

Summit Semiconductor LLC

Summit FS848 Master Module (Wheeler)

Report No. FOCU0081

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: July 27, 2010

Summit Semiconductor LLC

Model: Summit FS848 Master Module (Wheeler)

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

Modifications made to the product

See the Modifications section of this report

Test Facility

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

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

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

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

Approved By:

Don Fecteau, IS Manager



NVLAP Lab Code: 200630-0

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

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

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

FCC

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



NVLAP

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



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

Industry Canada

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



CAB

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



NEMKO

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



Australia/New Zealand

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



VCCI

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



BSMI

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



GOST

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



KCC

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



VIETNAM

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



SCOPE

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

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



Northwest EMC Locations



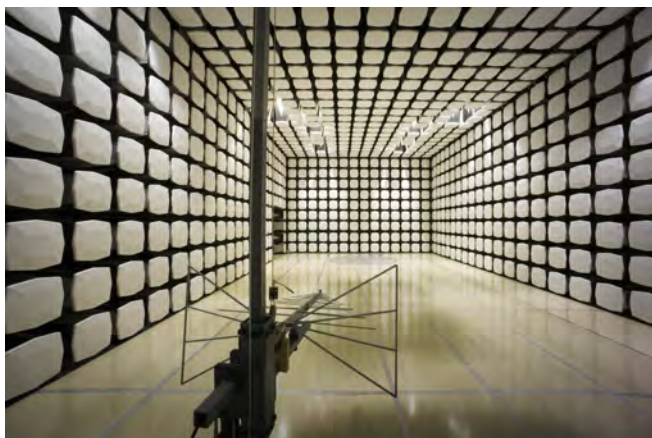
Oregon
Labs EV01-EV12
22975 NW Evergreen Pkwy
Suite 400
Hillsboro, OR 97124
(503) 844-4066

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

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

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

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



Party Requesting the Test

Company Name:	Summit Semiconductor LLC
Address:	22867 NW Bennett St, Suite 200
City, State, Zip:	Hillsboro, OR 97124
Test Requested By:	Alex Macdonald
Model:	Summit FS848 Master Module (Wheeler)
First Date of Test:	July 15, 2010
Last Date of Test:	July 27, 2010
Receipt Date of Samples:	July 14, 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):**

UNII radio module

Testing Objective:

Seeking limited modular approval of the master under FCC 15.247 for operation in the 5.8 GHz band

CONFIGURATION 1 FOCU0081

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Summit FS848 Master Module (Wheeler)	Summit Semiconductor LLC	444-2203	0265
Antenna	Aeon Technologies	C6276-510004A	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Supply - I/O Board	Summit Semiconductor LLC	Redmond	Linear
AC Adapter	Cincon Electronics	TR20B120X 01E03	20120-0007356

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Remote PC	Compaq	NX9500	CNF4520HP6

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Lead	PA	1.8m	PA	AC Adapter	Power Supply - I/O Board
AC Power	No	1.8m	No	AC Mains	AC Adapter
USB - Serial	Yes	1.9m	No	Summit FS848 Master Module (Wheeler)	Remote PC
Antenna Cable	Yes	0.1m	No	Summit FS848 Master Module (Wheeler)	Antenna
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 2 FOCU0081**EUT**

Description	Manufacturer	Model/Part Number	Serial Number
Summit FS848 Master Module (Wheeler)	Summit Semiconductor LLC	444-2203	A146

Peripherals in test setup boundary

Description	Manufacturer	Model/Part Number	Serial Number
Power Supply - I/O Board	Summit Semiconductor LLC	Redmond	18
AC Adapter	PHIHONG	PSS--45W-120	0706

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Remote PC	Dell	Inspiron 6000	IS386

