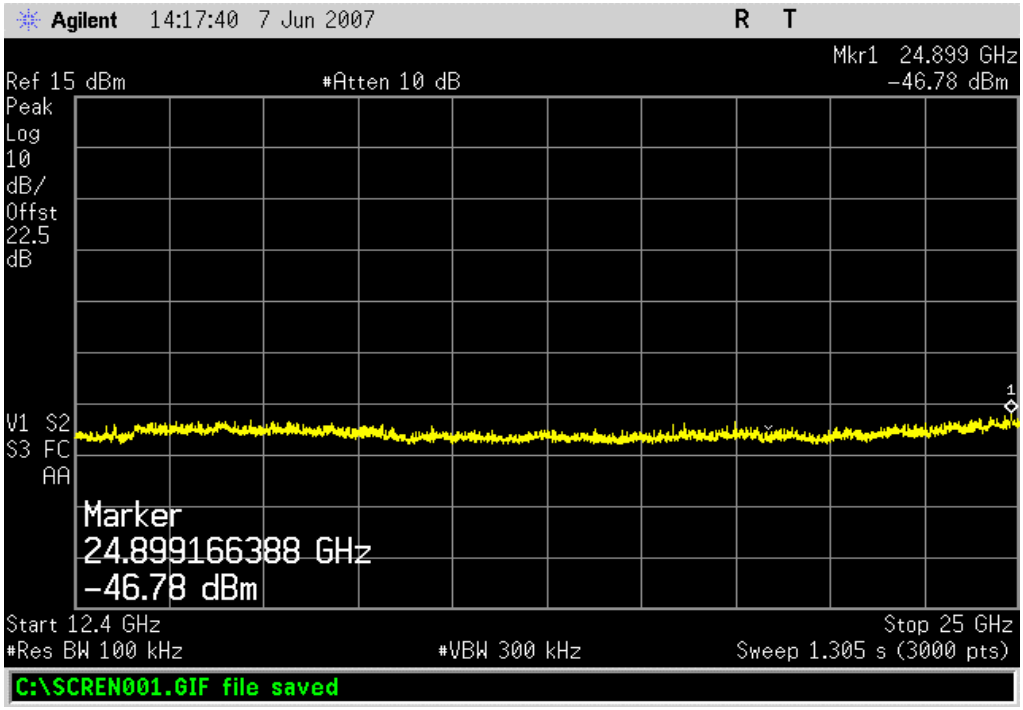
2DH5, 4-DQPSK, Mid channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



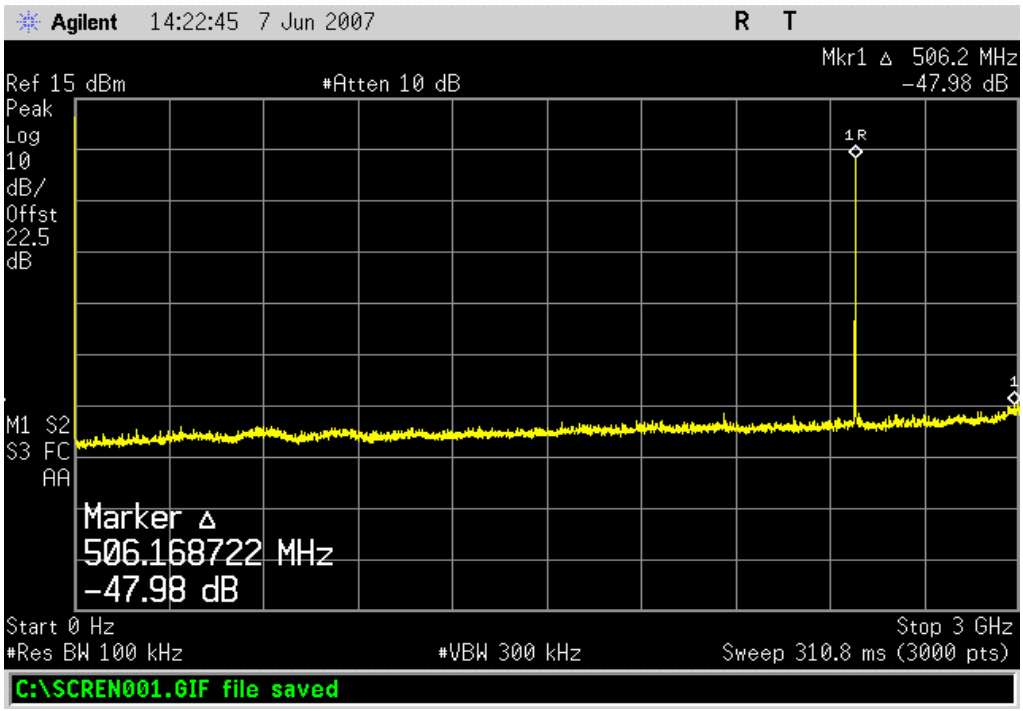
2DH5, 4-DQPSK, Mid channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



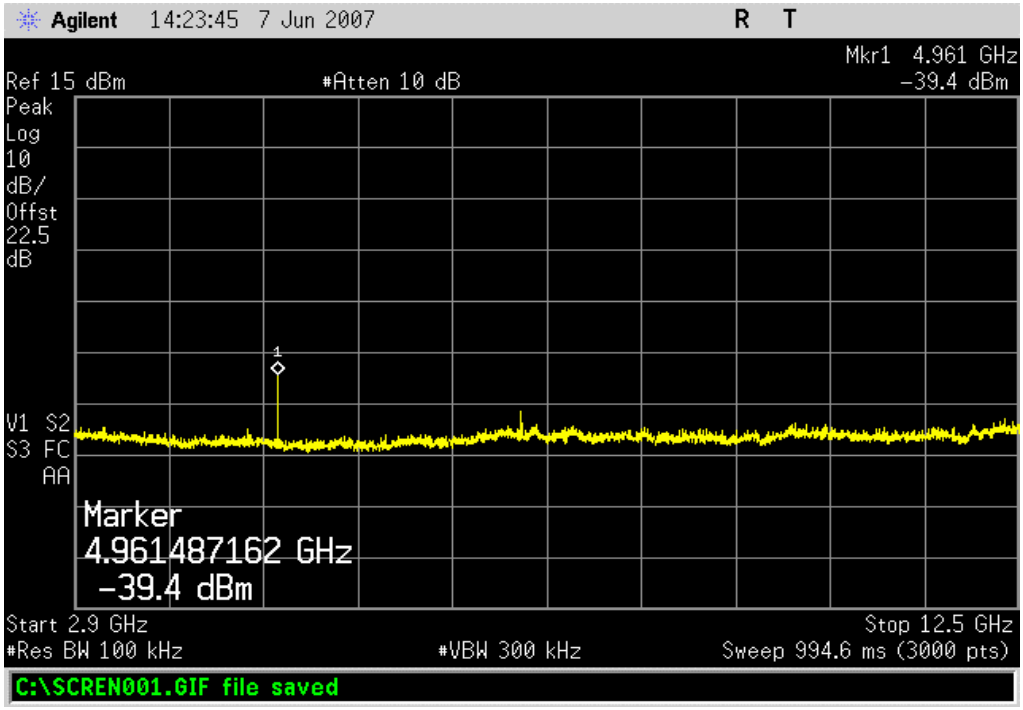
2DH5, 4-DQPSK, Mid channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



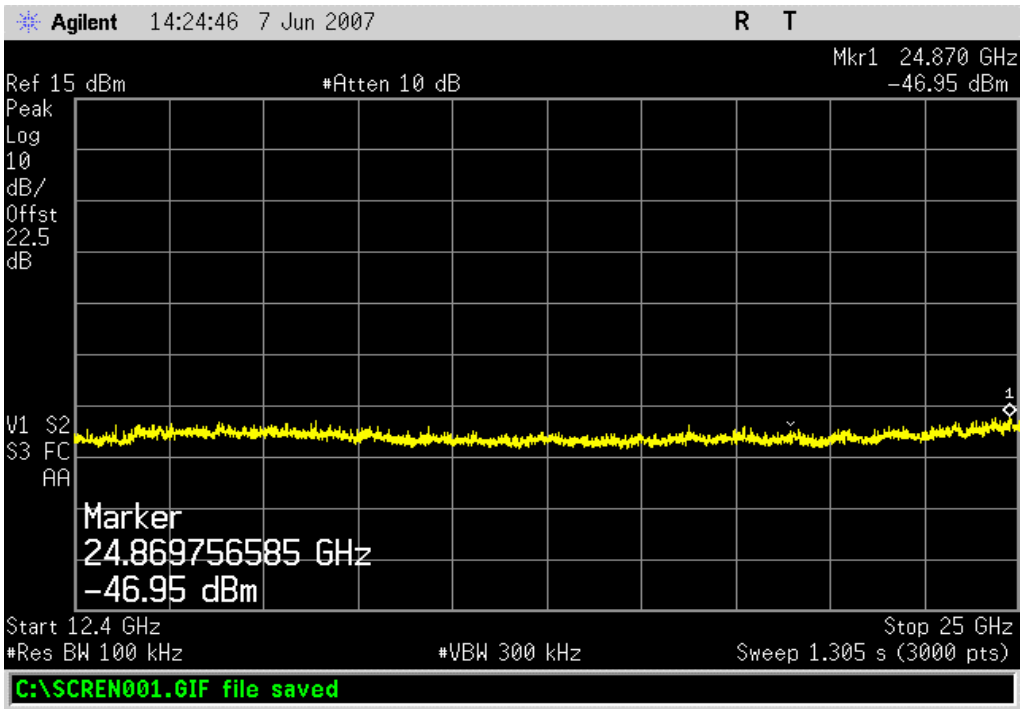
2DH5, 4-DQPSK, High channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



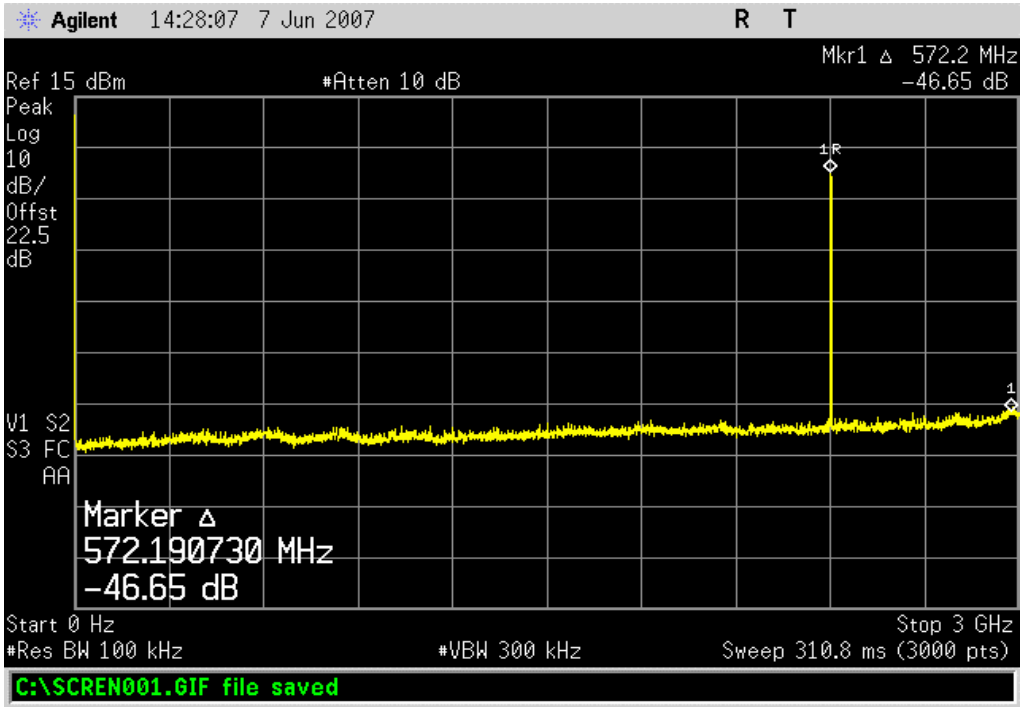
2DH5, 4-DQPSK, High channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



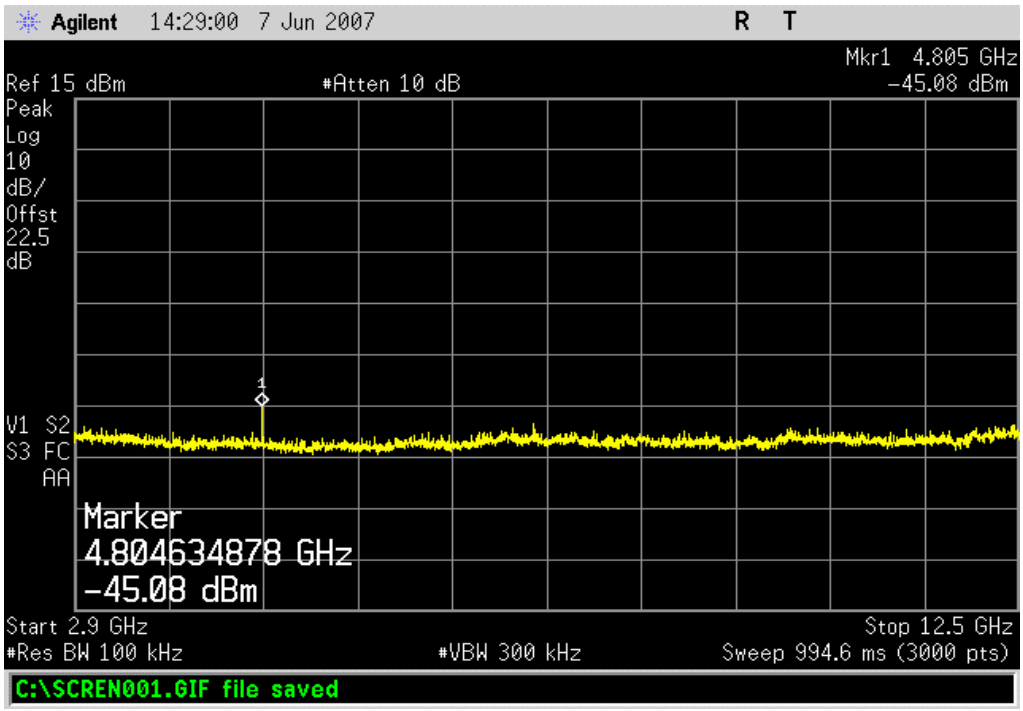
2DH5, 4-DQPSK, High channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



