

Lightspeed Technologies, Inc.

AC-CAVWC

Report No. LITS0005.5

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: May 28, 2010
Lightspeed Technologies, Inc.
Model: AC-CAVWC

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Occupied Bandwidth	FCC 15.247 (DTS):2009	ANSI C63.10:2009	Pass
Output Power	FCC 15.247 (DTS):2009	ANSI C63.10:2009	Pass
Band Edge Compliance	FCC 15.247 (DTS):2009	ANSI C63.10:2009	Pass
Spurious Conducted Emissions	FCC 15.247 (DTS):2009	ANSI C63.10:2009	Pass
Power Spectral Density	FCC 15.247 (DTS):2009	ANSI C63.10:2009	Pass
Spurious Radiated Emissions	FCC 15.247 (DTS):2009	ANSI C63.10:2009	Pass
Pulse Duration	FCC 15.247 (DTS):2009	ANSI C63.10:2009	Pass

Modifications made to the product

See the Modifications section of this report

Test Facility

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

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

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

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-2).

Approved By:

Don Facteau, IS Manager



NVLAP Lab Code: 200630-0

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

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

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

FCC

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



NVLAP

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



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

Industry Canada

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



CAB

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



NEMKO

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



Australia/New Zealand

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



VCCI

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



BSMI

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



GOST

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



KCC

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



VIETNAM

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



SCOPE

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

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



Northwest EMC Locations



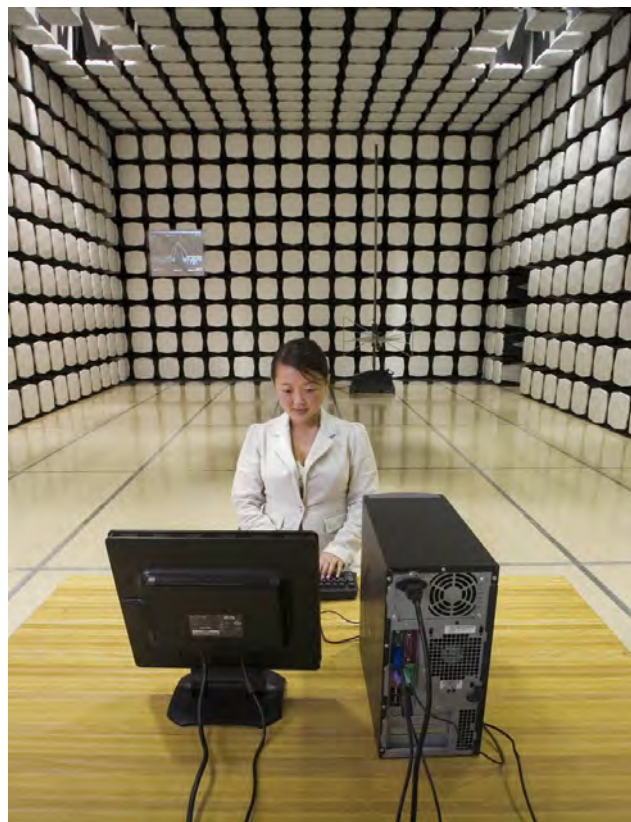
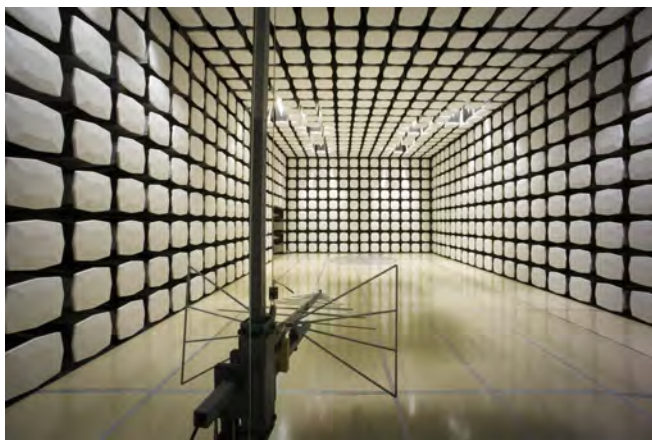
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

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

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

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

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



Party Requesting the Test

Company Name:	Lightspeed Technologies, Inc.
Address:	11509 SW Herman Rd
City, State, Zip:	Tualatin, OR 97062
Test Requested By:	Dave Jordahl
Model:	AC-CAVWC
First Date of Test:	May 25, 2010
Last Date of Test:	May 28, 2010
Receipt Date of Samples:	May 25, 2010
Equipment Design Stage:	Preproduction
Equipment Condition:	No Damage

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

2.4 GHz DTS radio device

Testing Objective:

To demonstrate compliance to FCC 15.247 requirements.

CONFIGURATION 1 LITS0005

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Remote	Lightspeed Technologies, Inc.	AC-CAVWC	A1019 0005

CONFIGURATION 7 LITS0005

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Remote	Lightspeed Technologies, Inc.	AC-CAVWC	A1019 0002

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	5/25/2010	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	5/25/2010	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	5/25/2010	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	5/25/2010	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	5/26/2010	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	5/26/2010	Pulse Duration	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	5/28/2010	Spurious Radiated 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	E4440A	AFD	6/1/2009	24
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0

MEASUREMENT UNCERTAINTY

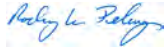
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/-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

TEST DESCRIPTION

The 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 at its maximum data rate with the typical modulation.

EMC

OCCUPIED BANDWIDTH

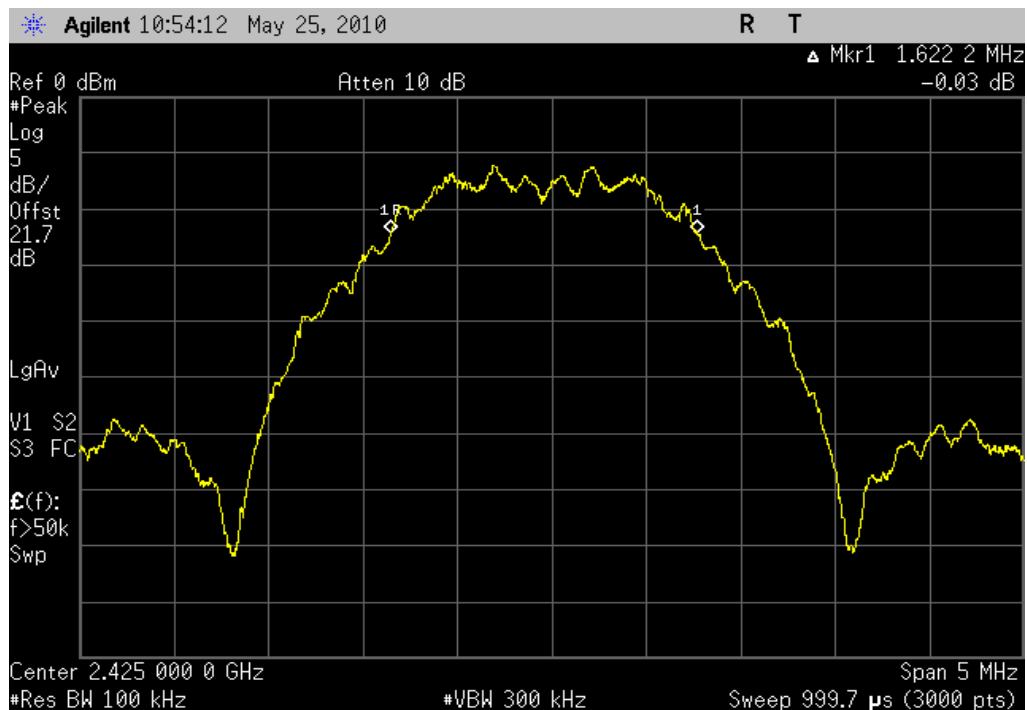
EUT:	AC-CAVWC		Work Order:	LITS0005
Serial Number:	A1019 0005		Date:	05/25/10
Customer:	Lightspeed Technologies, Inc.		Temperature:	22°C
Attendees:	Steve Krieg		Humidity:	43%
Project:	None		Barometric Pres.:	29.75 in
Tested by:	Rod Peloquin	Power:	Battery	Job Site:
TEST SPECIFICATIONS		Test Method		
FCC 15.247:2010		ANSI C63.10:2009		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
No Deviations				
Configuration #	1	 Signature		
		Value	Limit	Results
Low Channel		1.622 MHz	> 500 kHz	Pass
Mid Channel		1.621 MHz	> 500 kHz	Pass
High Channel		1.626 MHz	> 500 kHz	Pass