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Lead	PA	1.8m	PA	AC Adapter	Power Supply - I/O Board
AC Power	No	1.8m	No	AC Mains	AC Adapter
USB - Serial	Yes	1.9m	No	Summit FS848 Master Module (Wheeler)	Remote PC
Audio	Yes	1.8m	No	Remote PC	Summit FS848 Master Module (Wheeler)
Trigger	Yes	1.1m	No	Summit FS848 Master Module (Wheeler)	Measurement analyzer
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 4 FOCU0081**EUT**

Description	Manufacturer	Model/Part Number	Serial Number
Summit FS848 Master Module (Wheeler)	Summit Semiconductor LLC	444-2203	0265
Antenna	Aeon Technologies	C6276-510004A	None

Peripherals in test setup boundary

Description	Manufacturer	Model/Part Number	Serial Number
Power Supply - I/O Board	Summit Semiconductor LLC	Redmond	AC

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
DC Power Supply (Test Equipment)	Tektronix	PS280	TPM

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Lead (4x)	No	1.0m	No	DC Power Supply (Test Equipment)	Power Supply - I/O Board
AC Power	No	1.8m	No	AC Mains	DC Power Supply
USB - Serial	Yes	1.9m	No	Summit FS848 Master Module (Wheeler)	Remote PC
Antenna Cable	Yes	0.1m	No	Summit FS848 Master Module (Wheeler)	Antenna

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	7/15/2010	Output Power – Channel Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	7/16/2010	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.
3	7/16/2010	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.
4	7/16/2010	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	7/20/2010	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	7/21/2010	AC Powerline 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.
7	7/27/2010	Spurious 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	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 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 the data rates called out on the data sheet.

EMC

OCCUPIED BANDWIDTH

EUT:	Summit FS848 Master Module (Wheeler)	Work Order:	FOCU0081
Serial Number:	A146	Date:	07/16/10
Customer:	Summit Semiconductor LLC	Temperature:	23°C
Attendees:	Alex Macdonald	Humidity:	45%
Project:	None	Barometric Pres.:	30.16 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

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

COMMENTS

Transmitting random audio data

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	2	Signature 
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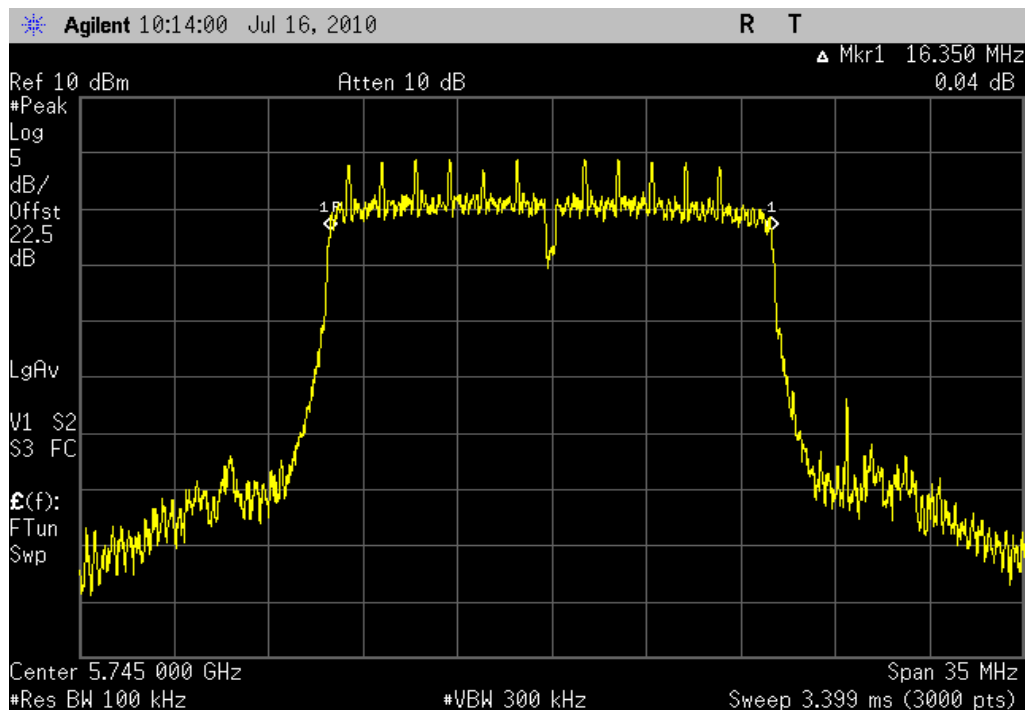
		Value	Limit	Results
802.11(a) 6 Mbps	Low Channel 149, 5745 MHz	16.350 MHz	> 500 kHz	Pass
	Mid Channel 157, 5785 MHz	16.327 MHz	> 500 kHz	Pass
	High Channel 165, 5825 MHz	16.327 MHz	> 500 kHz	Pass
802.11(a) 36 Mbps	Low Channel 149, 5745 MHz	16.409 MHz	> 500 kHz	Pass
	Mid Channel 157, 5785 MHz	16.467 MHz	> 500 kHz	Pass
	High Channel 165, 5825 MHz	16.432 MHz	> 500 kHz	Pass