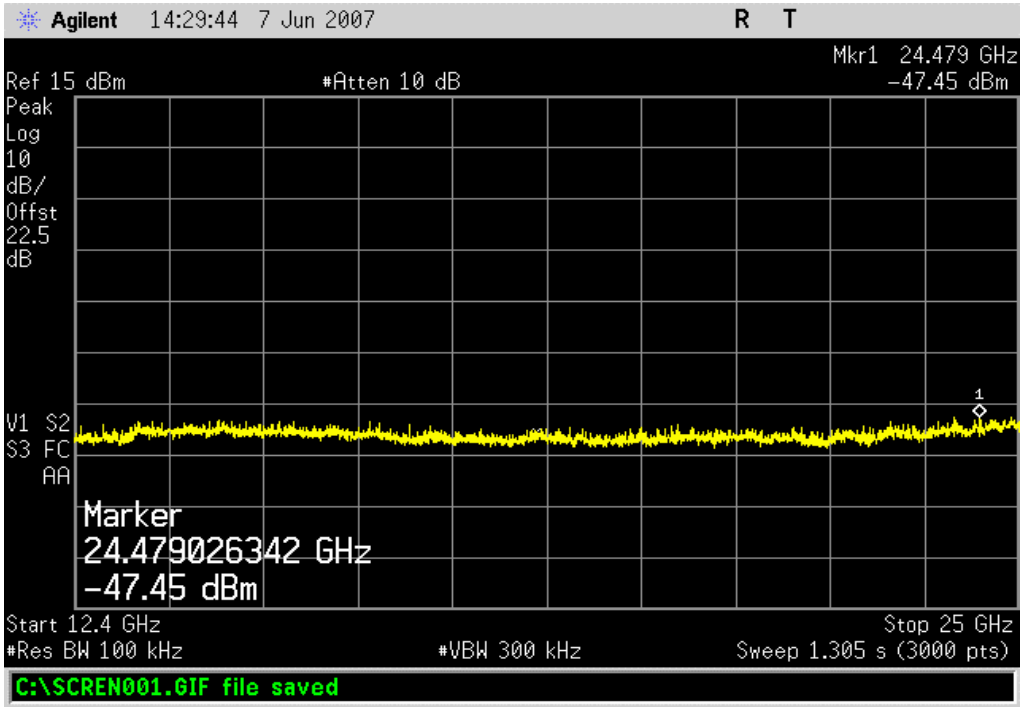
3DH5, 8DPSK, Low channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



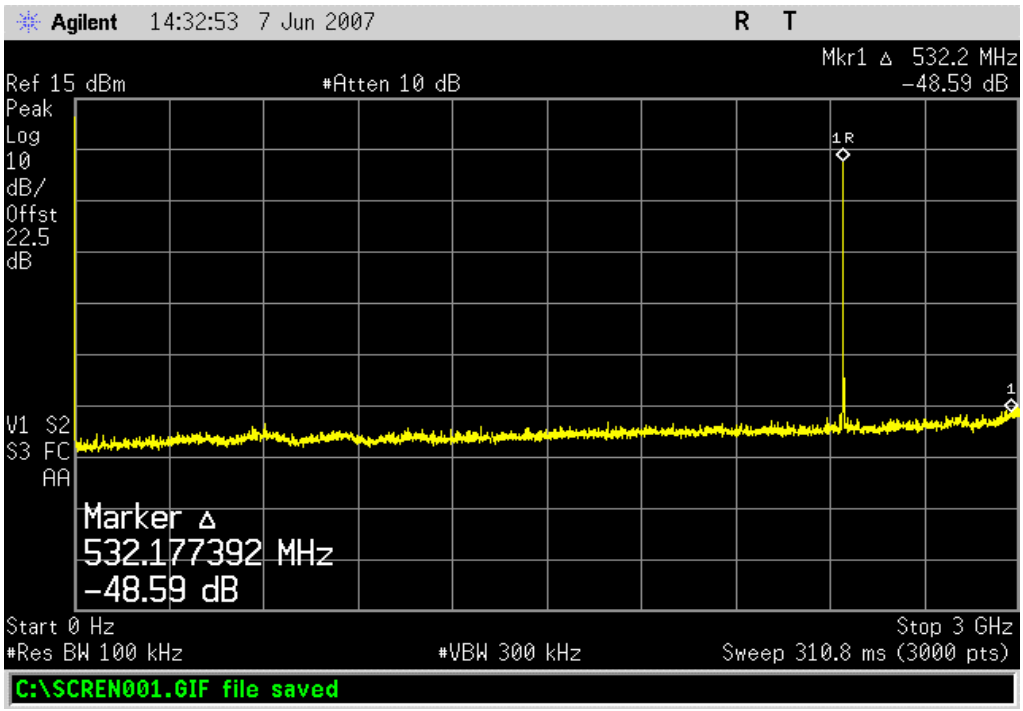
3DH5, 8DPSK, Low channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



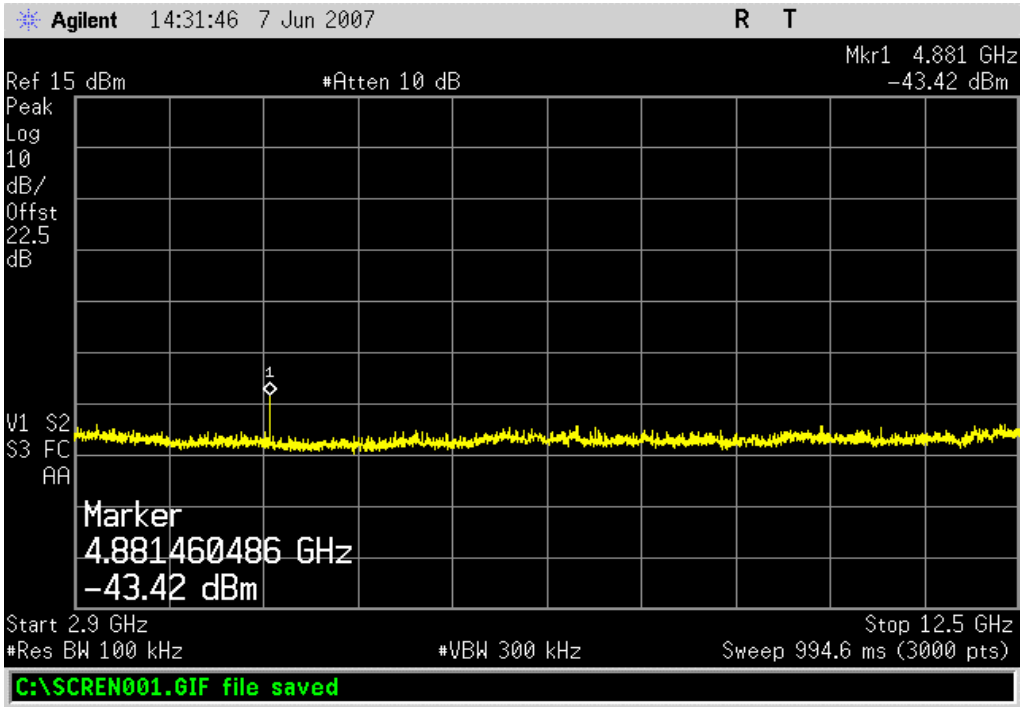
3DH5, 8DPSK, Low channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



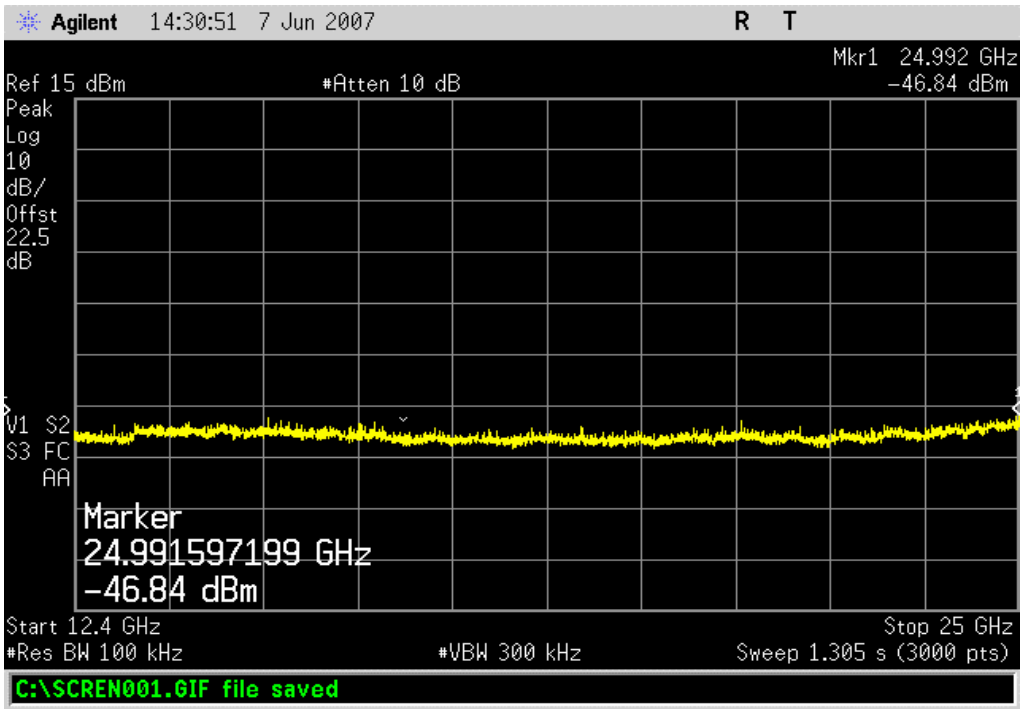
3DH5, 8DPSK, Mid channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



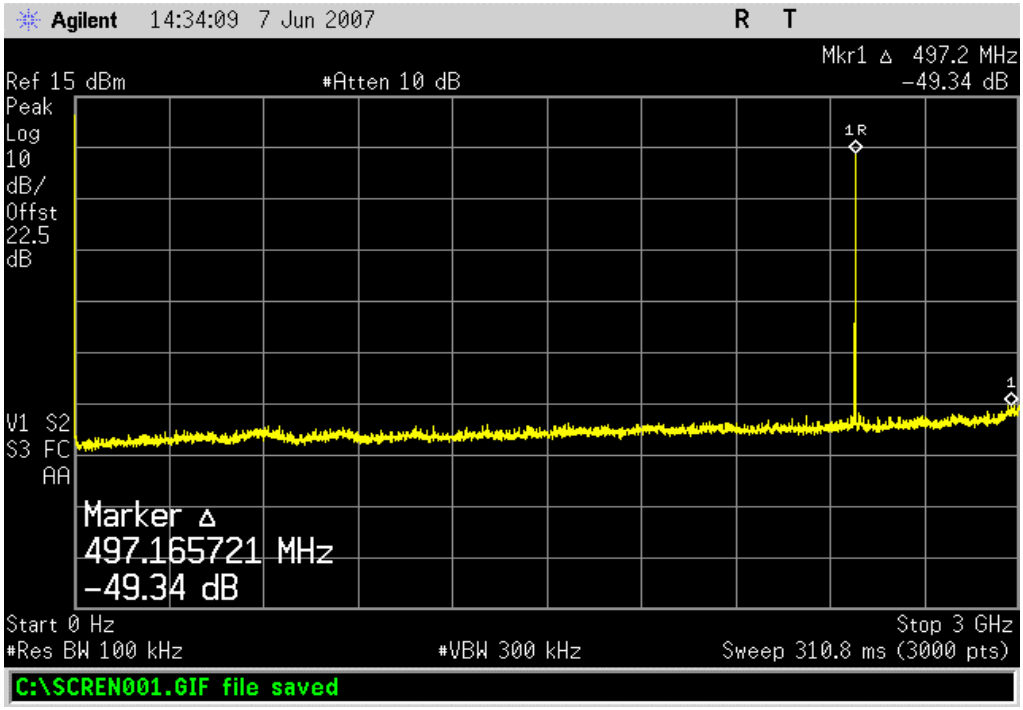
3DH5, 8DPSK, Mid channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