Low Channel

Result: Pass

Value: 1.622 MHz

Limit: > 500 kHz

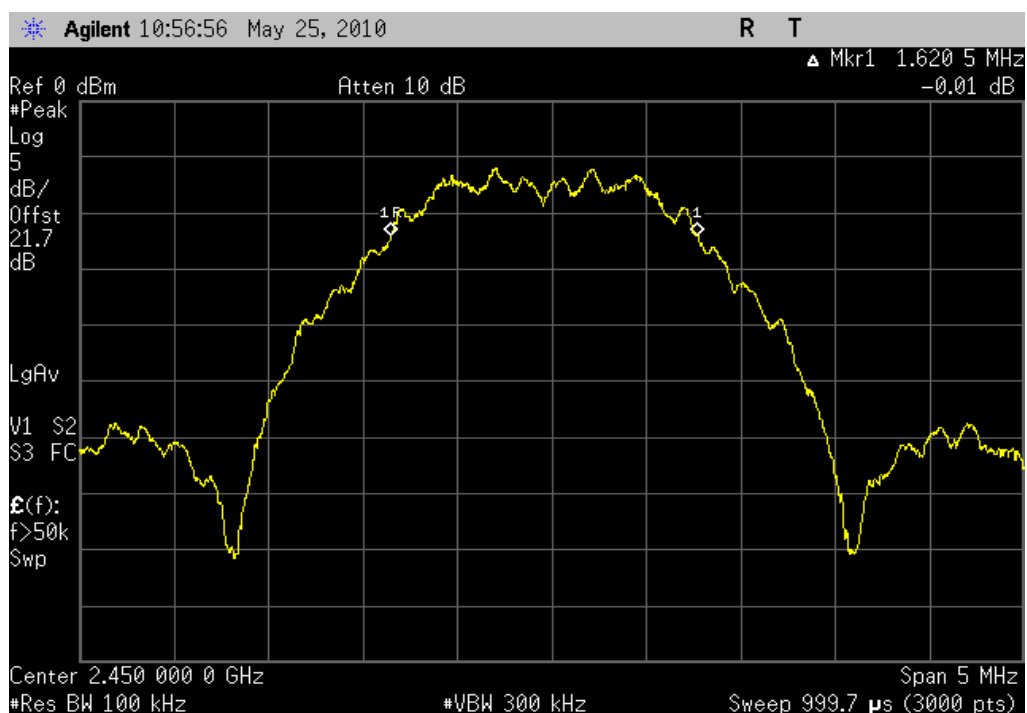


Mid Channel

Result: Pass

Value: 1.621 MHz

Limit: > 500 kHz



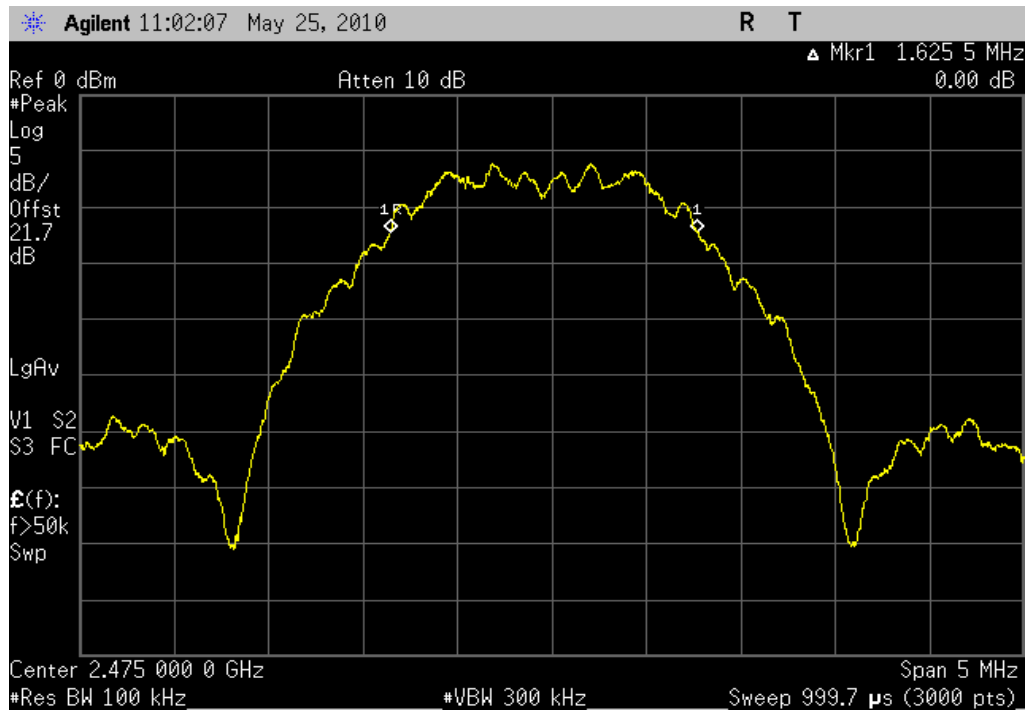
OCCUPIED BANDWIDTH

High Channel

Result: Pass

Value: 1.626 MHz

Limit: > 500 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.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator, 6 dB, 'SMA'	N/A	93459 3330A-6	AUF	4/1/2010	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Signal Generator	Agilent	E8257D	TGX	12/10/2008	24

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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

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

EMC

OUTPUT POWER

EUT:	AC-CAVWC	Work Order:	LITS0005
Serial Number:	A1019 0005	Date:	05/25/10
Customer:	Lightspeed Technologies, Inc.	Temperature:	22°C
Attendees:	Steve Krieg	Humidity:	43%
Project:	None	Barometric Pres.:	29.75 in
Tested by:	Rod Peloquin	Power:	Battery
		Job Site:	EV06

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

COMMENTS
None

DEVIATIONS FROM TEST STANDARD
No Deviations

Configuration #	1	Signature 
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	Value	Limit	Results
Low Channel	0.558 mW	1 W	Pass
Mid Channel	0.582 mW	1 W	Pass
High Channel	0.557 mW	1 W	Pass

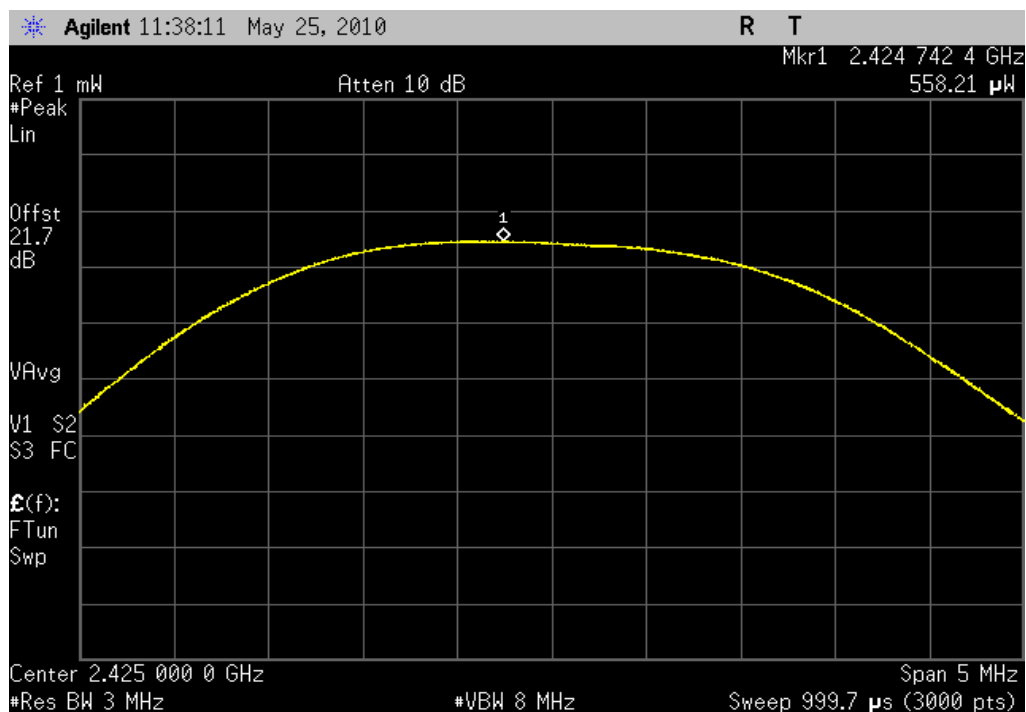
OUTPUT POWER

Low Channel

Result: Pass

Value: 0.558 mW

Limit: 1 W

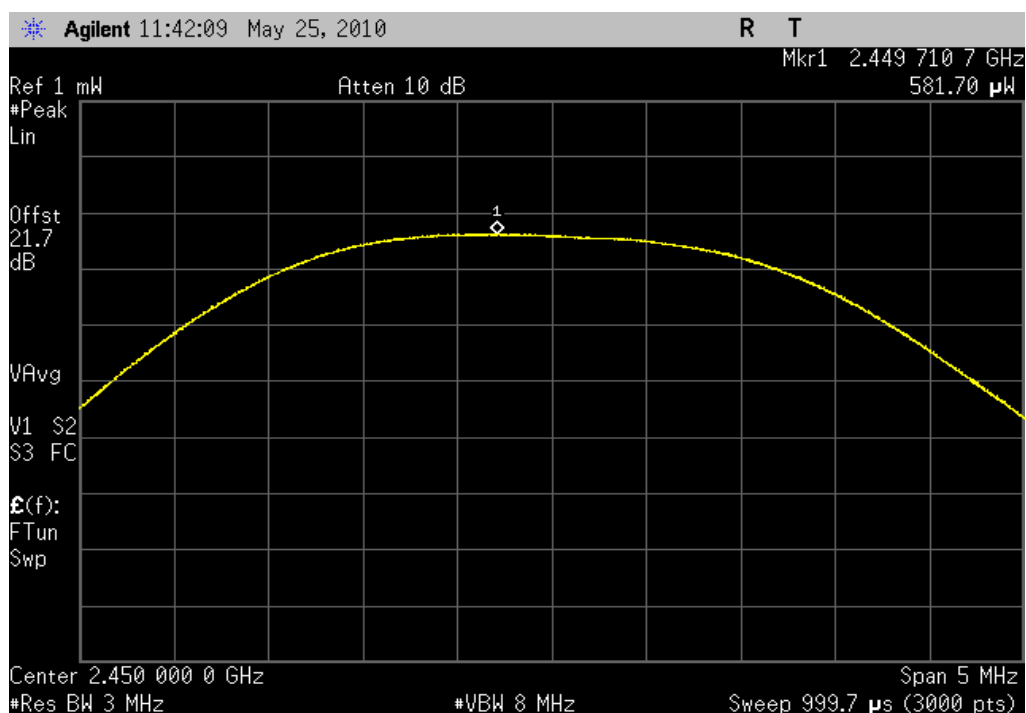


Mid Channel

Result: Pass

Value: 0.582 mW

Limit: 1 W



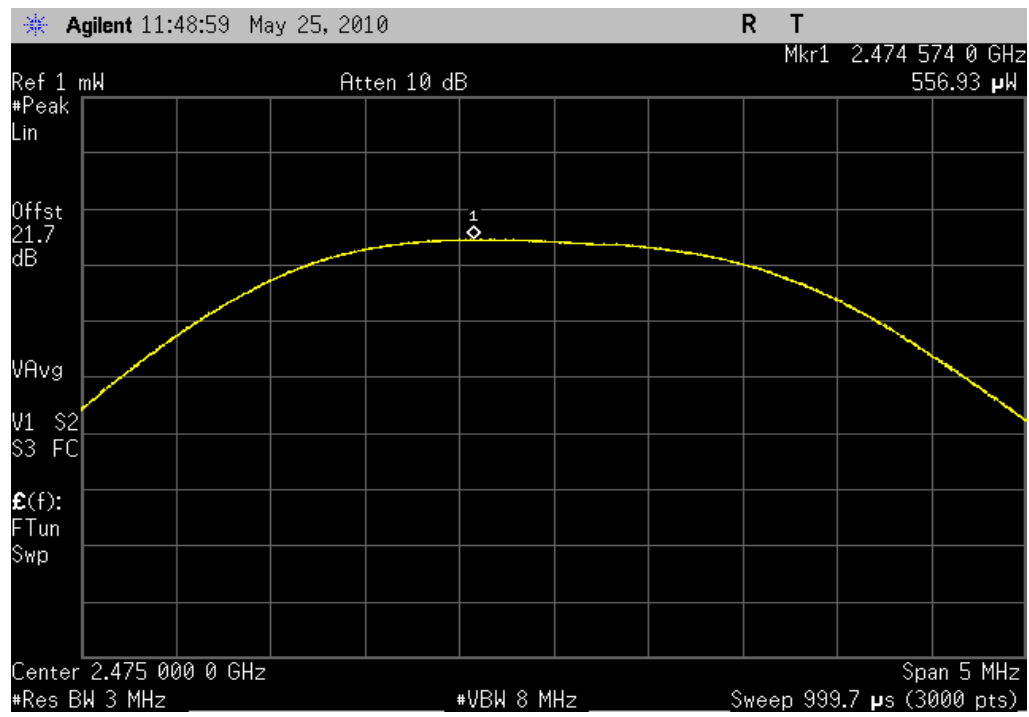
OUTPUT POWER

High Channel

Result: Pass

Value: 0.557 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	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
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. 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 lowest, middle, and maximum data rate available.