802.11(a) 6 Mbps, Low Channel 149, 5745 MHz

Result: Pass

Value: 16.350 MHz

Limit: > 500 kHz

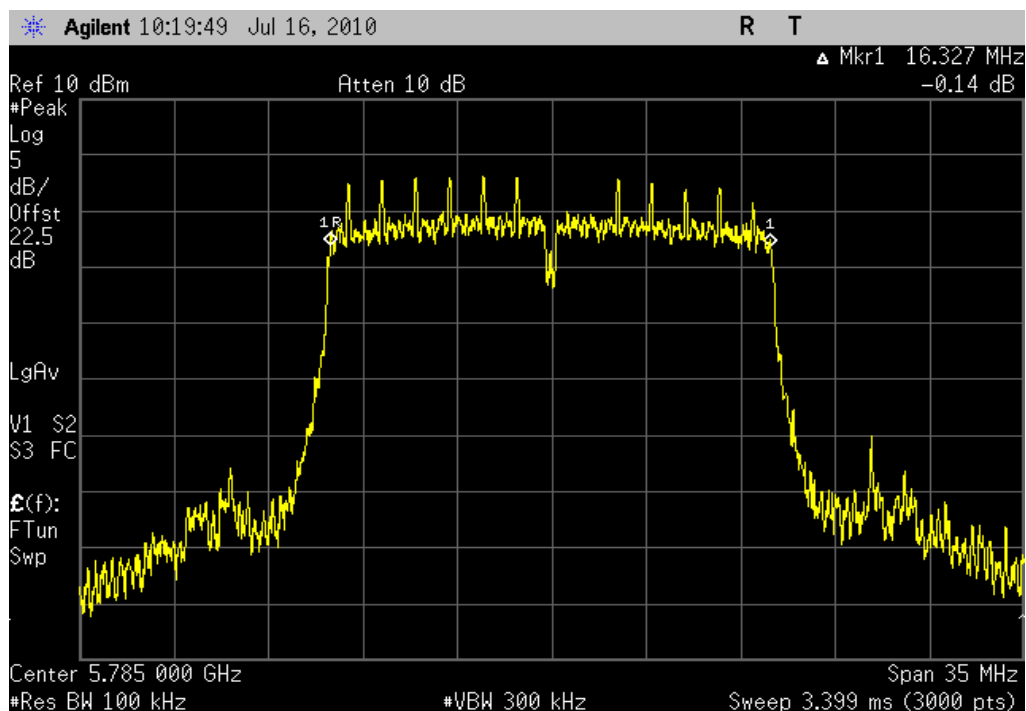


802.11(a) 6 Mbps, Mid Channel 157, 5785 MHz

Result: Pass

Value: 16.327 MHz