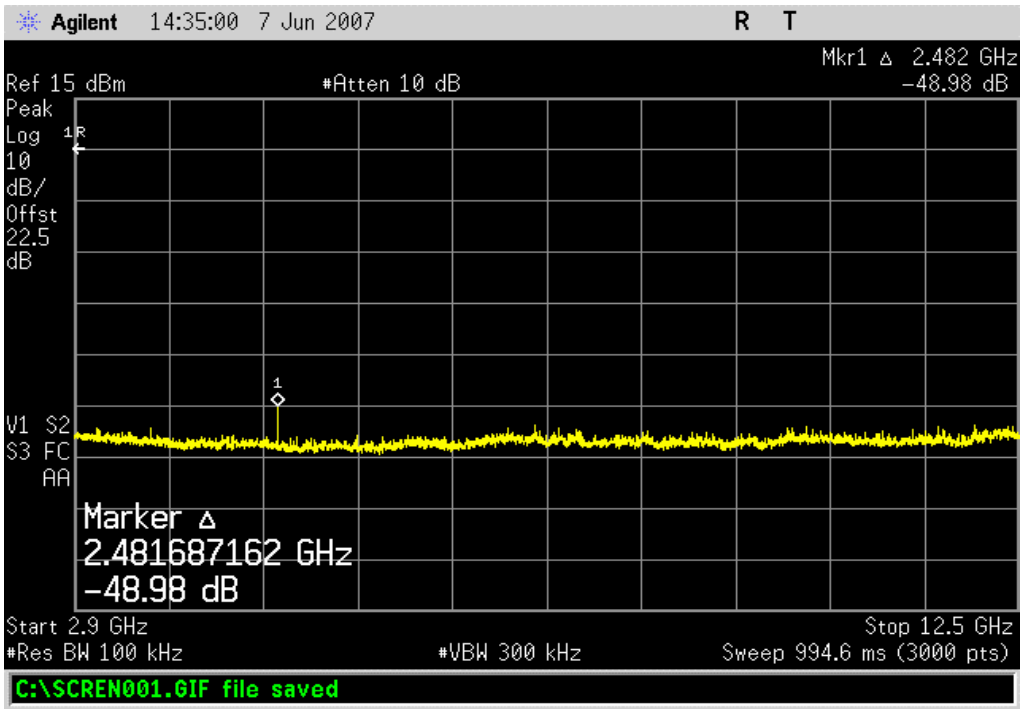
3DH5, 8DPSK, Mid channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc



3DH5, 8DPSK, High channel, 0 Hz - 3 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc

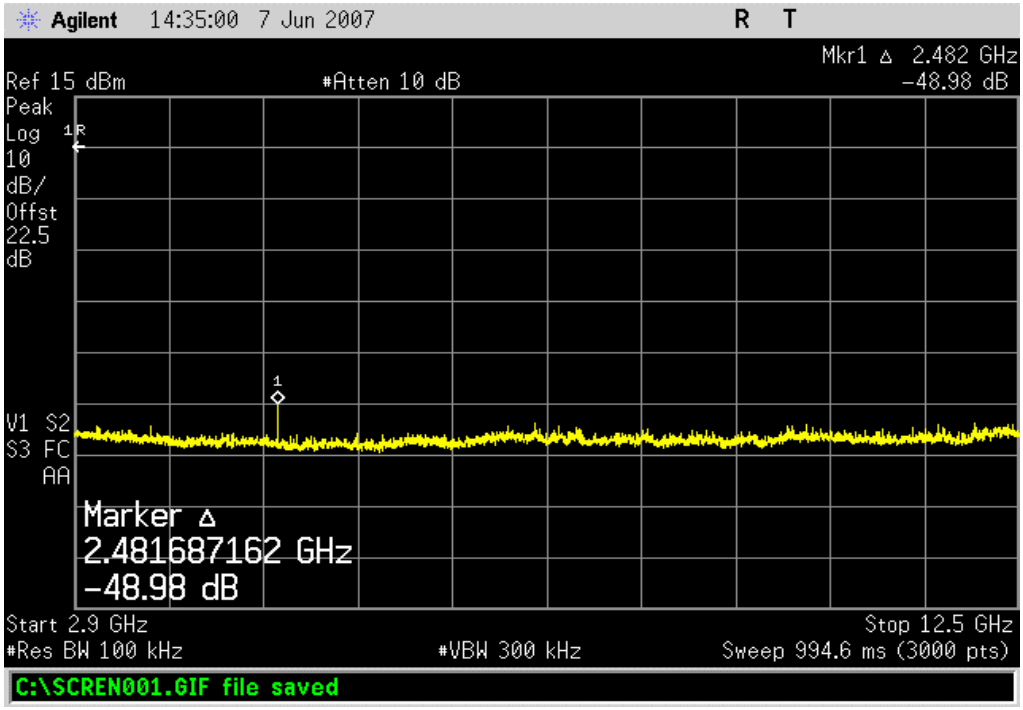


3DH5, 8DPSK, High channel, 2.9 GHz - 12.5 GHz					
Result:	Pass	**Value:**	≤ - 40 dBc	**Limit:**	≤ - 20 dBc

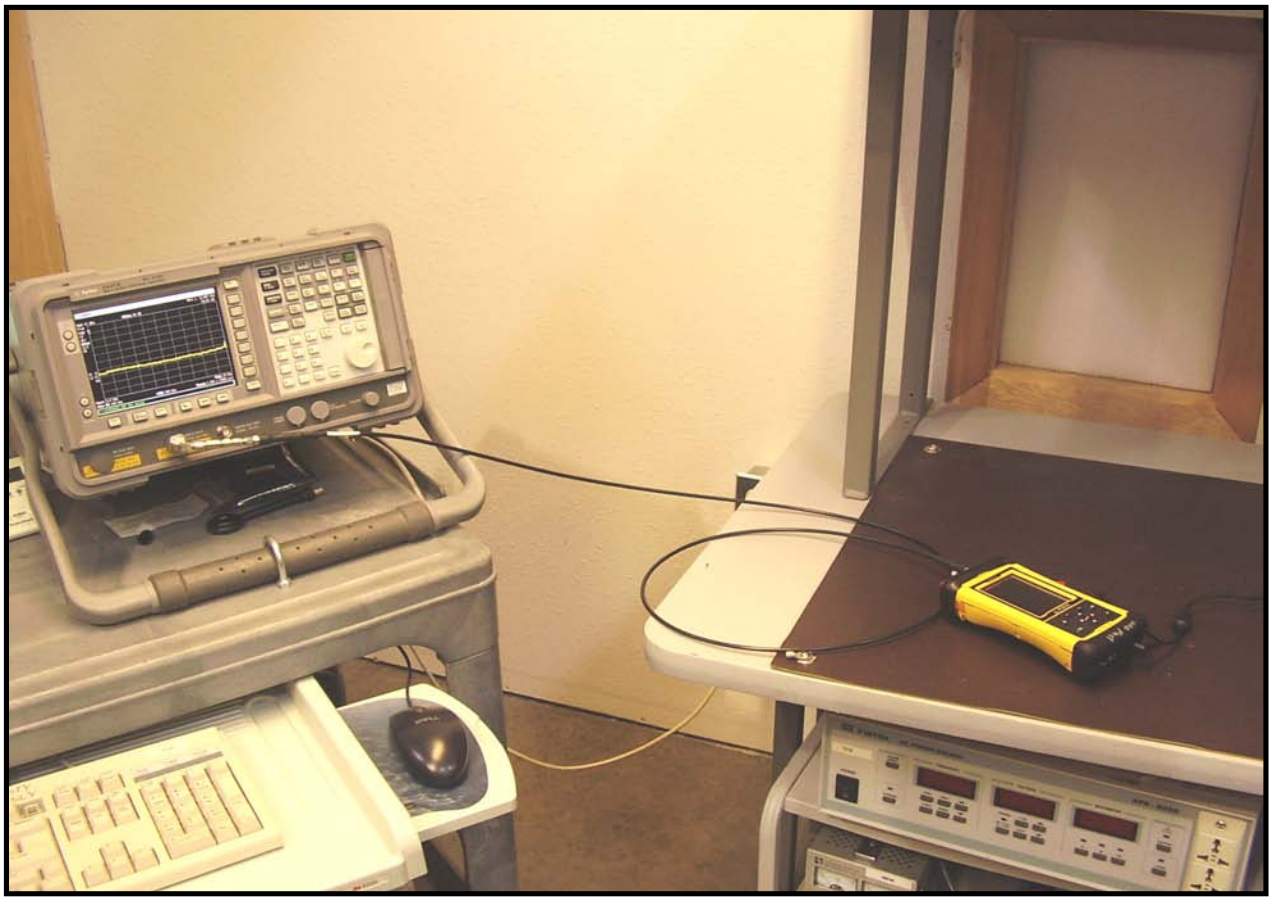


Spurious Conducted Emissions

3DH5, 8DPSK, High channel, 12.4 GHz - 25 GHz					
Result:	Pass	**Value:**	≤ - 40 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	E4446A	AAT	12/7/2006	13

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is 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 using direct sequence modulation. Per the procedure outlined in FCC 97-114, 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 34.8 dB for correction to 3 kHz."

NORTHWEST EMC

POWER SPECTRAL DENSITY

XMit 2007.03.30

EUT:	ST Micro STLC2500C in Eagle			Work Order:	TRPO0034
Serial Number:	Unknown			Date:	06/04/07
Customer:	Tripod Data Systems, Inc.			Temperature:	24°C
Attendees:	None			Humidity:	41%
Project:	None			Barometric Pres.:	29.9
Tested by:	Rod Peloquin	Power:	120VAC/60Hz	Job Site:	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2006	ANSI C63.4:2003 KDB No. 558074

COMMENTS

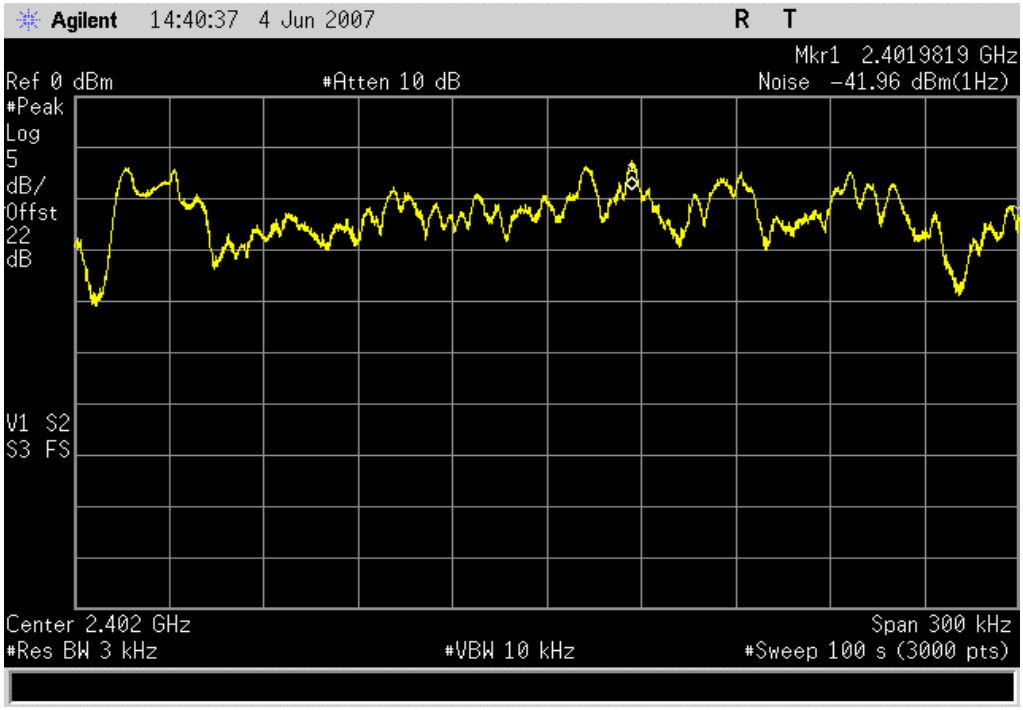
Operating in PRBS9 pattern with modulation called out in data sheets.