The spectrum was scanned across each band edge from at least 25 MHz below the band edge to 25 MHz above the band edge.

EMC

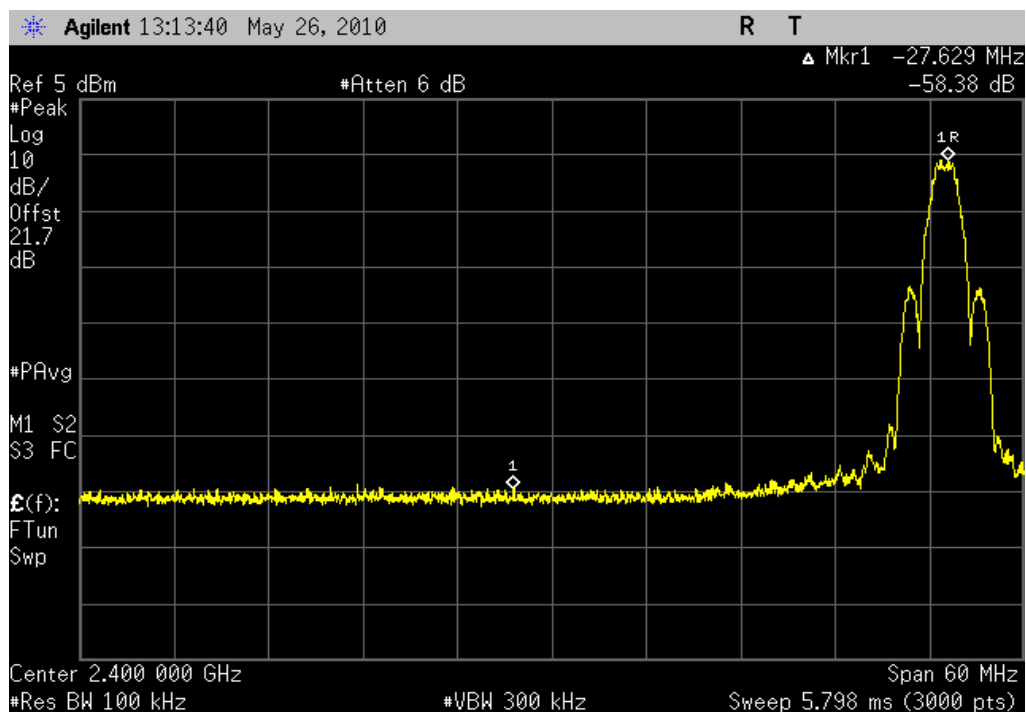
BAND EDGE COMPLIANCE

EUT:	AC-CAVWC		Work Order:	LITS0005
Serial Number:	A1019 0005		Date:	05/25/10
Customer:	Lightspeed Technologies, Inc.		Temperature:	22°C
Attendees:	Steve Krieg		Humidity:	43%
Project:	None		Barometric Pres.:	29.75 in
Tested by:	Rod Peloquin	Power:	Battery	Job Site:
TEST SPECIFICATIONS		Test Method		
FCC 15.247:2010		ANSI C63.10:2009		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
No Deviations				
Configuration #	1	Signature 		
		Value	Limit	Results
Low Channel		-58.4 dBc	≤ -20 dBc	Pass
High Channel		-56.5 dBc	≤ -20 dBc	Pass

Low Channel

Result: Pass

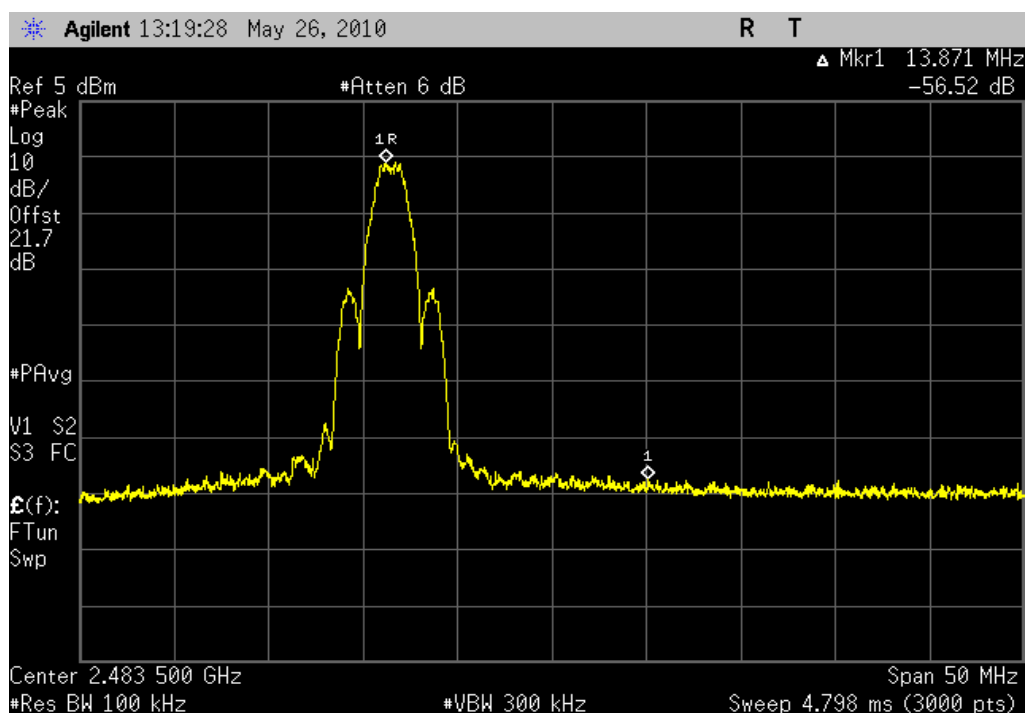
Value: -58.4 dBc

Limit: ≤ -20 dBc

High Channel

Result: Pass

Value: -56.5 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
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
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

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 using direct sequence modulation. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

EMC

SPURIOUS CONDUCTED EMISSIONS

EUT:	AC-CAVWC	Work Order:	LITS0005
Serial Number:	A1019 0005	Date:	05/25/10
Customer:	Lightspeed Technologies, Inc.	Temperature:	22°C
Attendees:	None	Humidity:	43%
Project:	None	Barometric Pres.:	29.75 in
Tested by:	Rod Peloquin	Power:	Battery
		Job Site:	EV06

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

COMMENTS
None

DEVIATIONS FROM TEST STANDARD
No Deviations

Configuration #	1	Signature 
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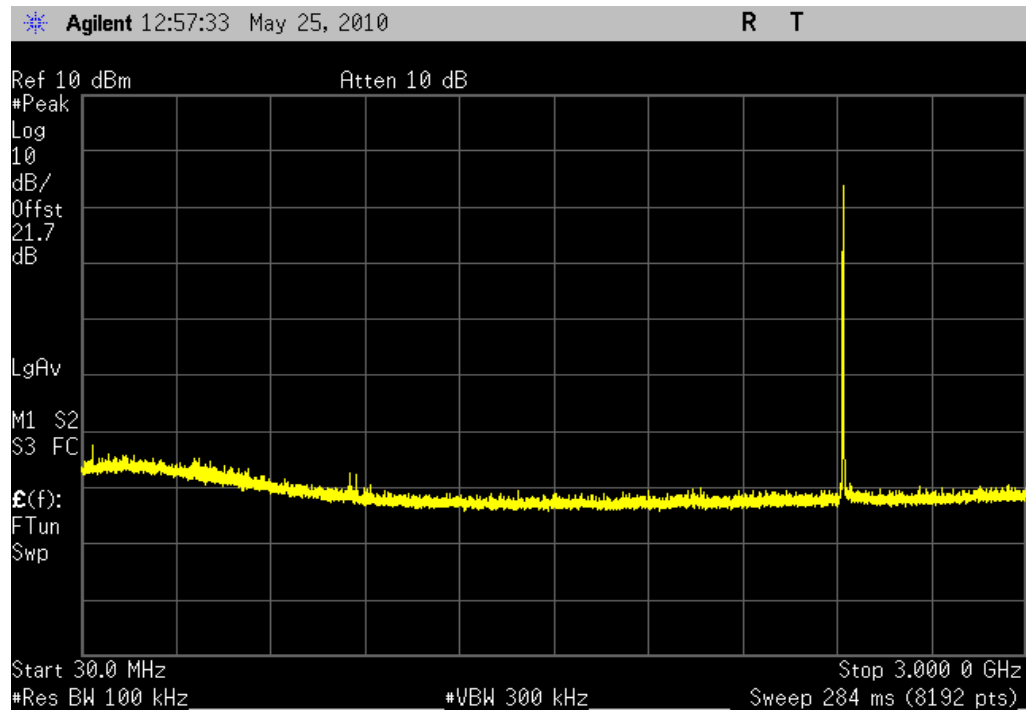
		Value	Limit	Results
Low Channel				
	30M Hz - 3 GHz	< -40 dBc	≤ -20 dBc	Pass
	2.95 GHz - 6.6 GHz	< -40 dBc	≤ -20 dBc	Pass
	6.59 GHz - 13 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.95 GHz - 25 GHz	< -40 dBc	≤ -20 dBc	Pass
Mid Channel				
	30M Hz - 3 GHz	< -40 dBc	≤ -20 dBc	Pass
	2.95 GHz - 6.6 GHz	< -40 dBc	≤ -20 dBc	Pass
	6.59 GHz - 13 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.95 GHz - 25 GHz	< -40 dBc	≤ -20 dBc	Pass
High Channel				
	30M Hz - 3 GHz	< -40 dBc	≤ -20 dBc	Pass
	2.95 GHz - 6.6 GHz	< -40 dBc	≤ -20 dBc	Pass
	6.59 GHz - 13 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.95 GHz - 25 GHz	< -40 dBc	≤ -20 dBc	Pass