Limit: > 500 kHz

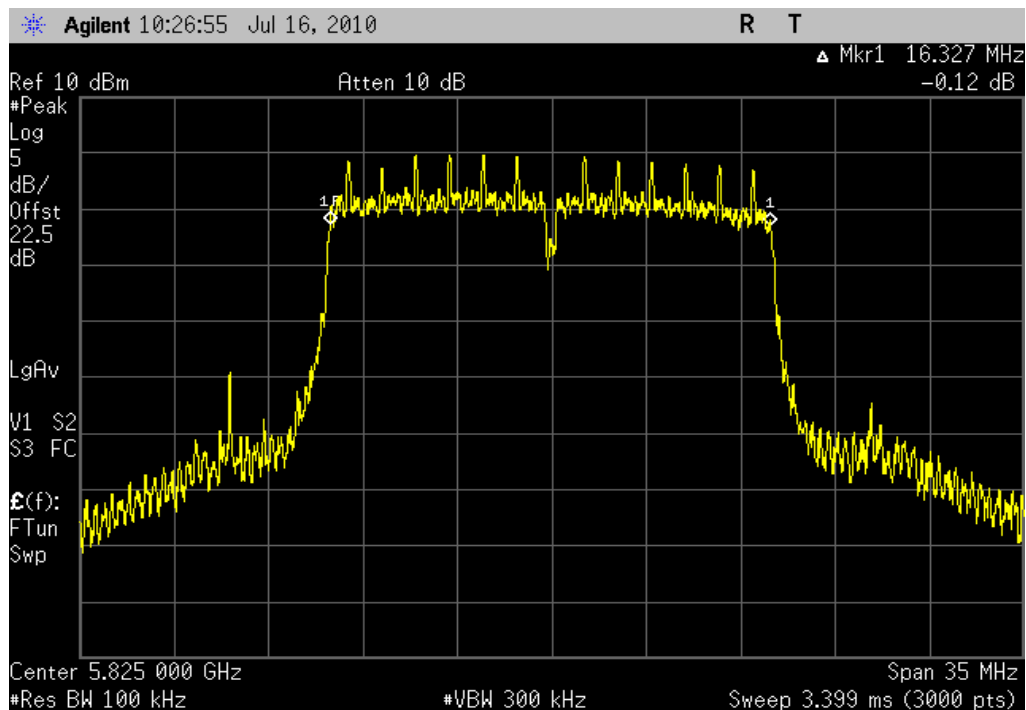


802.11(a) 6 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: 16.327 MHz

Limit: > 500 kHz

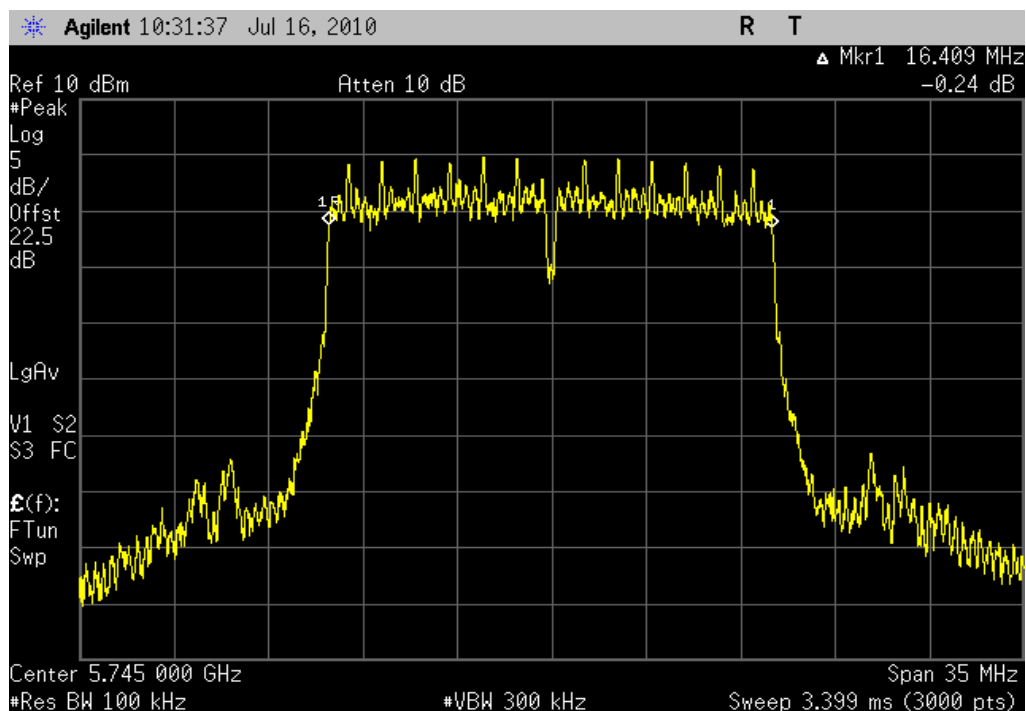


802.11(a) 36 Mbps, Low Channel 149, 5745 MHz