DEVIATIONS FROM TEST STANDARD

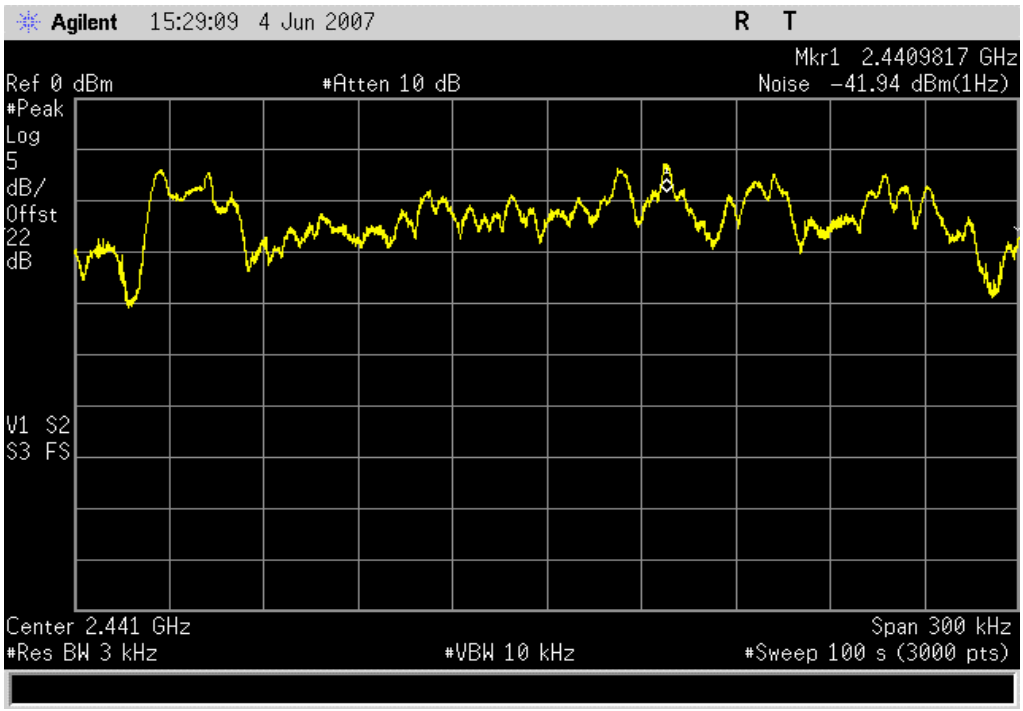
Configuration #	1	Signature

		Value	Limit	Results
DH5, GFSK				
	Low Channel	-7.16 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-7.14 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-7.37 dBm / 3 kHz	8 dBm / 3 kHz	Pass
2DH5, 4-DQPSK				
	Low Channel	-9.17 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-9.14 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-8.93 dBm / 3 kHz	8 dBm / 3 kHz	Pass
3DH5, 8-DPSK				
	Low Channel	-9.76 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel	-9.77 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel	-9.54 dBm / 3 kHz	8 dBm / 3 kHz	Pass

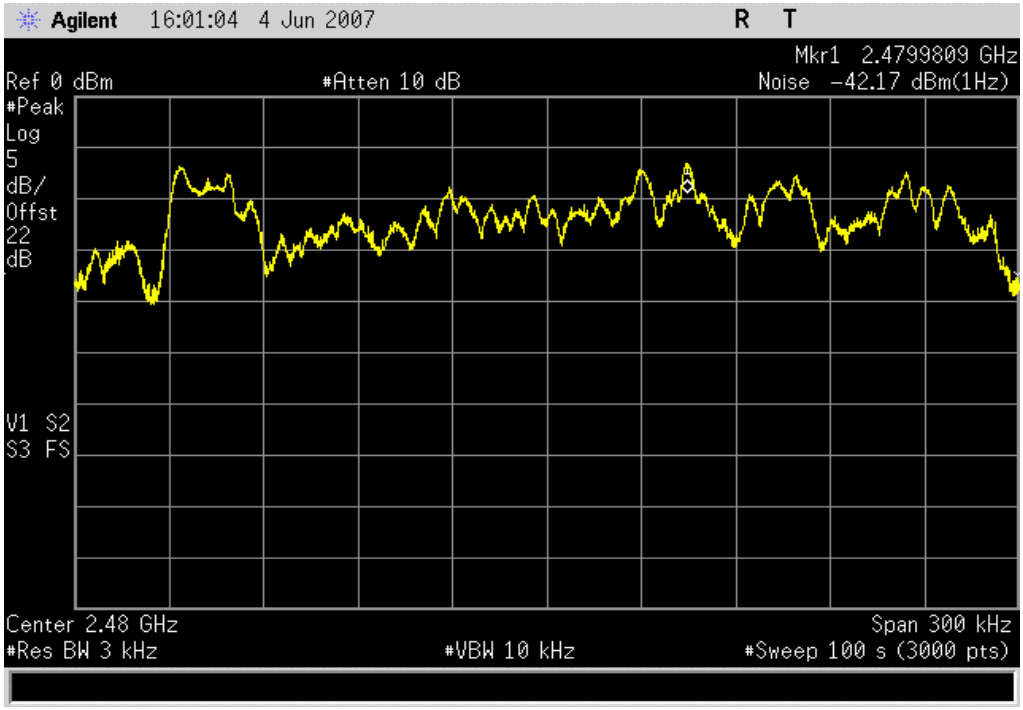
DH5, GFSK, Low Channel					
Result:	Pass	**Value:**	-7.16 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



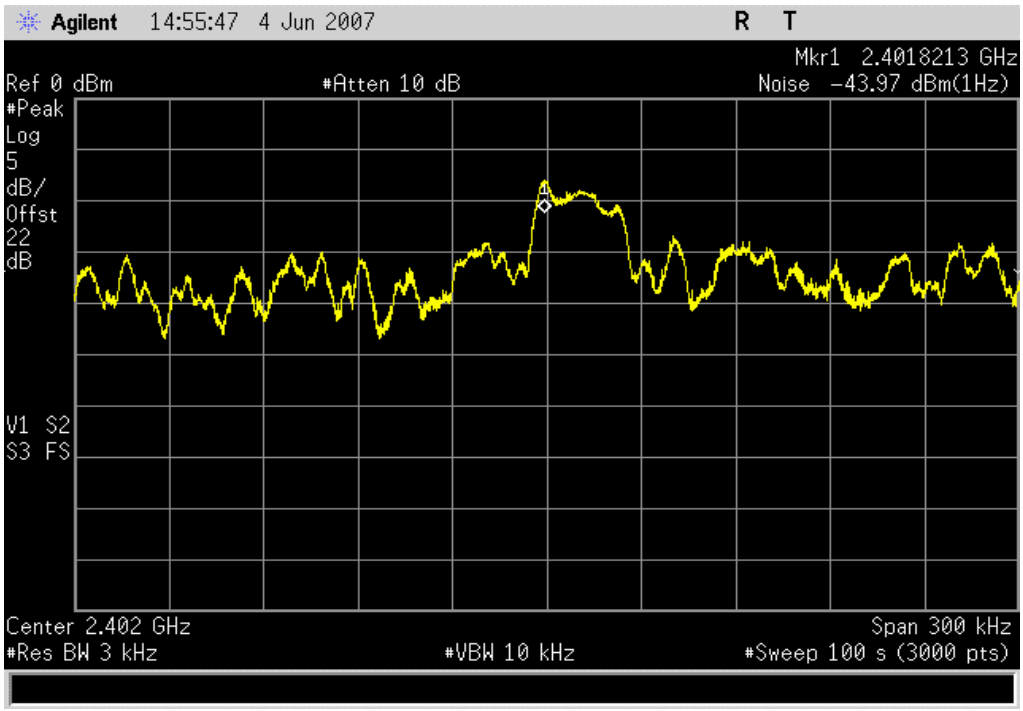
DH5, GFSK, Mid Channel					
Result:	Pass	**Value:**	-7.14 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



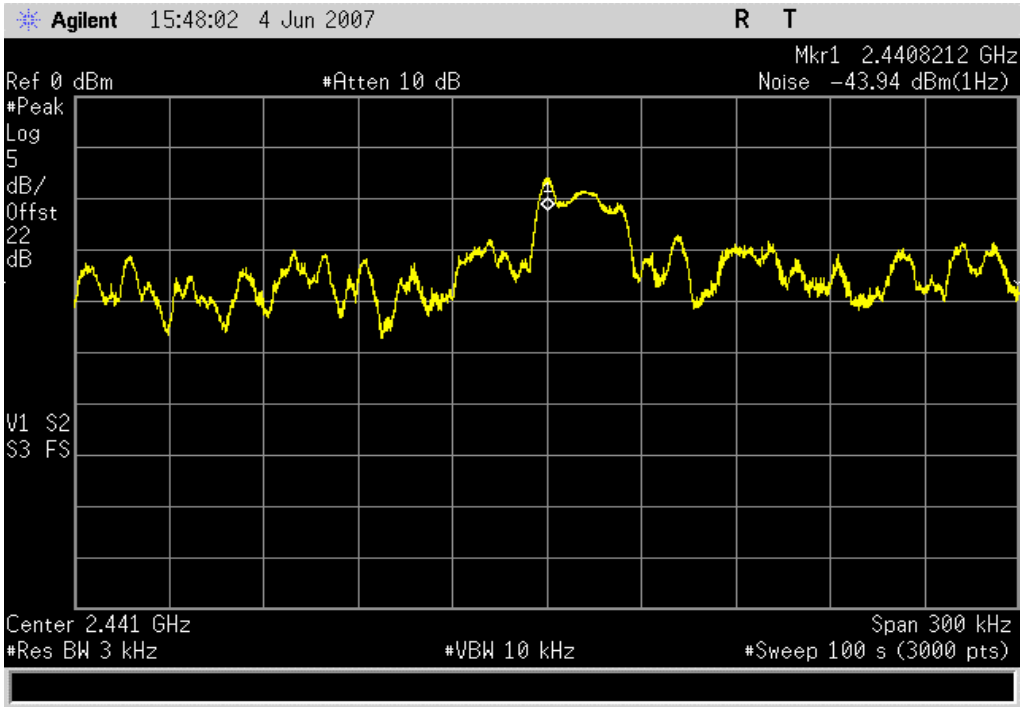
DH5, GFSK, High Channel					
Result:	Pass	**Value:**	-7.37 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



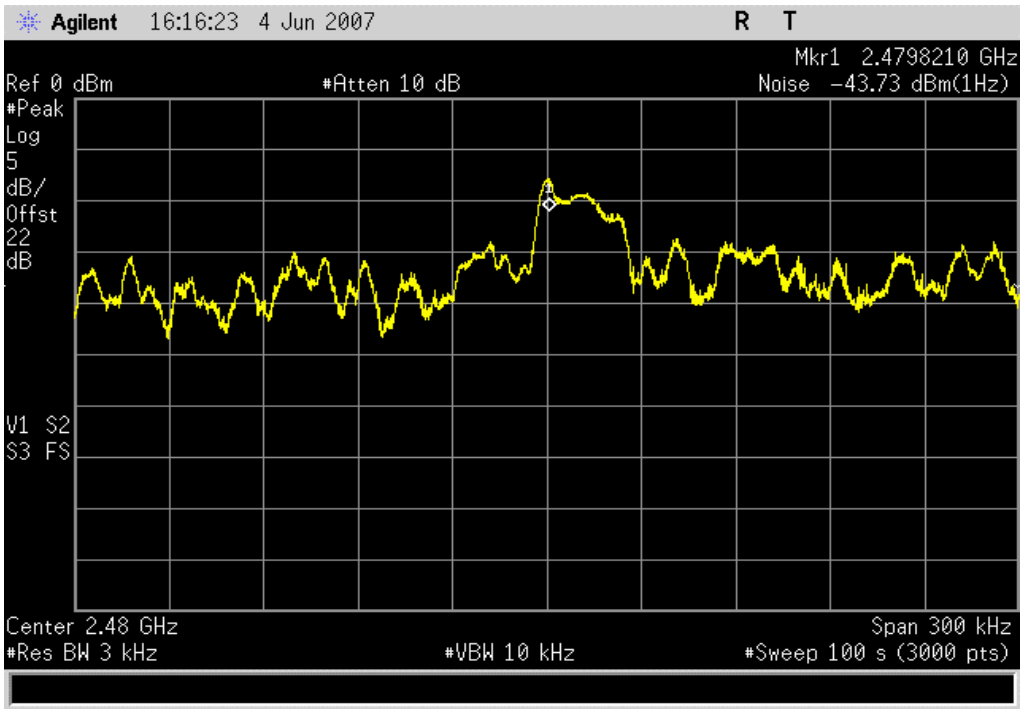
2DH5, 4-DQPSK, Low Channel					
Result:	Pass	**Value:**	-9.17 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



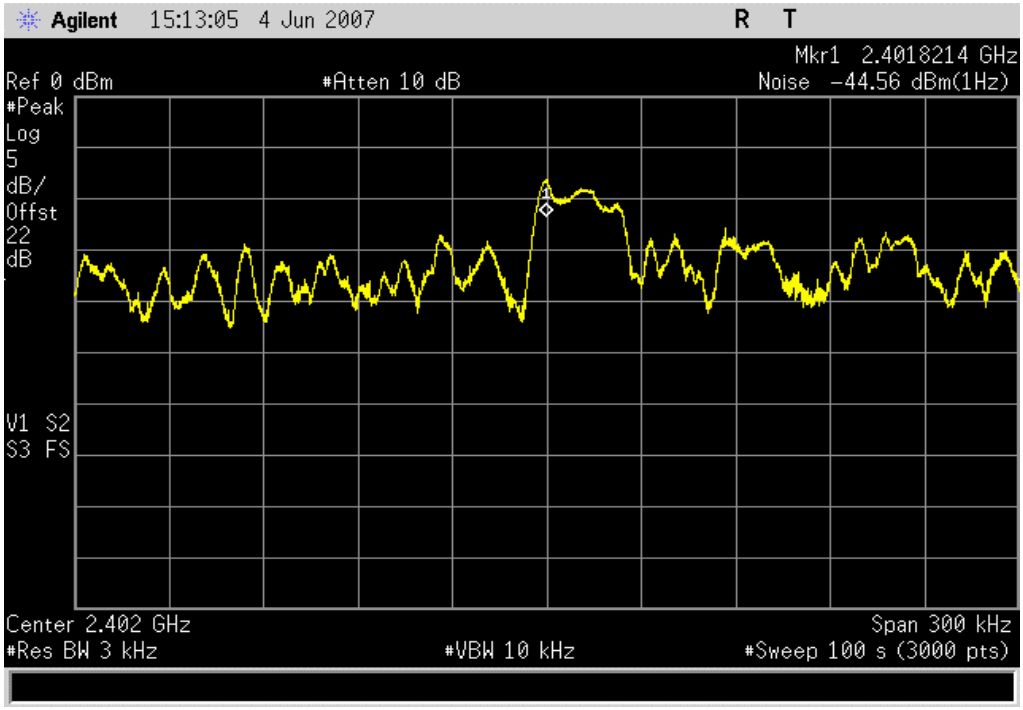
2DH5, 4-DQPSK, Mid Channel					
Result:	Pass	**Value:**	-9.14 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