SPURIOUS CONDUCTED EMISSIONS

Low Channel, 30M Hz - 3 GHz

Result: Pass

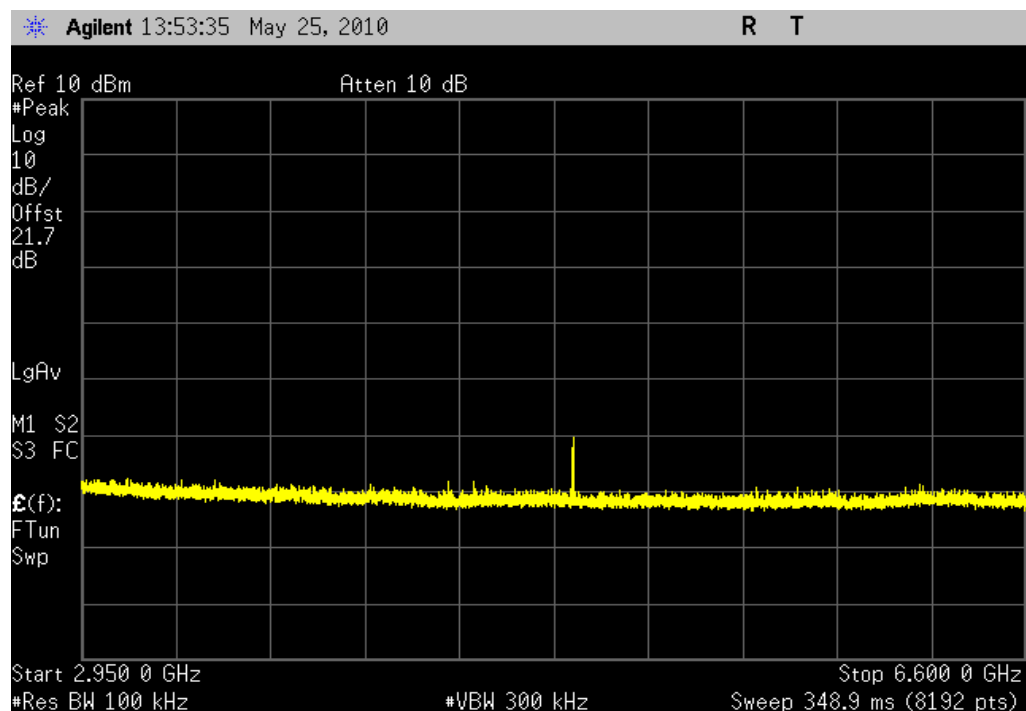
Value: < -40 dBc

Limit: ≤ -20 dBc

Low Channel, 2.95 GHz - 6.6 GHz

Result: Pass

Value: < -40 dBc

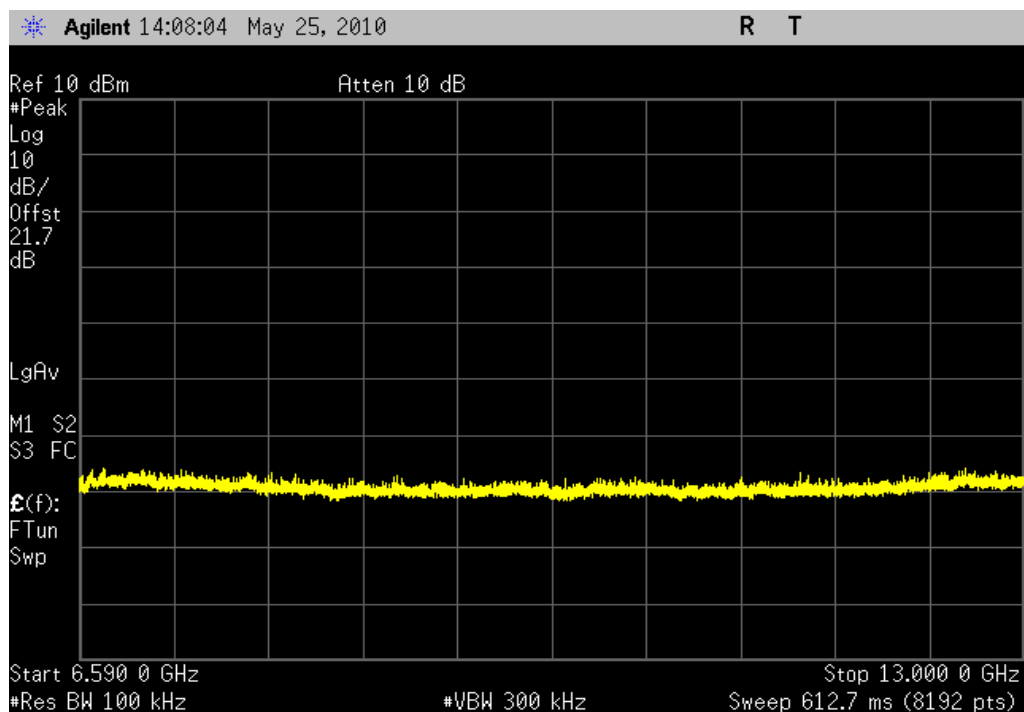
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

Low Channel, 6.59 GHz - 13 GHz

Result: Pass

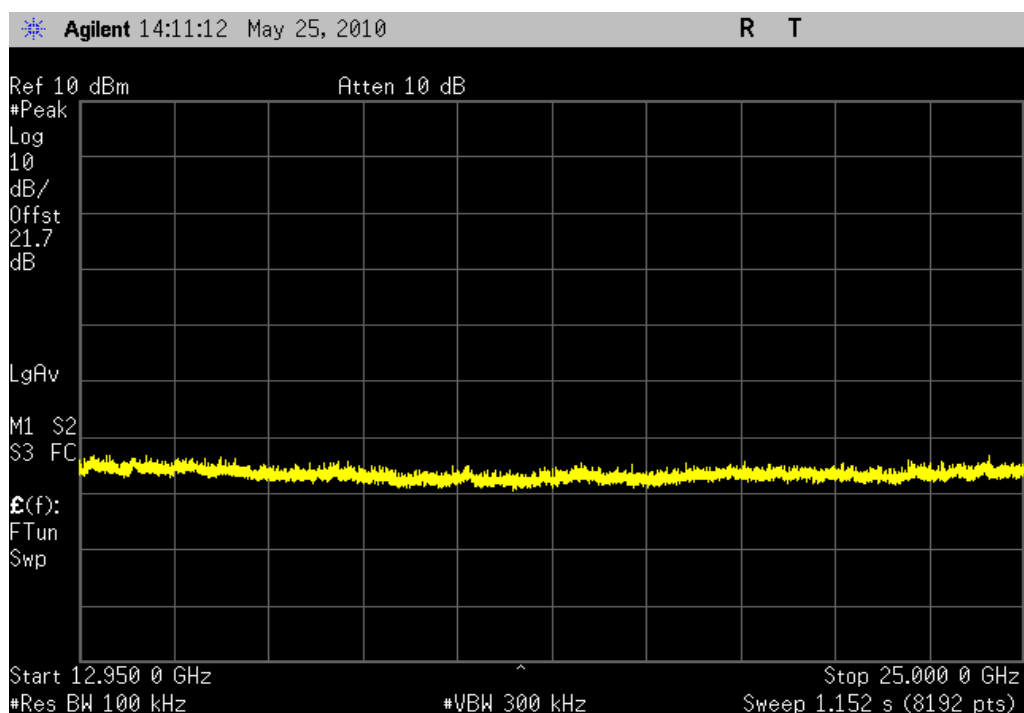
Value: < -40 dBc

Limit: ≤ -20 dBc

Low Channel, 12.95 GHz - 25 GHz

Result: Pass

Value: < -40 dBc

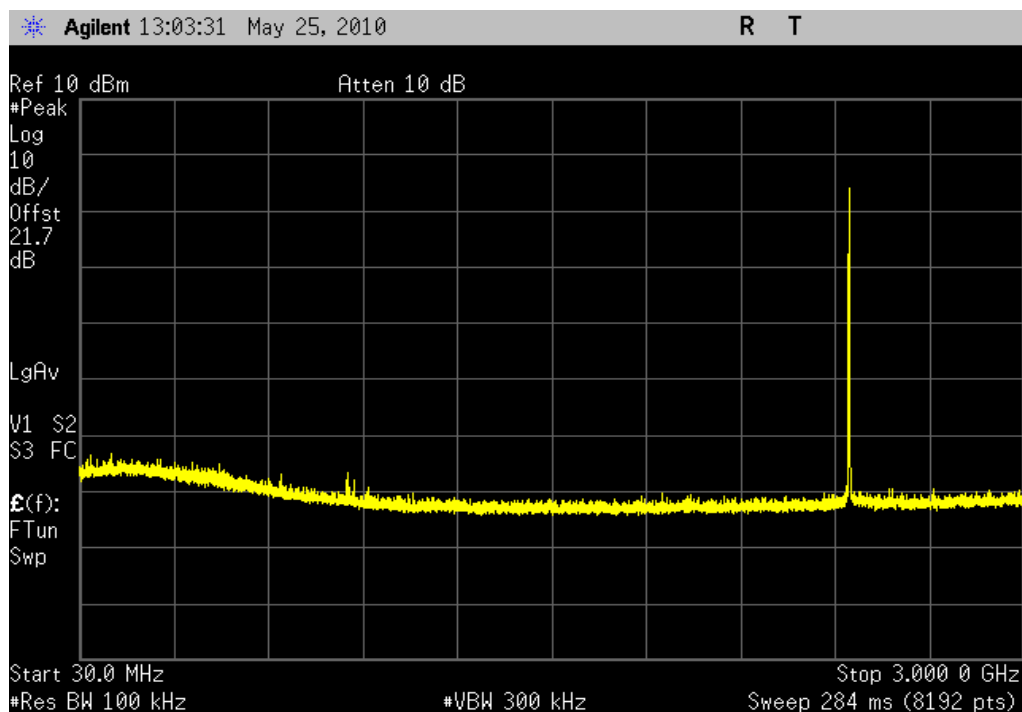
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

Mid Channel, 30M Hz - 3 GHz

Result: Pass

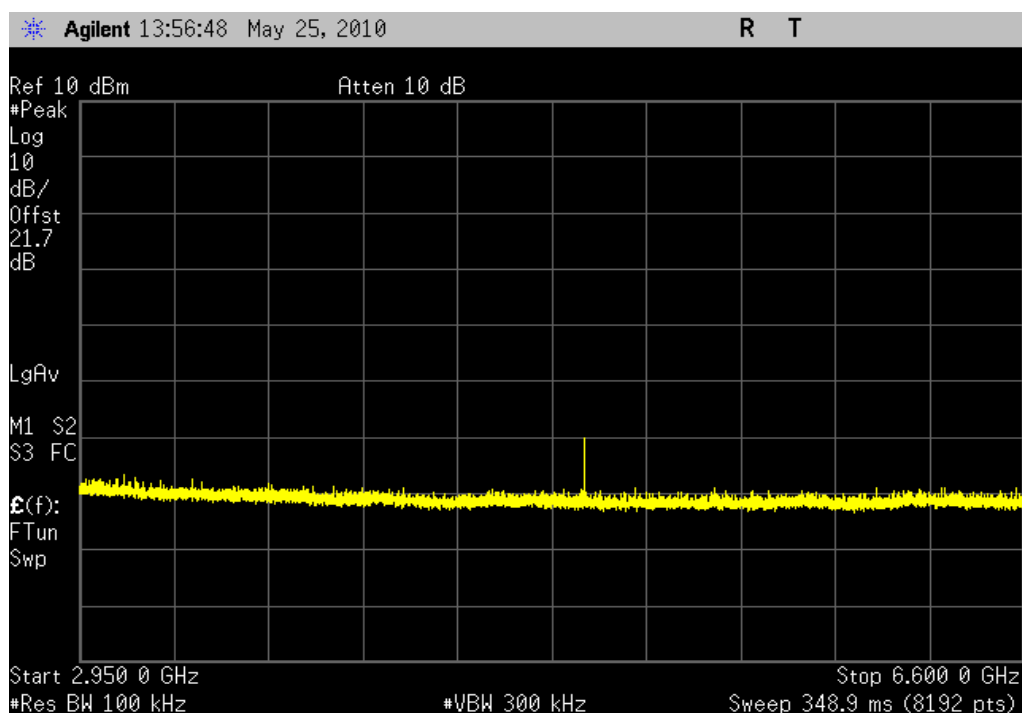
Value: < -40 dBc

Limit: ≤ -20 dBc

Mid Channel, 2.95 GHz - 6.6 GHz

Result: Pass

Value: < -40 dBc

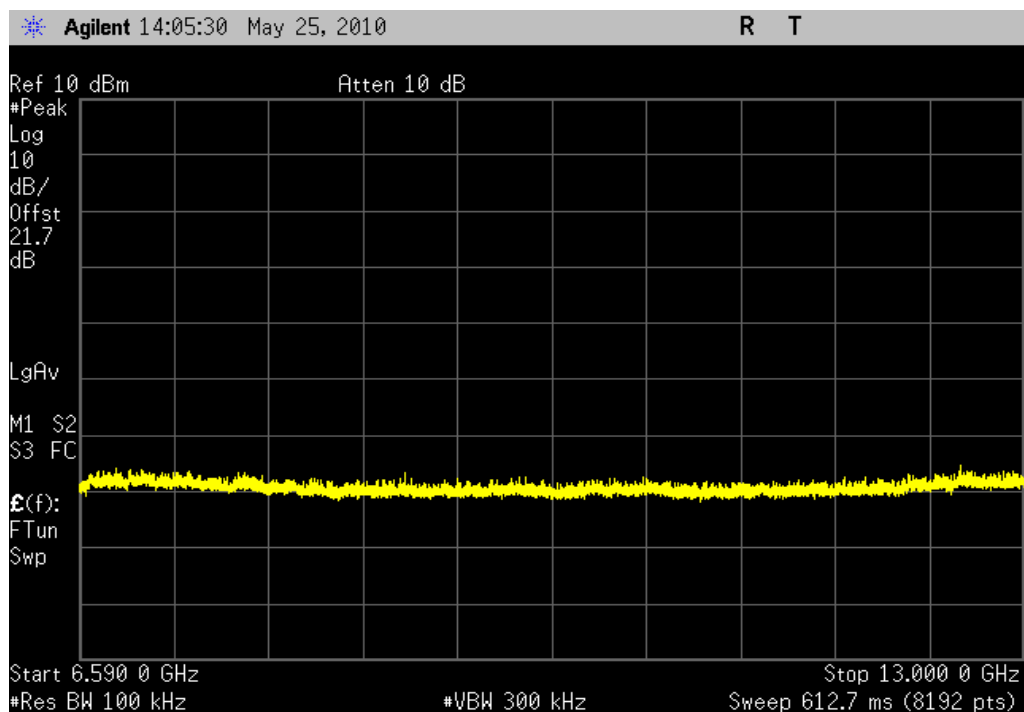
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

Mid Channel, 6.59 GHz - 13 GHz

Result: Pass

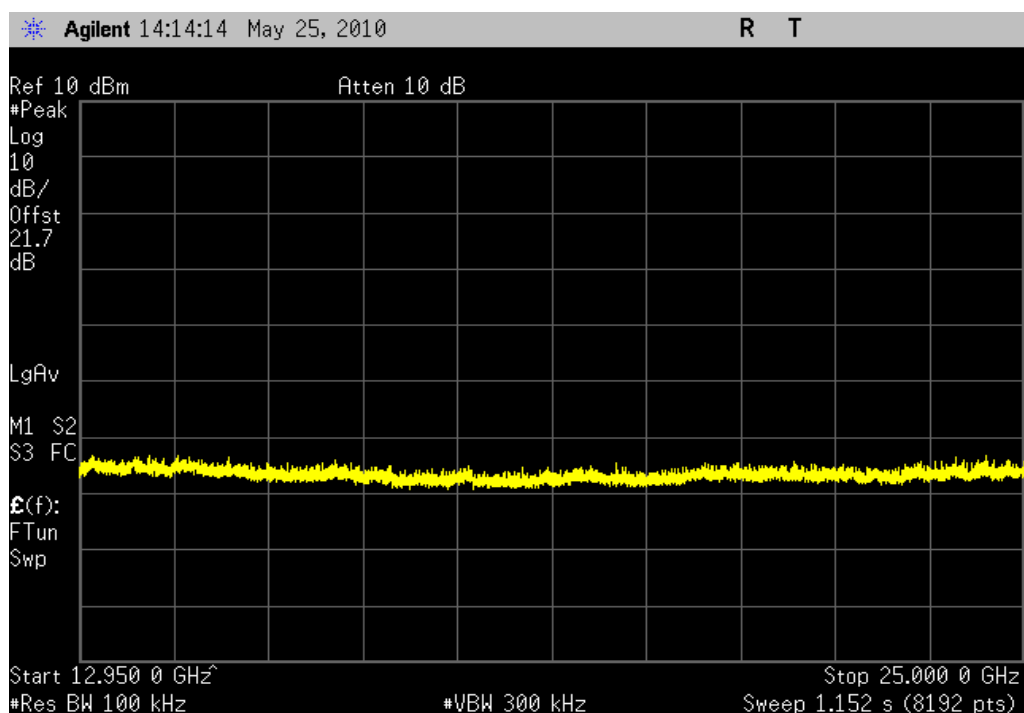
Value: < -40 dBc

Limit: ≤ -20 dBc

Mid Channel, 12.95 GHz - 25 GHz

Result: Pass

Value: < -40 dBc

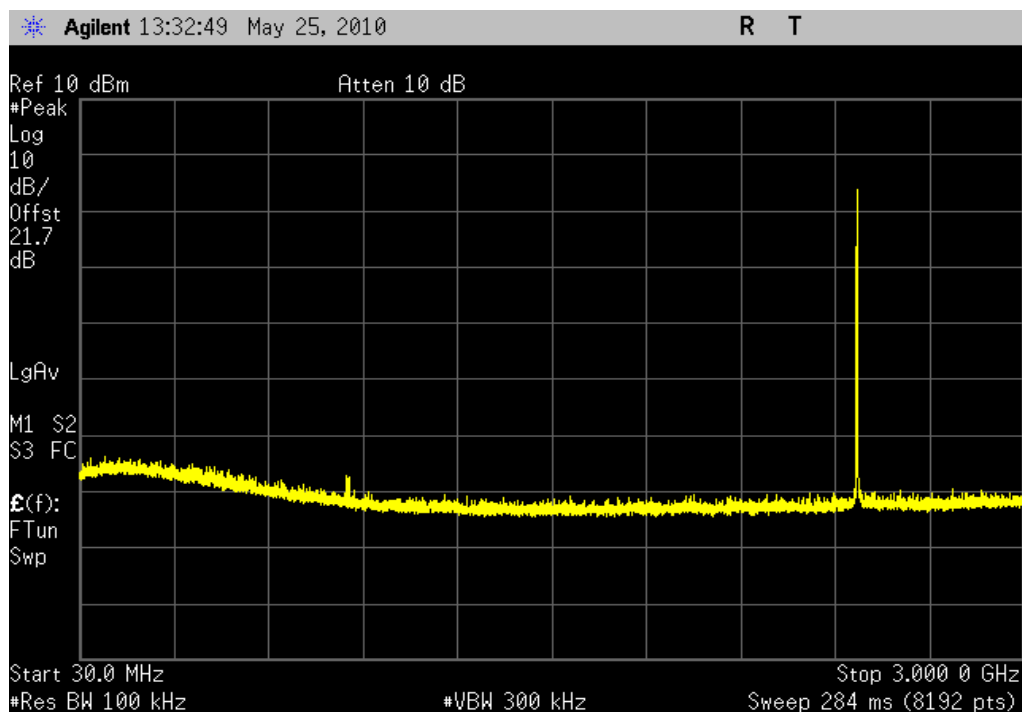
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