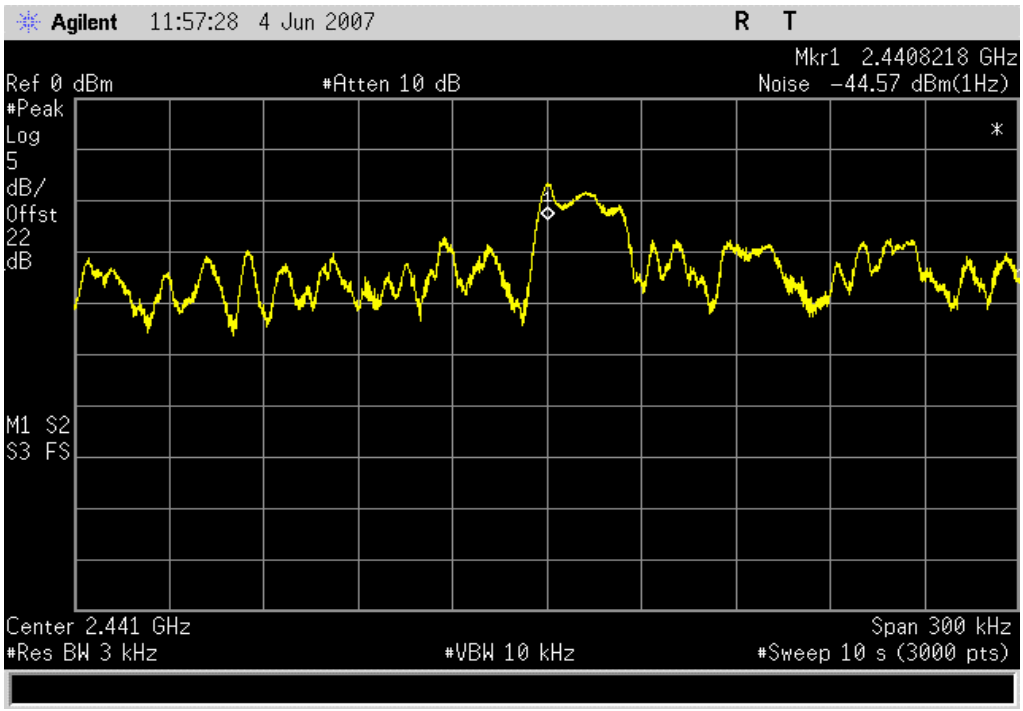
2DH5, 4-DQPSK, High Channel					
Result:	Pass	**Value:**	-8.93 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



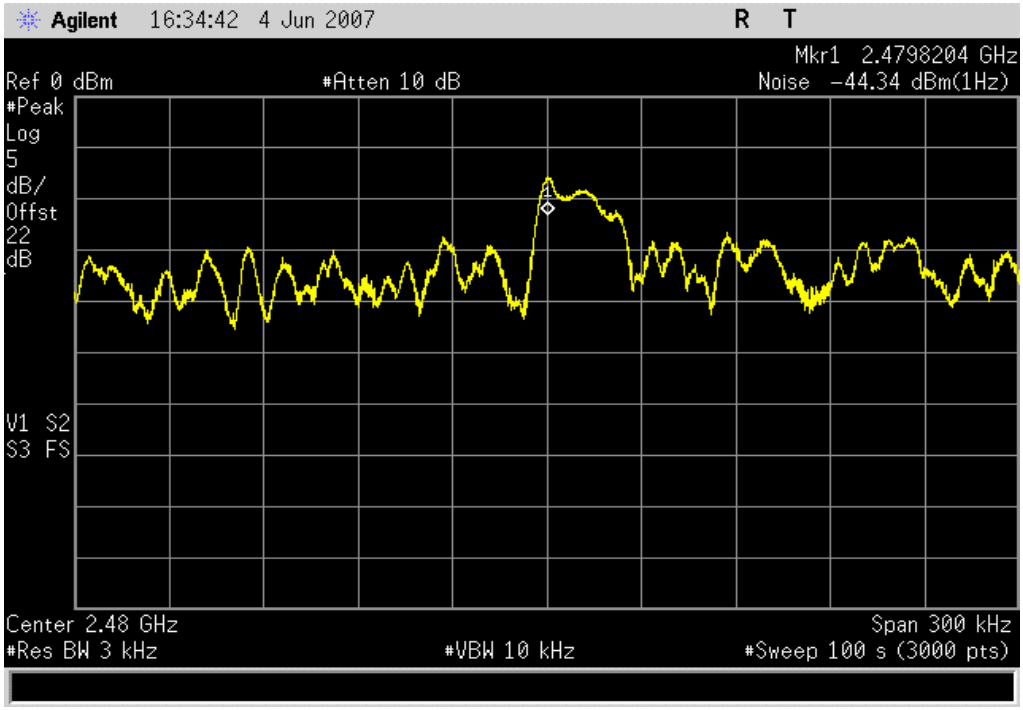
3DH5, 8-DPSK, Low Channel					
Result:	Pass	**Value:**	-9.76 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



3DH5, 8-DPSK, Mid Channel					
Result:	Pass	**Value:**	-9.77 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



3DH5, 8-DPSK, High Channel					
Result:	Pass	**Value:**	-9.54 dBm / 3 kHz	**Limit:**	8 dBm / 3 kHz



POWER SPECTRAL DENSITY

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
Transmit mode, Bluetooth, DH5 modulation
Transmit mode, Bluetooth, 2DH5 modulation
Transmit mode, Bluetooth, 3DH5 modulation

CHANNELS INVESTIGATED
Low Channel, Channel 0, 2402 MHz
Mid Channel, Channel 38, 2440 MHz
High Channel, Channel 78, 2480 MHz

POWER SETTINGS INVESTIGATED
120VAC/60Hz

FREQUENCY RANGE INVESTIGATED			
Start Frequency	30 MHz	Stop Frequency	26 GHz

CLOCKS AND OSCILLATORS
None Provided

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4446A	AAT	12/7/2006	13
High Pass Filter	Micro-Tronics	HPM50111	HFO	12/29/2006	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	12/29/2006	13
Antenna, Biconilog	EMCO	3141	AXE	12/28/2005	24
EV01 cables c,g, h			EVA	12/29/2006	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	5/10/2007	13
Antenna, Horn	EMCO	3115	AHC	8/24/2006	12
EV01 cables g,h,j			EVB	5/10/2007	13
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	5/10/2007	13
Antenna, Horn	EMCO	3160-08	AHK	NCR	0
EV01 Cable D			EVD	3/30/2006	15
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	3/23/2006	17
Antenna, Horn	EMCO	3160-09	AHG	NCR	0
EV01 cables g,h,I			EVF	5/10/2007	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

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test 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 2007.05.07
EMI 2006.12.20

EUT:	ST Micro STLC2500C in Eagle	**Work Order:**	TRPO0034
Serial Number:	Unknown	**Date:**	06/23/07
Customer:	Tripod Data Systems, Inc.	**Temperature:**	25° C
Attendees:	None	**Humidity:**	31%
Project:	None	**Barometric Pres.:**	30.05
Tested by:	Dan Haas	**Power:** 120VAC/60Hz	**Job Site:** EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2006	ANSI C63.4:2003 KDB No. 558074

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

COMMENTS

EUT on its back.

EUT OPERATING MODES

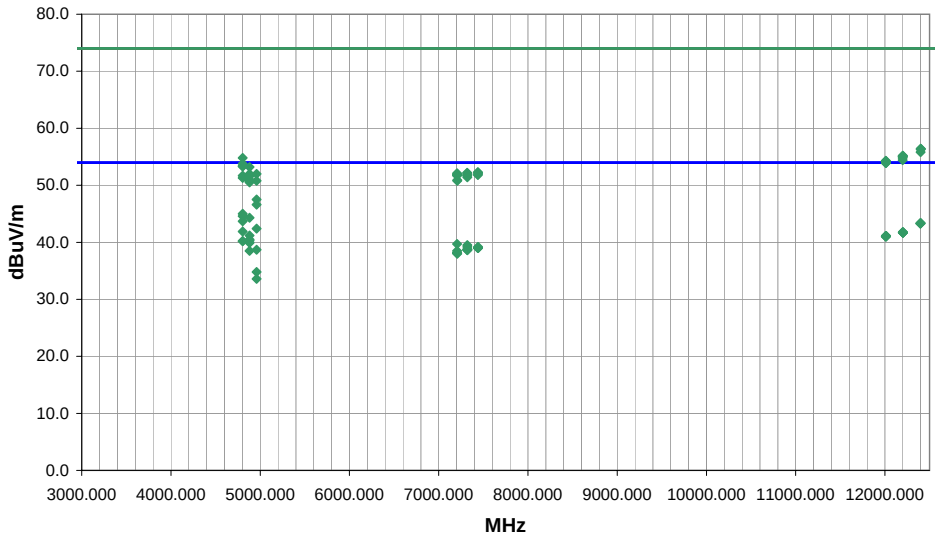
Continuous Tx Bluetooth

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	1
Configuration #	4
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
4803.975	37.6	7.4	230.0	1.6	0.0	0.0	H-Horn	AV	0.0	45.0	54.0	-9.0	Low Channel DH5 data rate.
4803.975	37.2	7.4	180.0	1.0	0.0	0.0	V-Horn	AV	0.0	44.6	54.0	-9.4	Low Channel DH5 data rate.
4880.010	36.6	7.7	177.0	1.0	0.0	0.0	V-Horn	AV	0.0	44.3	54.0	-9.7	Mid Channel DH5 data rate.
4804.010	36.3	7.4	282.0	1.5	0.0	0.0	H-Horn	AV	0.0	43.7	54.0	-10.3	Low Channel 2DH5 data rate.
12399.960	25.4	18.0	95.0	3.4	0.0	0.0	V-Horn	AV	0.0	43.4	54.0	-10.6	High Channel 2DH5 data rate.
12397.460	25.3	18.0	186.0	1.0	0.0	0.0	H-Horn	AV	0.0	43.3	54.0	-10.7	High Channel DH5 data rate.
12398.130	25.3	18.0	300.0	1.0	0.0	0.0	H-Horn	AV	0.0	43.3	54.0	-10.7	High Channel 2DH5 data rate.
12398.470	25.3	18.0	102.0	1.0	0.0	0.0	V-Horn	AV	0.0	43.3	54.0	-10.7	High Channel DH5 data rate.
4960.015	34.4	8.0	197.0	1.0	0.0	0.0	V-Horn	AV	0.0	42.4	54.0	-11.6	High Channel DH5 data rate.
4803.970	34.5	7.4	281.0	1.0	0.0	0.0	H-Horn	AV	0.0	41.9	54.0	-12.1	Low Channel 3DH5 data rate.
12200.180	24.9	16.9	57.0	1.7	0.0	0.0	H-Horn	AV	0.0	41.8	54.0	-12.2	Mid Channel DH5 data rate.
12200.480	24.8	16.9	17.0	1.0	0.0	0.0	V-Horn	AV	0.0	41.7	54.0	-12.3	Mid Channel DH5 data rate.
12200.640	24.8	16.9	239.0	1.0	0.0	0.0	V-Horn	AV	0.0	41.7	54.0	-12.3	Mid Channel 2DH5 data rate.
12201.780	24.8	16.9	113.0	1.0	0.0	0.0	H-Horn	AV	0.0	41.7	54.0	-12.3	Mid Channel 3DH5 data rate.
12202.030	24.8	16.9	236.0	1.0	0.0	0.0	H-Horn	AV	0.0	41.7	54.0	-12.3	Mid Channel 2DH5 data rate.
12202.710	24.8	16.9	199.0	1.0	0.0	0.0	V-Horn	AV	0.0	41.7	54.0	-12.3	Mid Channel 3DH5 data rate.
4880.005	33.5	7.7	233.0	1.7	0.0	0.0	H-Horn	AV	0.0	41.2	54.0	-12.8	Mid Channel DH5 data rate.
12010.130	25.2	15.9	332.0	1.0	0.0	0.0	H-Horn	AV	0.0	41.1	54.0	-12.9	Low Channel 3DH5 data rate.
12010.470	25.2	15.9	177.0	1.0	0.0	0.0	H-Horn	AV	0.0	41.1	54.0	-12.9	Low Channel DH5 data rate.
12011.670	25.2	15.9	175.0	1.0	0.0	0.0	H-Horn	AV	0.0	41.1	54.0	-12.9	Low Channel 2DH5 data rate.