High Channel, 30M Hz - 3 GHz

Result: Pass

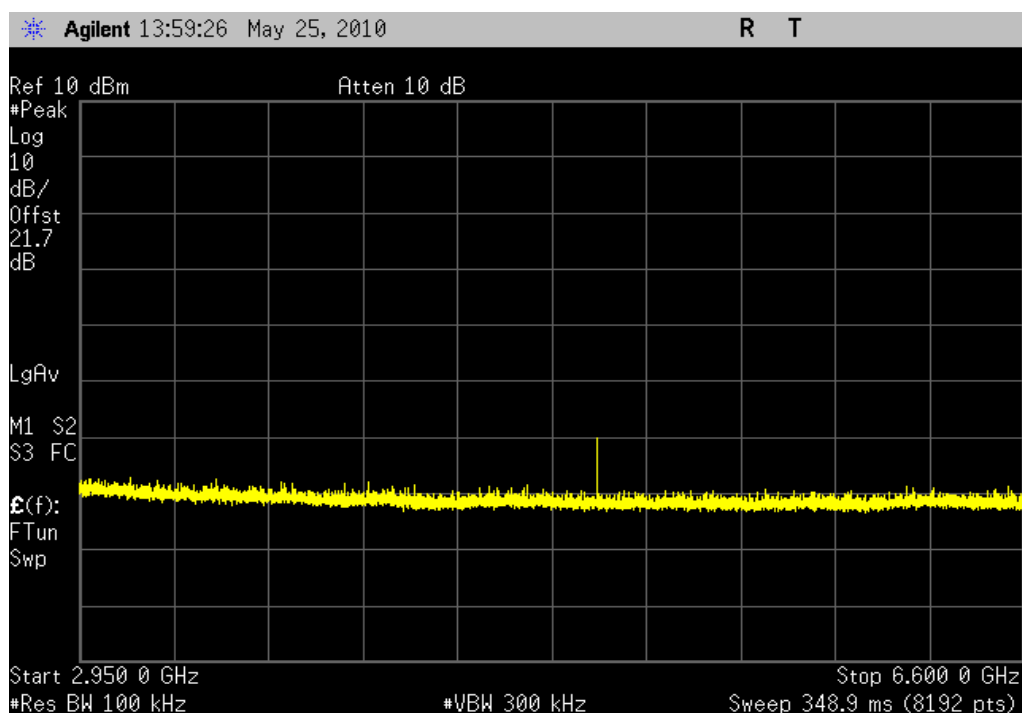
Value: < -40 dBc

Limit: $\leq$ -20 dBc

High Channel, 2.95 GHz - 6.6 GHz

Result: Pass

Value: < -40 dBc

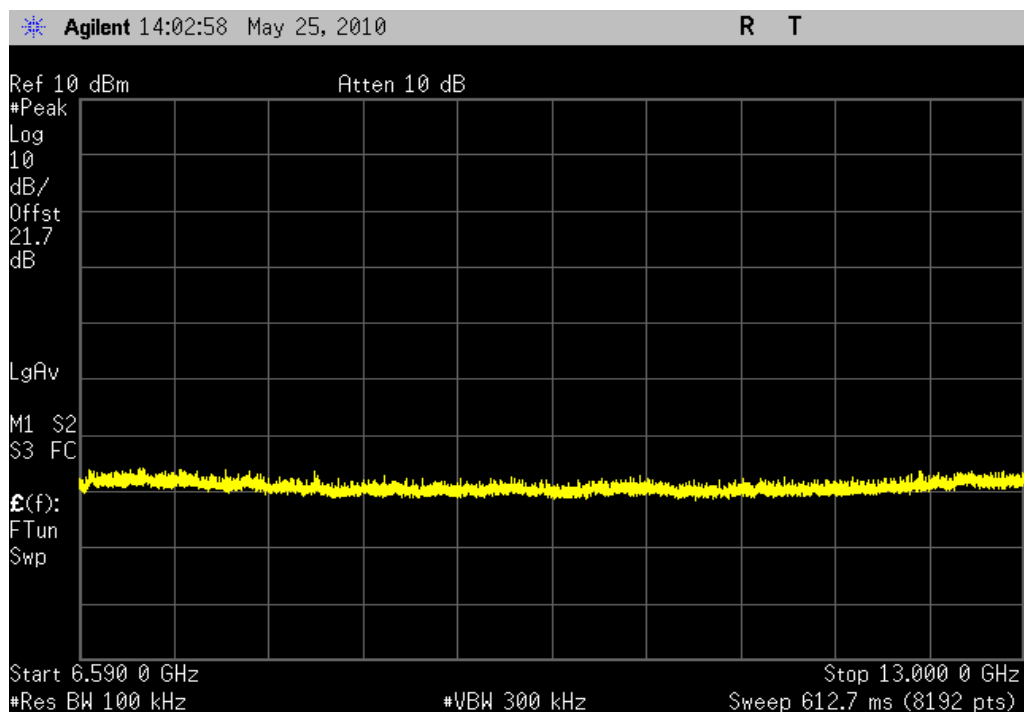
Limit: $\leq$ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

High Channel, 6.59 GHz - 13 GHz

Result: Pass

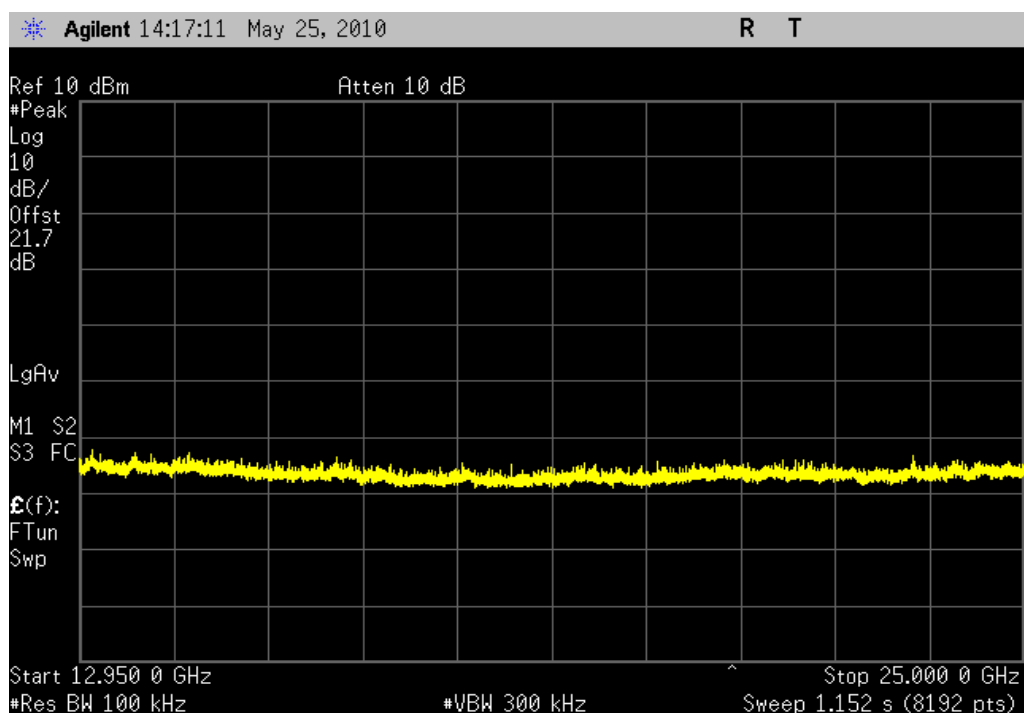
Value: < -40 dBc

Limit: ≤ -20 dBc

High Channel, 12.95 GHz - 25 GHz

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
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator, 6 dB, 'SMA'	N/A	93459 3330A-6	AUF	4/1/2010	13
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Signal Generator	Agilent	E8257D	TGX	12/10/2008	24

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

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

The the spectrum analyzer was set as follows:

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

a) RBW = 3 kHz

b) VBW = 10 kHz

c) Span = 300 kHz

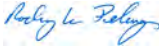
d) Sweep time = 100s

e) Trace set to MAX

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

EMC

POWER SPECTRAL DENSITY

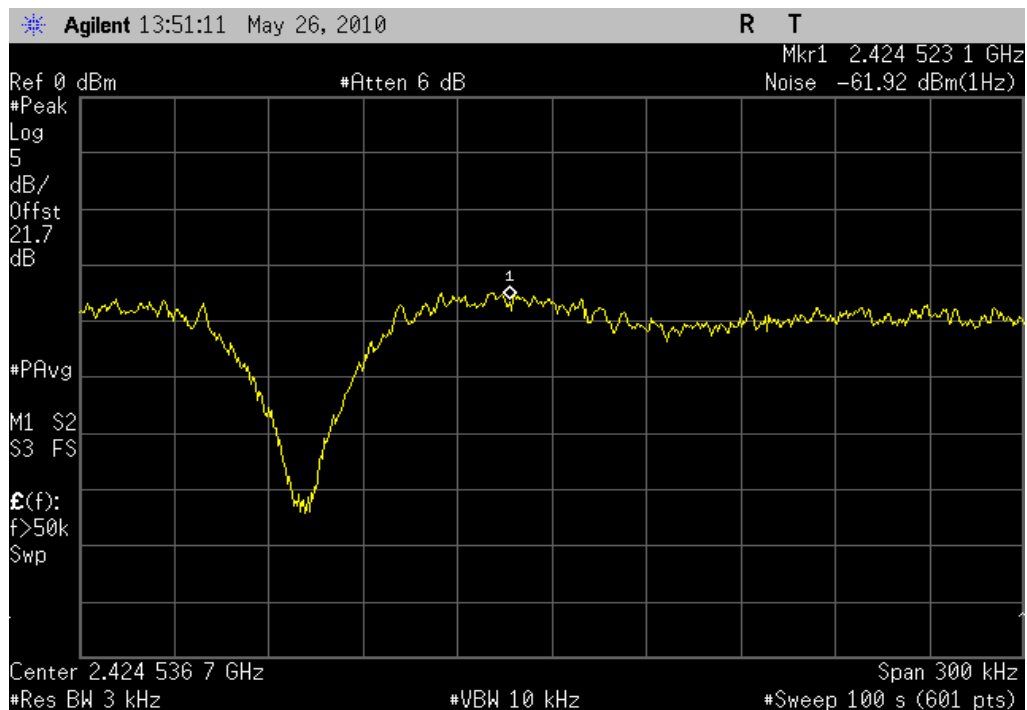
EUT:	AC-CAVWC		Work Order:	LITS0005
Serial Number:	A1019 0005		Date:	05/26/10
Customer:	Lightspeed Technologies, Inc.		Temperature:	22°C
Attendees:	Steve Krieg		Humidity:	43%
Project:	None		Barometric Pres.:	29.75 in
Tested by:	Rod Peloquin	Power:	Battery	Job Site:
TEST SPECIFICATIONS		Test Method		
FCC 15.247:2010		ANSI C63.10:2009		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
No Deviations				
Configuration #	1	 Signature		
		Value	Limit	Results
Low Channel		-27.1 dBm / 3 kHz	8 dBm / 3 kHz	Pass
Mid Channel		-27.0 dBm / 3 kHz	8 dBm / 3 kHz	Pass
High Channel		-27.1 dBm / 3 kHz	8 dBm / 3 kHz	Pass

Low Channel

Result: Pass

Value: -27.1 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

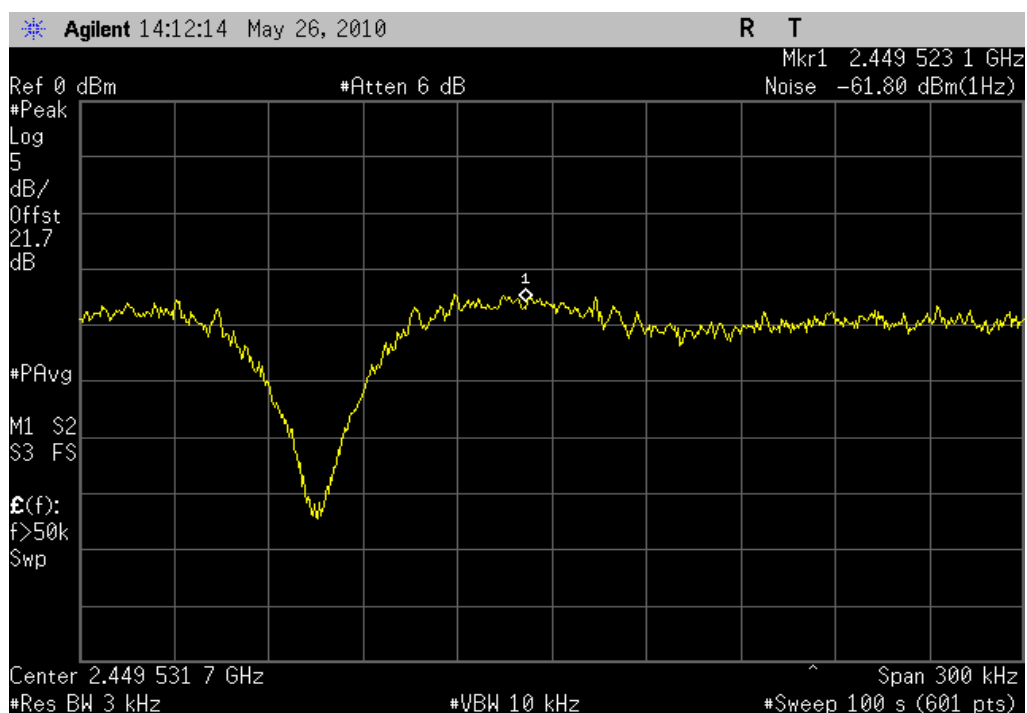


Mid Channel

Result: Pass

Value: -27.0 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



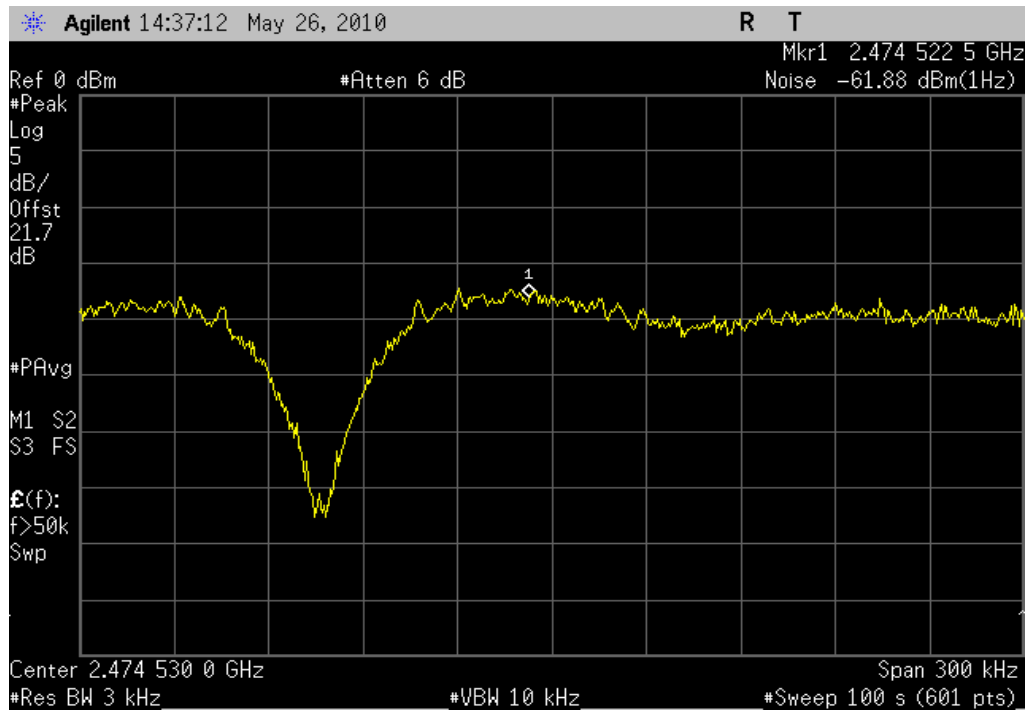
POWER SPECTRAL DENSITY

High Channel

Result: Pass

Value: -27.1 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



SPURIOUS RADIATED EMISSIONS

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

MODES OF OPERATION

Transmitting with normal modulation at 100% duty cycle

CHANNELS TESTED

Low channel, 2425 MHz

Mid channel, 2450 MHz

High channel, 2475 MHz

POWER SETTINGS INVESTIGATED

Battery

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	E4446A	AAQ	1/6/2010	12
Low Pass Filter 0-1000 MHz	Micro-Tronics	LPM50004	LFD	7/10/2009	13
High Pass Filter	Micro-Tronics	HPM50111	HFO	7/10/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	7/10/2009	13
Antenna, Biconilog	EMCO	3141	AXE	1/14/2010	13
EV01 Cables	N/A	Bilog Cables	EVA	7/10/2009	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	7/10/2009	13
Antenna, Horn	EMCO	3115	AHC	8/12/2008	24
EV01 Cables	N/A	Double Ridge Horn Cables	EVB	7/10/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	7/10/2009	13
Antenna, Horn	ETS	3160-07	AHU	NCR	0
EV01 Cables	N/A	Standard Gain Horns Cables	EVF	4/2/2010	13
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	7/10/2009	13
Antenna, Horn	ETS	3160-08	AHV	NCR	0
EV01 Cables	N/A	Standard Gain Horns Cables	EVF	4/2/2010	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

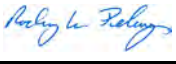
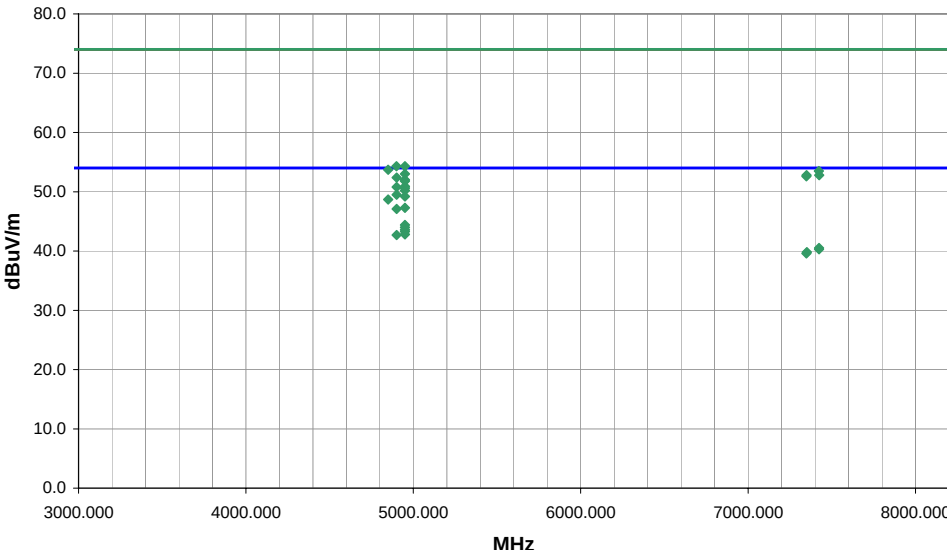
Measurements were made using the bandwidths and detectors specified. No video filter was used.

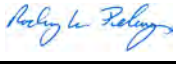
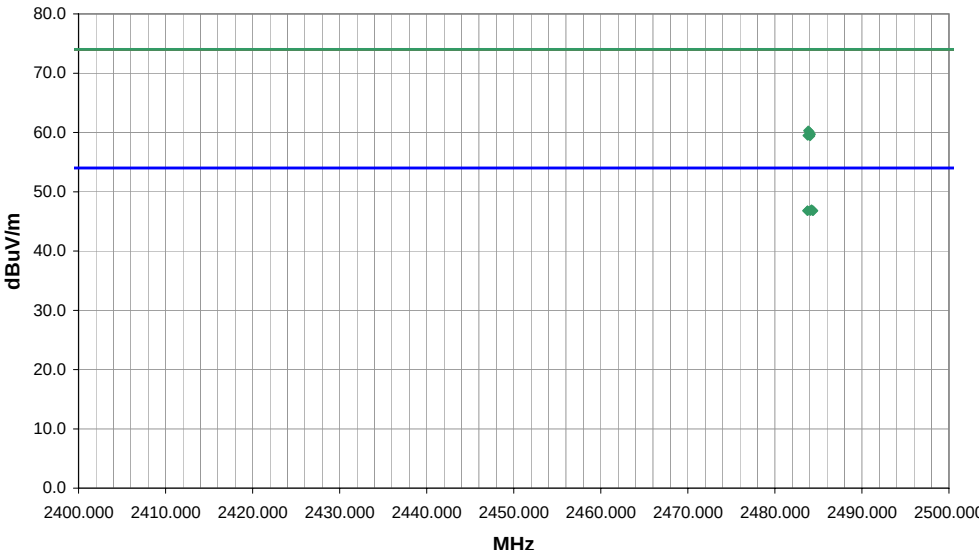
MEASUREMENT UNCERTAINTY

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 C63.10:2009). 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 2008.1.9	
EUT: AC-CAVWC										Work Order: LITS0005											
Serial Number: See configurations										Date: 05/27/10											
Customer: Lightspeed Technologies, Inc.										Temperature: 23											
Attendees: None										Humidity: 42%											
Project: None										Barometric Pres.: 1029.5 in											
Tested by: Rod Peloquin					Power: Battery					Job Site: EV01											
TEST SPECIFICATIONS										Test Method											
FCC 15.247:2010										ANSI C63.10:2009											
TEST PARAMETERS																					
Antenna Height(s) (m)					1 - 4					Test Distance (m)					3						
COMMENTS																					
None																					
EUT OPERATING MODES																					
Transmitting, see comments for channel																					
DEVIATIONS FROM TEST STANDARD																					
No deviations.																					
Run #		1																			
Configuration #		7																			
Results		Pass																			
																					
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments								
4899.917	39.7	9.8	11.0	1.1	3.0	0.0	V-Horn	AV	0.0	49.5	54.0	-4.5	Mid channel, EUT vertical								
4949.907	39.2	10.0	30.0	1.1	3.0	0.0	V-Horn	AV	0.0	49.2	54.0	-4.8	High channel, EUT vertical								
4849.920	39.1	9.6	14.0	1.1	3.0	0.0	V-Horn	AV	0.0	48.7	54.0	-5.3	Low channel, EUT vertical								
4949.913	37.3	10.0	100.0	1.3	3.0	0.0	H-Horn	AV	0.0	47.3	54.0	-6.7	High channel, EUT on side								
4899.910	37.3	9.8	92.0	1.4	3.0	0.0	H-Horn	AV	0.0	47.1	54.0	-6.9	Mid channel, EUT on side								
4949.923	34.4	10.0	37.0	1.0	3.0	0.0	V-Horn	AV	0.0	44.4	54.0	-9.6	High channel, EUT horizontal								
4949.910	34.0	10.0	214.0	1.4	3.0	0.0	H-Horn	AV	0.0	44.0	54.0	-10.0	High channel, EUT on side								
4949.900	33.6	10.0	303.0	1.3	3.0	0.0	H-Horn	AV	0.0	43.6	54.0	-10.4	High channel, EUT horizontal								
4949.873	33.3	10.0	4.0	1.1	3.0	0.0	H-Horn	AV	0.0	43.3	54.0	-10.7	High channel, EUT vertical								
4949.907	32.8	10.0	348.0	1.0	3.0	0.0	V-Horn	AV	0.0	42.8	54.0	-11.2	High channel, EUT on side								
4899.900	32.9	9.8	339.0	1.1	3.0	0.0	H-Horn	AV	0.0	42.7	54.0	-11.3	Mid channel, EUT horizontal								
7423.723	23.6	16.9	289.0	1.0	3.0	0.0	V-Horn	AV	0.0	40.5	54.0	-13.5	High channel, EUT vertical								
7423.390	23.4	16.9	236.0	1.3	3.0	0.0	H-Horn	AV	0.0	40.3	54.0	-13.7	High channel, EUT on side								
7351.348	23.5	16.3	57.0	1.0	3.0	0.0	V-Horn	AV	0.0	39.8	54.0	-14.2	Mid channel, EUT vertical								
7348.143	23.3	16.3	111.0	2.0	3.0	0.0	H-Horn	AV	0.0	39.6	54.0	-14.4	Mid channel, EUT on side								
4899.657	44.5	9.8	11.0	1.1	3.0	0.0	V-Horn	PK	0.0	54.3	74.0	-19.7	Mid channel, EUT vertical								
4949.860	44.3	10.0	30.0	1.1	3.0	0.0	V-Horn	PK	0.0	54.3	74.0	-19.7	High channel, EUT vertical								
4849.943	44.1	9.6	14.0	1.1	3.0	0.0	V-Horn	PK	0.0	53.7	74.0	-20.3	Low channel, EUT vertical								
7422.482	36.6	16.9	289.0	1.0	3.0	0.0	V-Horn	PK	0.0	53.5	74.0	-20.5	High channel, EUT vertical								
4949.893	43.0	10.0	100.0	1.3	3.0	0.0	H-Horn	PK	0.0	53.0	74.0	-21.0	High channel, EUT on side								
7349.523	36.5	16.3	111.0	2.0	3.0	0.0	H-Horn	PK	0.0	52.8	74.0	-21.2	Mid channel, EUT on side								
7424.480	35.9	16.9	236.0	1.3	3.0	0.0	H-Horn	PK	0.0	52.8	74.0	-21.2	High channel, EUT on side								
7348.015	36.3	16.3	57.0	1.0	3.0	0.0	V-Horn	PK	0.0	52.6	74.0	-21.4	Mid channel, EUT vertical								
4899.890	42.6	9.8	92.0	1.4	3.0	0.0	H-Horn	PK	0.0	52.4	74.0	-21.6	Mid channel, EUT on side								
4949.707	42.0	10.0	303.0	1.3	3.0	0.0	H-Horn	PK	0.0	52.0	74.0	-22.0	High channel, EUT horizontal								
4949.920	41.8	10.0	37.0	1.0	3.0	0.0	V-Horn	PK	0.0	51.8	74.0	-22.2	High channel, EUT horizontal								
4949.830	40.9	10.0	214.0	1.4	3.0	0.0	H-Horn	PK	0.0	50.9	74.0	-23.1	High channel, EUT on side								
4899.830	41.0	9.8	339.0	1.1	3.0	0.0	H-Horn	PK	0.0	50.8	74.0	-23.2	Mid channel, EUT horizontal								
4949.897	40.6	10.0	4.0	1.1	3.0	0.0	H-Horn	PK	0.0	50.6	74.0	-23.4	High channel, EUT vertical								
4950.123	40.2	10.0	348.0	1.0	3.0	0.0	V-Horn	PK	0.0	50.2	74.0	-23.8	High channel, EUT on side								