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS

PSA 2007.05.07
EMI 2006.12.20

EUT:	ST Micro STLC2500C in Eagle	Work Order:	TRPO0034
Serial Number:	Unknown	Date:	06/25/07
Customer:	Tripod Data Systems, Inc.	Temperature:	25° C
Attendees:	None	Humidity:	31%
Project:	None	Barometric Pres.:	30.05
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2006	ANSI C63.4:2003 KDB No. 558074

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

COMMENTS

EUT OPERATING MODES

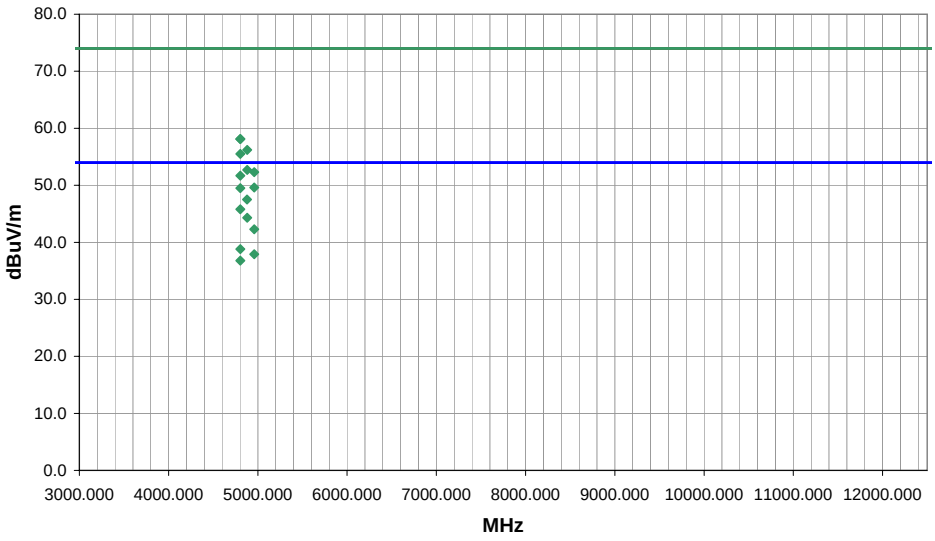
Transmit mode, Bluetooth

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	6
Configuration #	4
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
4804.010	42.1	7.4	51.0	1.0	3.0	0.0	V-Horn	AV	0.0	49.5	54.0	-4.5	Low channel, DH5, EUT vertical
4879.715	39.8	7.7	36.0	1.1	3.0	0.0	V-Horn	AV	0.0	47.5	54.0	-6.5	Mid channel, DH5, EUT vertical
4804.005	38.4	7.4	31.0	1.1	3.0	0.0	H-Horn	AV	0.0	45.8	54.0	-8.2	Low channel, DH5, EUT vertical
4880.025	36.6	7.7	30.0	1.1	3.0	0.0	H-Horn	AV	0.0	44.3	54.0	-9.7	Mid channel, DH5, EUT vertical
4960.015	34.3	8.0	108.0	1.6	3.0	0.0	V-Horn	AV	0.0	42.3	54.0	-11.7	High channel, DH5, EUT vertical
4803.922	31.4	7.4	308.0	1.2	3.0	0.0	H-Horn	AV	0.0	38.8	54.0	-15.2	Low channel, DH5, EUT on side
4803.758	50.7	7.4	31.0	1.1	3.0	0.0	H-Horn	PK	0.0	58.1	74.0	-15.9	Low channel, DH5, EUT vertical
4804.112	50.7	7.4	51.0	1.0	3.0	0.0	V-Horn	PK	0.0	58.1	74.0	-15.9	Low channel, DH5, EUT vertical
4960.008	29.9	8.0	320.0	1.2	3.0	0.0	H-Horn	AV	0.0	37.9	54.0	-16.1	High channel, DH5, EUT vertical
4803.950	29.4	7.4	34.0	1.0	3.0	0.0	V-Horn	AV	0.0	36.8	54.0	-17.2	Low channel, DH5, EUT on side
4879.848	48.5	7.7	36.0	1.1	3.0	0.0	V-Horn	PK	0.0	56.2	74.0	-17.8	Mid channel, DH5, EUT vertical
4803.858	48.1	7.4	308.0	1.2	3.0	0.0	H-Horn	PK	0.0	55.5	74.0	-18.5	Low channel, DH5, EUT on side
4880.112	45.0	7.7	30.0	1.1	3.0	0.0	H-Horn	PK	0.0	52.7	74.0	-21.3	Mid channel, DH5, EUT vertical
4960.150	44.3	8.0	108.0	1.6	3.0	0.0	V-Horn	PK	0.0	52.3	74.0	-21.7	High channel, DH5, EUT vertical
4803.472	44.3	7.4	34.0	1.0	3.0	0.0	V-Horn	PK	0.0	51.7	74.0	-22.3	Low channel, DH5, EUT on side
4959.808	41.6	8.0	320.0	1.2	3.0	0.0	H-Horn	PK	0.0	49.6	74.0	-24.4	High channel, DH5, EUT vertical

NORTHWEST EMC

SPURIOUS RADIATED EMISSIONS

PSA 2007.05.07
EMI 2006.12.20

EUT:	ST Micro STLC2500C in Eagle	Work Order:	TRPO0034
Serial Number:	Unknown	Date:	06/25/07
Customer:	Tripod Data Systems, Inc.	Temperature:	25° C
Attendees:	None	Humidity:	31%
Project:	None	Barometric Pres.:	30.05
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS	Test Method
FCC 15.247 (DTS):2006	ANSI C63.4:2003 KDB No. 558074

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

COMMENTS

EUT OPERATING MODES

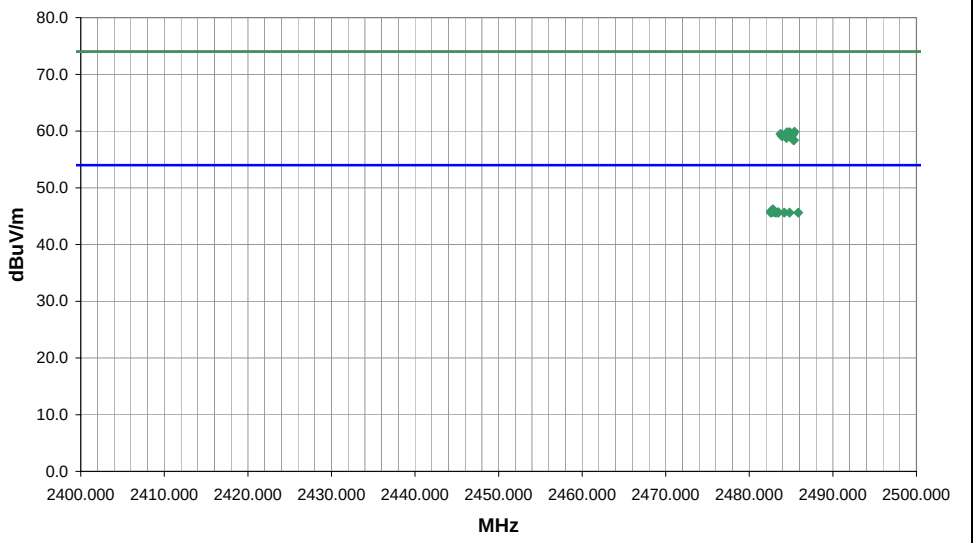
Transmit mode, Bluetooth, High channel

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	7
Configuration #	4
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
2482.827	25.8	0.4	255.0	1.2	3.0	20.0	H-Horn	AV	0.0	46.2	54.0	-7.8	2DH5 Modulation, EUT vertical
2482.607	25.5	0.4	255.0	1.2	3.0	20.0	H-Horn	AV	0.0	45.9	54.0	-8.1	3DH5 Modulation, EUT horizontal
2482.617	25.3	0.4	281.0	1.0	3.0	20.0	H-Horn	AV	0.0	45.7	54.0	-8.3	2DH5 Modulation, EUT horizontal
2482.777	25.3	0.4	225.0	1.0	3.0	20.0	V-Horn	AV	0.0	45.7	54.0	-8.3	3DH5 Modulation, EUT vertical
2483.027	25.3	0.4	127.0	1.0	3.0	20.0	V-Horn	AV	0.0	45.7	54.0	-8.3	DH5 Modulation, EUT horizontal
2483.467	25.3	0.4	111.0	1.0	3.0	20.0	V-Horn	AV	0.0	45.7	54.0	-8.3	2DH5 Modulation, EUT horizontal
2482.583	25.2	0.4	85.0	1.2	3.0	20.0	H-Horn	AV	0.0	45.6	54.0	-8.4	3DH5 Modulation, EUT vertical
2483.173	25.2	0.4	10.0	1.0	3.0	20.0	V-Horn	AV	0.0	45.6	54.0	-8.4	3DH5 Modulation, EUT horizontal
2483.453	25.2	0.4	43.0	1.0	3.0	20.0	V-Horn	AV	0.0	45.6	54.0	-8.4	2DH5 Modulation, EUT vertical
2484.180	25.2	0.4	157.0	1.0	3.0	20.0	H-Horn	AV	0.0	45.6	54.0	-8.4	DH5 Modulation, EUT horizontal
2484.817	25.2	0.4	193.0	1.2	3.0	20.0	H-Horn	AV	0.0	45.6	54.0	-8.4	DH5 Modulation, EUT vertical
2485.847	25.2	0.4	135.0	1.1	3.0	20.0	V-Horn	AV	0.0	45.6	54.0	-8.4	DH5 Modulation, EUT vertical
2485.410	39.5	0.4	157.0	1.0	3.0	20.0	H-Horn	PK	0.0	59.9	74.0	-14.1	DH5 Modulation, EUT horizontal
2484.530	39.4	0.4	135.0	1.1	3.0	20.0	V-Horn	PK	0.0	59.8	74.0	-14.2	DH5 Modulation, EUT vertical
2484.837	39.4	0.4	255.0	1.2	3.0	20.0	H-Horn	PK	0.0	59.8	74.0	-14.2	3DH5 Modulation, EUT horizontal
2483.727	39.1	0.4	255.0	1.2	3.0	20.0	H-Horn	PK	0.0	59.5	74.0	-14.5	2DH5 Modulation, EUT vertical
2485.270	39.1	0.4	193.0	1.2	3.0	20.0	H-Horn	PK	0.0	59.5	74.0	-14.5	DH5 Modulation, EUT vertical
2483.920	39.0	0.4	225.0	1.0	3.0	20.0	V-Horn	PK	0.0	59.4	74.0	-14.6	3DH5 Modulation, EUT vertical
2485.133	38.8	0.4	43.0	1.0	3.0	20.0	V-Horn	PK	0.0	59.2	74.0	-14.8	2DH5 Modulation, EUT vertical
2483.910	38.7	0.4	10.0	1.0	3.0	20.0	V-Horn	PK	0.0	59.1	74.0	-14.9	3DH5 Modulation, EUT horizontal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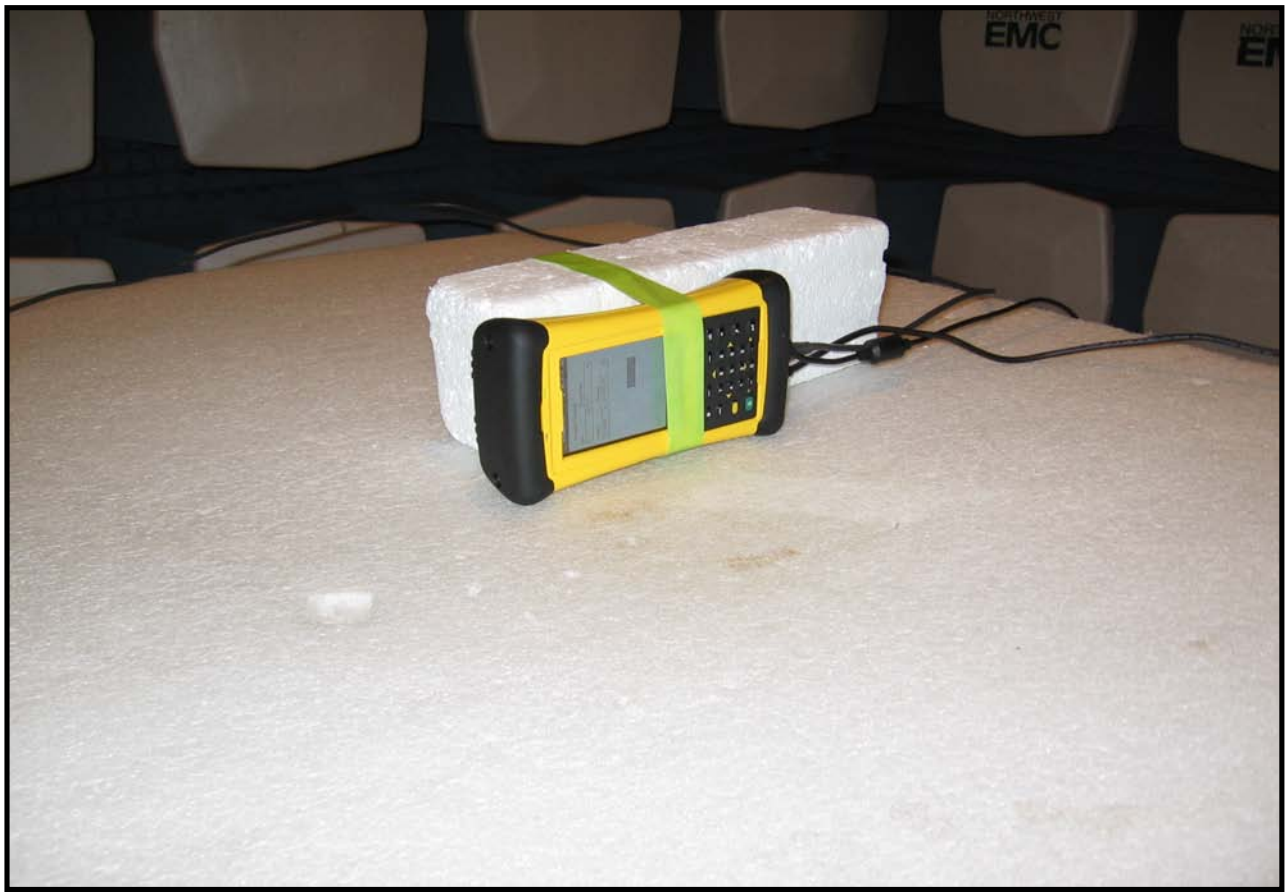


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AC POWER LINE CONDUCTED EMISSIONS

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.

MODES OF OPERATION
Transmit, Blootooth, DH5, High = 2480MHz
Transmit, Blootooth, DH5, Mid = 2440MHz
Transmit, Blootooth, DH5, Low = 2402MHz

POWER SETTINGS INVESTIGATED
120V/60Hz

SAMPLE CALCULATIONS
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIQ	12/20/2006	13
EV07 cable d			EVG	4/17/2007	13
Attenuator	Tektronix	011-0059-02	ATC	12/27/2006	13
High Pass Filter	TTE	H97-100K-50-720B	HFX	8/22/2006	13
Receiver	Rohde & Schwartz	ESCI	ARG	12/7/2006	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

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is 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 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50Ω.

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AC POWER LINE CONDUCTED EMISSIONS

Version 2007.1.29
PSA-ESCI 2007.05.07

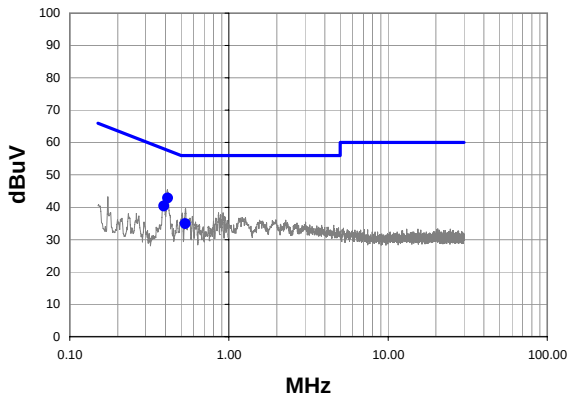
Work Order:	TRPO0034	**Date:**	06/28/07		
Project:	None	**Temperature:**	23° C		
Job Site:	EV07	**Humidity:**	40		
Serial Number:	Unknown	**Barometric Pres.:**	29.98	**Tested by:**	Kyle Holgate

EUT:	ST Micro STLC2500C in Eagle
Configuration:	4 - Spurious Radiated Emissions - Bluetooth
Customer:	Tripod Data Systems, Inc.
Attendees:	None
EUT Power:	120V/60Hz
Operating Mode:	Transmit, Blootooth, DH5, Low = 2402MHz
Deviations:	No deviations.
Comments:	None

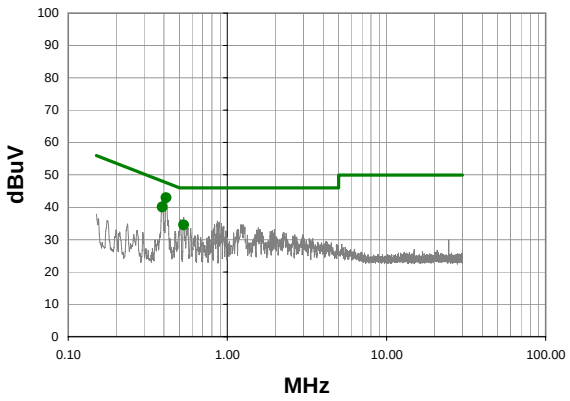
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	27	**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)
0.412	22.0	0.9	42.9	57.6	-14.7
0.390	19.5	0.9	40.4	58.1	-17.7
0.531	14.1	0.8	34.9	56.0	-21.1

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.412	22.1	0.9	43.0	47.6	-4.6
0.390	19.2	0.9	40.1	48.1	-8.0
0.531	13.7	0.8	34.5	46.0	-11.5

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AC POWER LINE CONDUCTED EMISSIONS

Version 2007.1.29
PSA-ESCI 2007.05.07

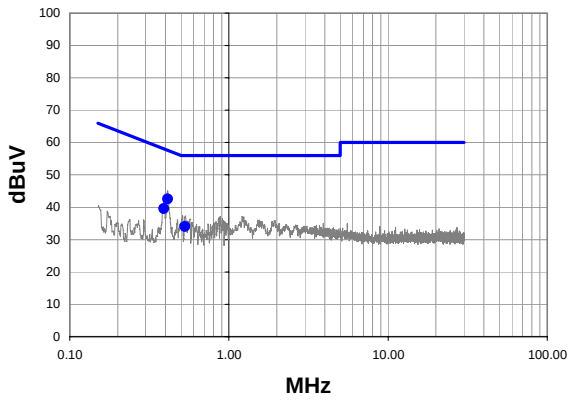
Work Order:	TRPO0034	**Date:**	06/28/07		
Project:	None	**Temperature:**	23° C		
Job Site:	EV07	**Humidity:**	40		
Serial Number:	Unknown	**Barometric Pres.:**	29.98	**Tested by:**	Kyle Holgate

EUT:	ST Micro STLC2500C in Eagle
Configuration:	4 - Spurious Radiated Emissions - Bluetooth
Customer:	Tripod Data Systems, Inc.
Attendees:	None
EUT Power:	120V/60Hz
Operating Mode:	Transmit, Blootooth, DH5, Low = 2402MHz
Deviations:	No deviations.
Comments:	None

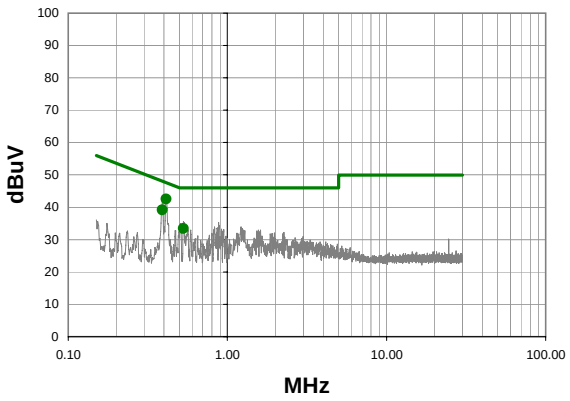
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	28	**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)
0.412	21.7	0.9	42.6	57.6	-15.0
0.390	18.7	0.9	39.6	58.1	-18.5
0.529	13.2	0.8	34.0	56.0	-22.0

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.412	21.7	0.9	42.6	47.6	-5.0
0.390	18.3	0.9	39.2	48.1	-8.9
0.529	12.6	0.8	33.4	46.0	-12.6

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AC POWER LINE CONDUCTED EMISSIONS

Version 2007.1.29
PSA-ESCI 2007.05.07

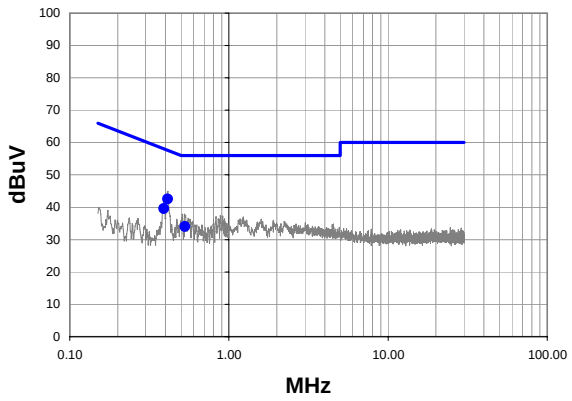
Work Order:	TRPO0034	**Date:**	06/28/07		
Project:	None	**Temperature:**	23° C		
Job Site:	EV07	**Humidity:**	40		
Serial Number:	Unknown	**Barometric Pres.:**	29.98	**Tested by:**	Kyle Holgate

EUT:	ST Micro STLC2500C in Eagle
Configuration:	4 - Spurious Radiated Emissions - Bluetooth
Customer:	Tripod Data Systems, Inc.
Attendees:	None
EUT Power:	120V/60Hz
Operating Mode:	Transmit, Blootooth, DH5, Mid = 2440MHz
Deviations:	No deviations.
Comments:	None

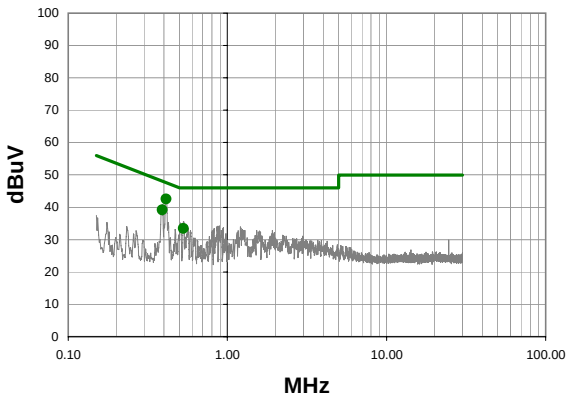
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	29	**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)
0.412	21.7	0.9	42.6	57.6	-15.0
0.390	18.7	0.9	39.6	58.1	-18.5
0.529	13.2	0.8	34.0	56.0	-22.0

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.412	21.7	0.9	42.6	47.6	-5.0
0.390	18.3	0.9	39.2	48.1	-8.9
0.529	12.6	0.8	33.4	46.0	-12.6

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AC POWER LINE CONDUCTED EMISSIONS

Version 2007.1.29
PSA-ESCI 2007.05.07

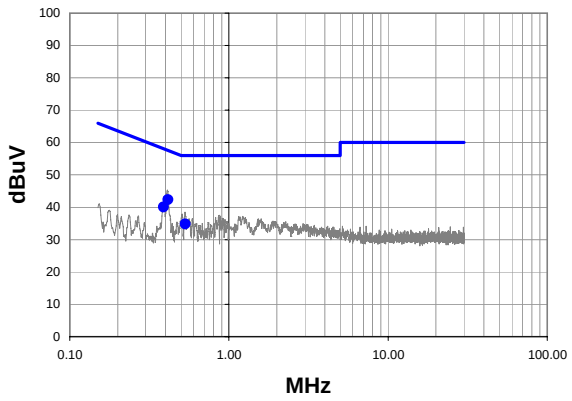
Work Order:	TRPO0034	**Date:**	06/28/07		
Project:	None	**Temperature:**	23° C		
Job Site:	EV07	**Humidity:**	40		
Serial Number:	Unknown	**Barometric Pres.:**	29.98	**Tested by:**	Kyle Holgate

EUT:	ST Micro STLC2500C in Eagle
Configuration:	4 - Spurious Radiated Emissions - Bluetooth
Customer:	Tripod Data Systems, Inc.
Attendees:	None
EUT Power:	120V/60Hz
Operating Mode:	Transmit, Blootooth, DH5, Mid = 2440MHz
Deviations:	No deviations.
Comments:	None

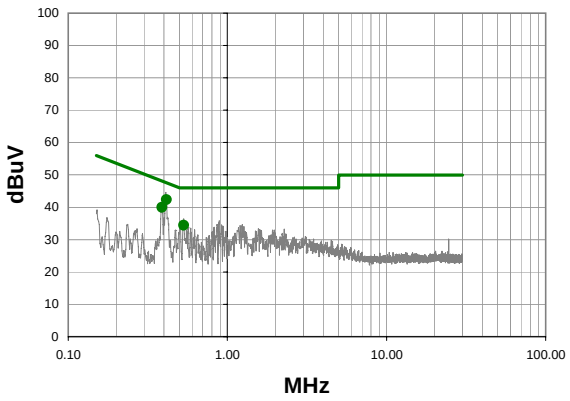
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	30	**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)
0.414	21.5	0.9	42.4	57.6	-15.2
0.388	19.2	0.9	40.1	58.1	-18.0
0.531	14.0	0.8	34.8	56.0	-21.2

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.414	21.5	0.9	42.4	47.6	-5.2
0.388	19.1	0.9	40.0	48.1	-8.1
0.531	13.6	0.8	34.4	46.0	-11.6

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AC POWER LINE CONDUCTED EMISSIONS

Version 2007.1.29
PSA-ESCI 2007.05.07

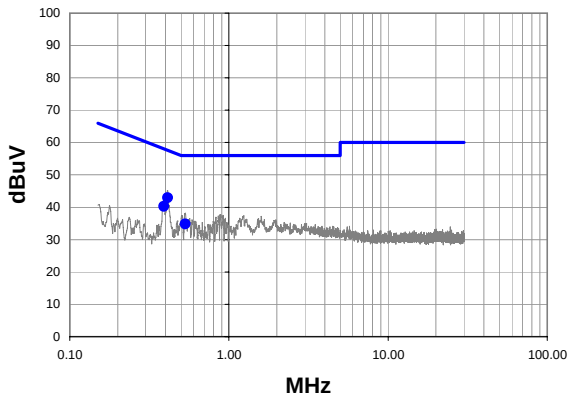
Work Order:	TRPO0034	**Date:**	06/28/07		
Project:	None	**Temperature:**	23° C		
Job Site:	EV07	**Humidity:**	40		
Serial Number:	Unknown	**Barometric Pres.:**	29.98	**Tested by:**	Kyle Holgate

EUT:	ST Micro STLC2500C in Eagle
Configuration:	4 - Spurious Radiated Emissions - Bluetooth
Customer:	Tripod Data Systems, Inc.
Attendees:	None
EUT Power:	120V/60Hz
Operating Mode:	Transmit, Blootooth, DH5, High = 2480MHz
Deviations:	No deviations.
Comments:	None