NORTHWEST EMC										SPURIOUS RADIATED EMISSIONS										PSA 2008.07.21 EMI 2008.1.9	
EUT: AC-CAVWC										Work Order: LITS0005											
Serial Number: See configurations										Date: 05/28/10											
Customer: Lightspeed Technologies, Inc.										Temperature: 23											
Attendees: None										Humidity: 42%											
Project: None										Barometric Pres.: 1029.5 in											
Tested by: Rod Peloquin					Power: Battery					Job Site: EV01											
TEST SPECIFICATIONS										Test Method											
FCC 15.247:2010										ANSI C63.10:2009											
TEST PARAMETERS																					
Antenna Height(s) (m)					1 - 4					Test Distance (m)					3						
COMMENTS																					
None																					
EUT OPERATING MODES																					
Transmitting high channel																					
DEVIATIONS FROM TEST STANDARD																					
No deviations.																					
Run #		2																			
Configuration #		7																			
Results		Pass																			
																					
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments								
2484.217	24.3	2.7	91.0	1.2	0.0	20.0	V-Horn	AV	0.0	47.0	54.0	-7.0	High channel, EUT on side								
2483.749	24.1	2.7	61.0	2.4	0.0	20.0	H-Horn	AV	0.0	46.8	54.0	-7.2	High channel, EUT on side								
2483.754	24.1	2.7	207.0	2.4	0.0	20.0	H-Horn	AV	0.0	46.8	54.0	-7.2	High channel, EUT horizontal								
2484.079	24.1	2.7	341.0	2.5	0.0	20.0	H-Horn	AV	0.0	46.8	54.0	-7.2	High channel, EUT vertical								
2484.332	24.1	2.7	307.0	1.8	0.0	20.0	V-Horn	AV	0.0	46.8	54.0	-7.2	High channel, EUT vertical								
2484.387	24.1	2.7	108.0	1.2	0.0	20.0	V-Horn	AV	0.0	46.8	54.0	-7.2	High channel, EUT horizontal								
2483.850	37.6	2.7	207.0	2.4	0.0	20.0	H-Horn	PK	0.0	60.3	74.0	-13.7	High channel, EUT horizontal								
2483.977	37.4	2.7	341.0	2.5	0.0	20.0	H-Horn	PK	0.0	60.1	74.0	-13.9	High channel, EUT vertical								
2484.112	37.0	2.7	61.0	2.4	0.0	20.0	H-Horn	PK	0.0	59.7	74.0	-14.3	High channel, EUT on side								
2483.945	36.9	2.7	91.0	1.2	0.0	20.0	V-Horn	PK	0.0	59.6	74.0	-14.4	High channel, EUT on side								
2483.772	36.8	2.7	307.0	1.8	0.0	20.0	V-Horn	PK	0.0	59.5	74.0	-14.5	High channel, EUT vertical								
2484.037	36.7	2.7	108.0	1.2	0.0	20.0	V-Horn	PK	0.0	59.4	74.0	-14.6	High channel, 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.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

Per ANSI C63.10, for unlicensed wireless devices unable to be configured for 100 % duty cycle even in test mode, the system should be configured for the longest duration duty cycle supported. The transmission pulse duration is that time over which the unlicensed wireless device is on and transmitting at its maximum output power.

Measurement methods defined in ANSI C63.10 are often based upon the relationship between the EUT transmission pulse duration and the sweep speed of the measurement analyzer.

The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer.

EMC

PULSE DURATION

EUT:	AC-CAVWC		Work Order:	LITS0005
Serial Number:	A1019 0005		Date:	05/25/10
Customer:	Lightspeed Technologies, Inc.		Temperature:	22°C
Attendees:	none		Humidity:	43%
Project:	None		Barometric Pres.:	29.75 in
Tested by:	Rod Peloquin	Power:	Battery	Job Site:
TEST SPECIFICATIONS		Test Method		
FCC 15.247:2010		ANSI C63.10:2009		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
No Deviations				
Configuration #	1	<i>Rod Peloquin</i> Signature		
				Value

20ms Sweep

100%

100ms Sweep

100%

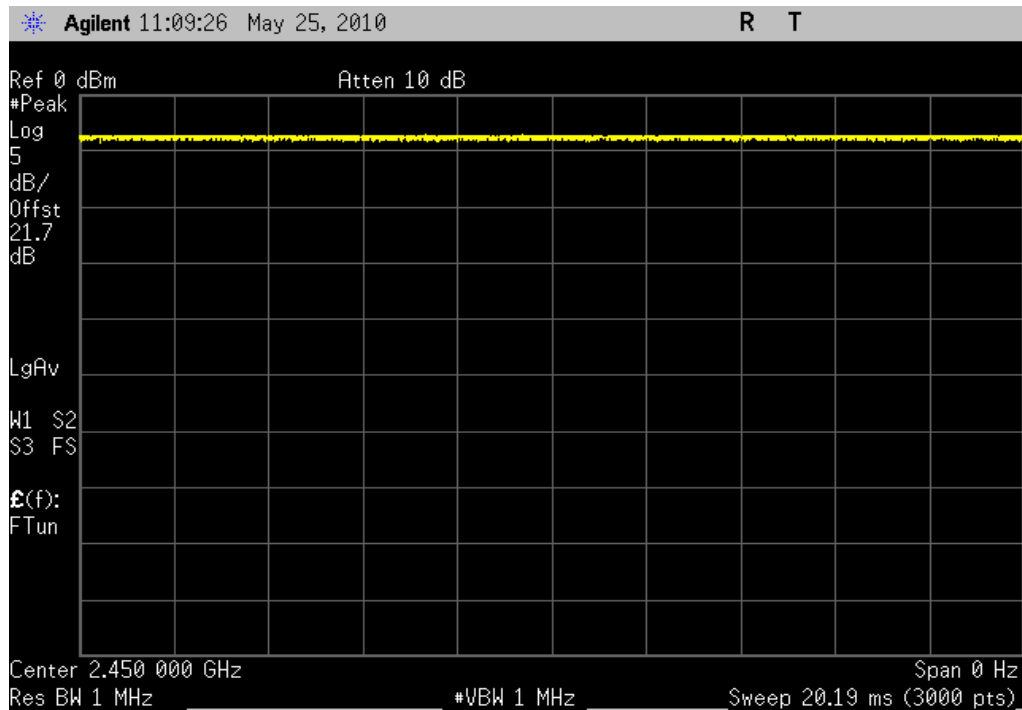
1s Sweep

100%

PULSE DURATION

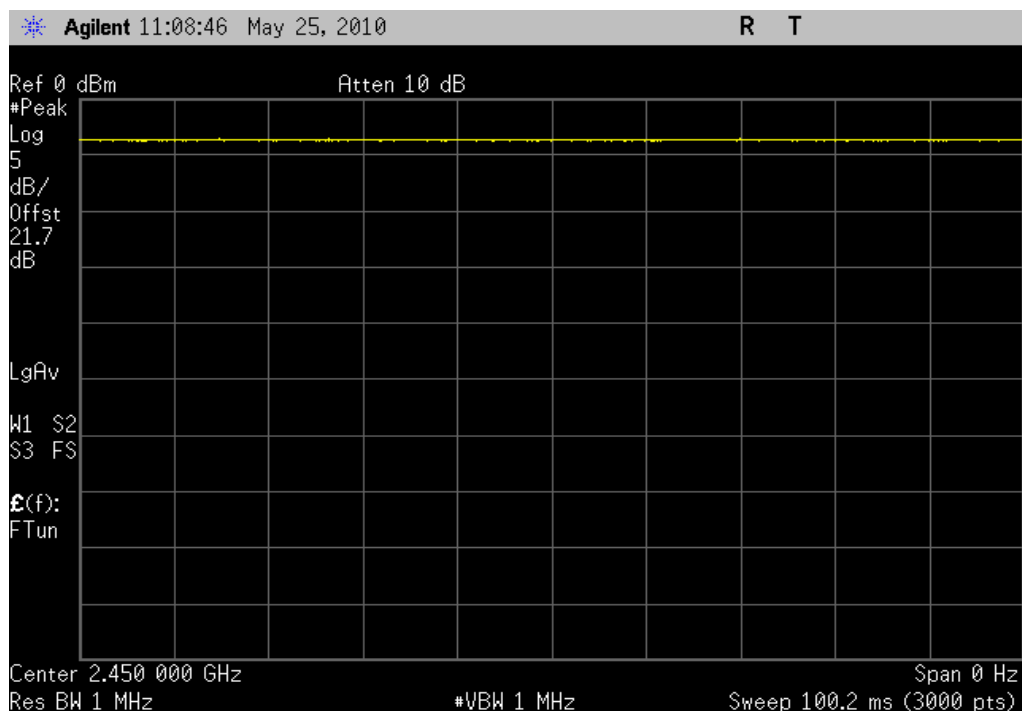
20ms Sweep

Value: 100%



100ms Sweep

Value: 100%



PULSE DURATION

1s Sweep

Value: 100%