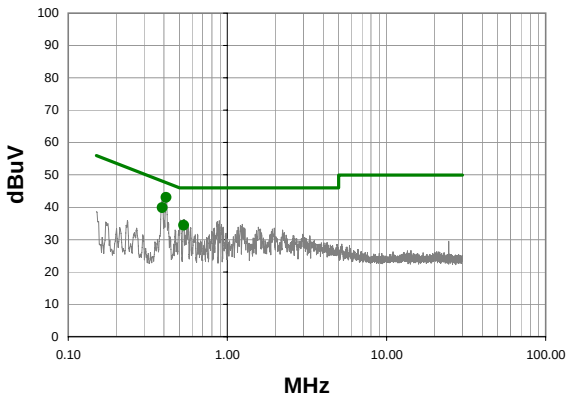
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	31	**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)
0.412	22.1	0.9	43.0	57.6	-14.6
0.390	19.4	0.9	40.3	58.1	-17.8
0.531	14.0	0.8	34.8	56.0	-21.2

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.412	22.2	0.9	43.1	47.6	-4.5
0.390	19.0	0.9	39.9	48.1	-8.2
0.531	13.6	0.8	34.4	46.0	-11.6

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AC POWER LINE CONDUCTED EMISSIONS

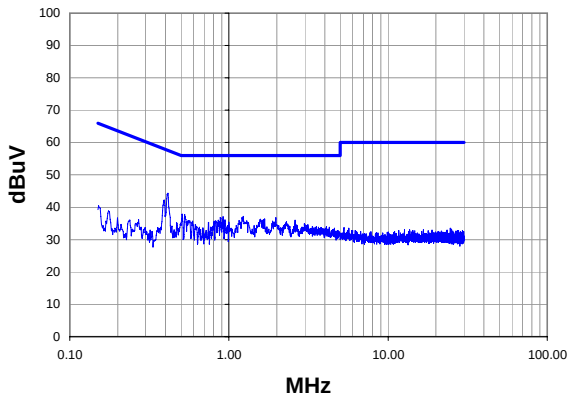
Version 2007.1.29
PSA-ESCI 2007.05.07

Work Order:	TRPO0034	**Date:**	06/28/07	
Project:	None	**Temperature:**	23° C	
Job Site:	EV07	**Humidity:**	40	
Serial Number:	Unknown	**Barometric Pres.:**	29.98	**Tested by:** Kyle Holgate
EUT:	ST Micro STLC2500C in Eagle			
Configuration:	4 - Spurious Radiated Emissions - Bluetooth			
Customer:	Tripod Data Systems, Inc.			
Attendees:	None			
EUT Power:	120V/60Hz			
Operating Mode:	Transmit, Blootooth, DH5, High = 2480MHz			
Deviations:	No deviations.			
Comments:	None			

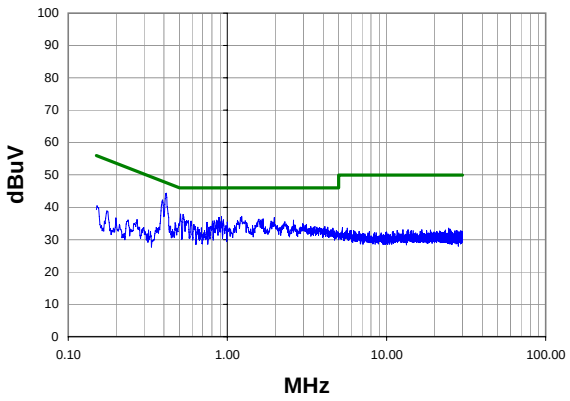
Test Specifications	**Test Method**
FCC 15.207:2006	ANSI C63.4:2003

Run #	32	**Line:**	High Line	**Ext. Attenuation:**	20	**Results**	Pass

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit

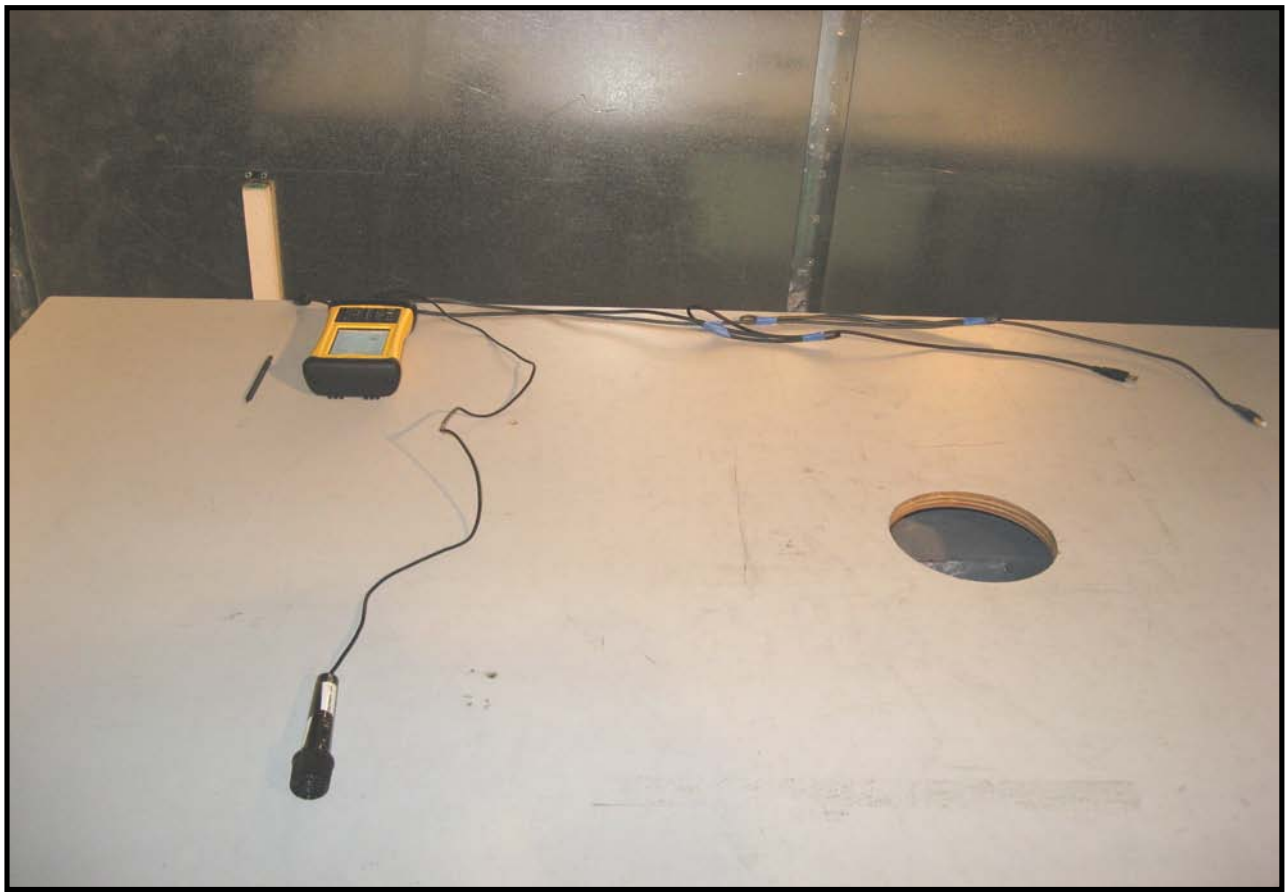


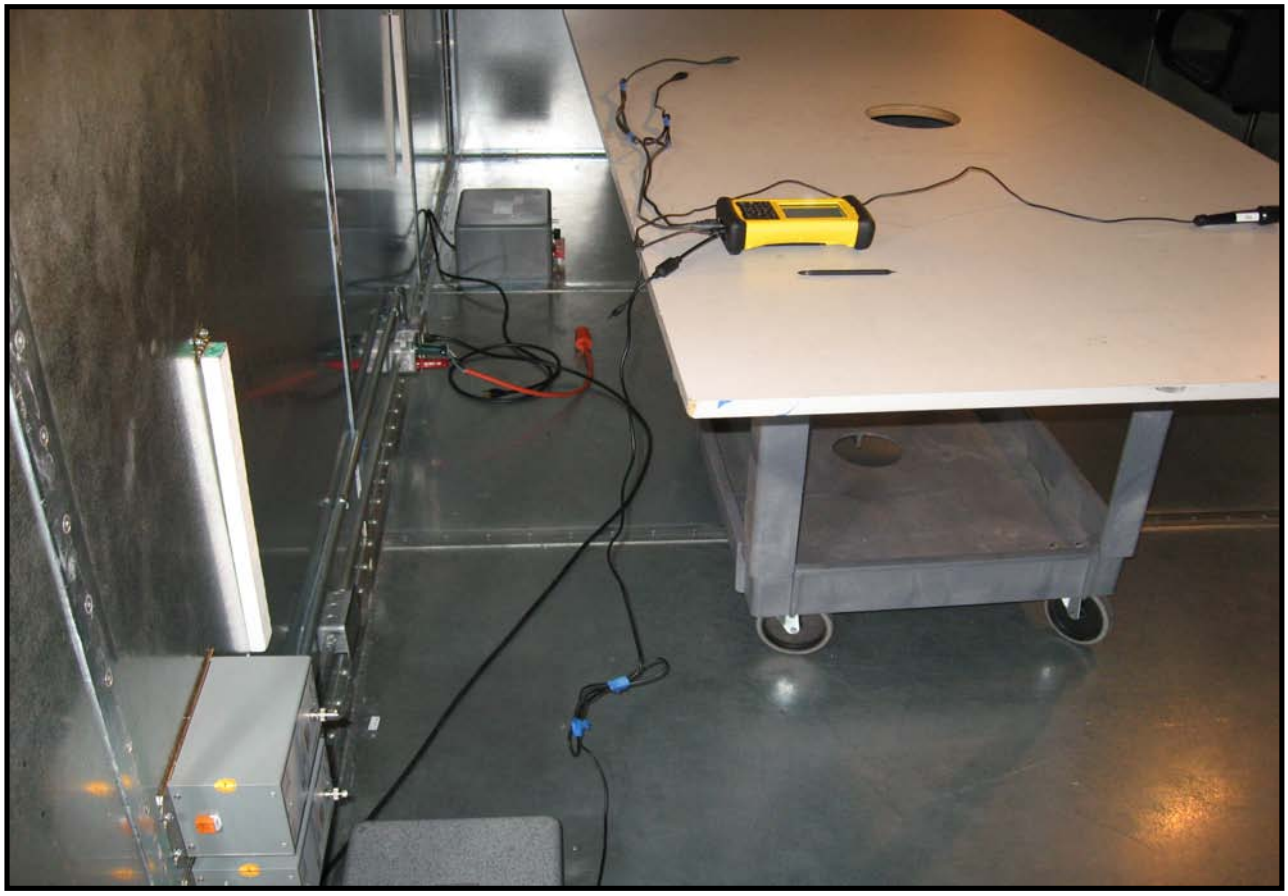
Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.412	23.4	0.9	44.3	57.6	-13.3
0.391	21.4	0.9	42.3	58.0	-15.8
0.509	17.1	0.8	37.9	56.0	-18.1
0.527	17.0	0.8	37.8	56.0	-18.2
1.232	16.7	0.5	37.2	56.0	-18.8
0.918	16.5	0.6	37.1	56.0	-18.9
1.968	16.3	0.5	36.8	56.0	-19.2
0.883	16.2	0.6	36.8	56.0	-19.2
1.680	15.9	0.5	36.4	56.0	-19.6
0.944	15.6	0.5	36.1	56.0	-19.9
2.600	15.5	0.5	36.0	56.0	-20.0
0.857	15.4	0.6	36.0	56.0	-20.0
0.555	15.1	0.8	35.9	56.0	-20.1
0.827	15.2	0.6	35.8	56.0	-20.2
0.592	15.0	0.8	35.8	56.0	-20.2
0.806	15.1	0.6	35.7	56.0	-20.3
2.296	15.0	0.5	35.5	56.0	-20.5
1.000	14.9	0.5	35.4	56.0	-20.6
0.743	14.7	0.7	35.4	56.0	-20.6
1.320	14.8	0.5	35.3	56.0	-20.7

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.412	23.4	0.9	44.3	47.6	-3.3
0.391	21.4	0.9	42.3	48.0	-5.8
0.509	17.1	0.8	37.9	46.0	-8.1
0.527	17.0	0.8	37.8	46.0	-8.2
1.232	16.7	0.5	37.2	46.0	-8.8
0.918	16.5	0.6	37.1	46.0	-8.9
1.968	16.3	0.5	36.8	46.0	-9.2
0.883	16.2	0.6	36.8	46.0	-9.2
1.680	15.9	0.5	36.4	46.0	-9.6
0.944	15.6	0.5	36.1	46.0	-9.9
2.600	15.5	0.5	36.0	46.0	-10.0
0.857	15.4	0.6	36.0	46.0	-10.0
0.555	15.1	0.8	35.9	46.0	-10.1
0.827	15.2	0.6	35.8	46.0	-10.2
0.592	15.0	0.8	35.8	46.0	-10.2
0.806	15.1	0.6	35.7	46.0	-10.3
2.296	15.0	0.5	35.5	46.0	-10.5
1.000	14.9	0.5	35.4	46.0	-10.6
0.743	14.7	0.7	35.4	46.0	-10.6
1.320	14.8	0.5	35.3	46.0	-10.7





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.