Result: Pass

Value: 16.409 MHz

Limit: > 500 kHz



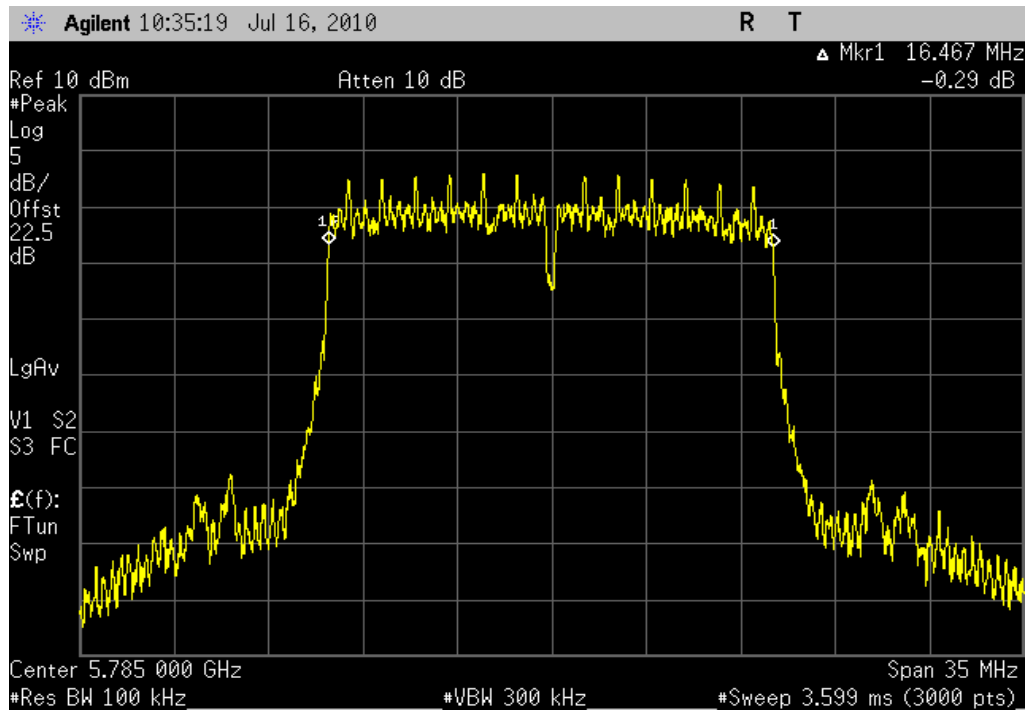
OCCUPIED BANDWIDTH

802.11(a) 36 Mbps, Mid Channel 157, 5785 MHz

Result: Pass

Value: 16.467 MHz

Limit: > 500 kHz

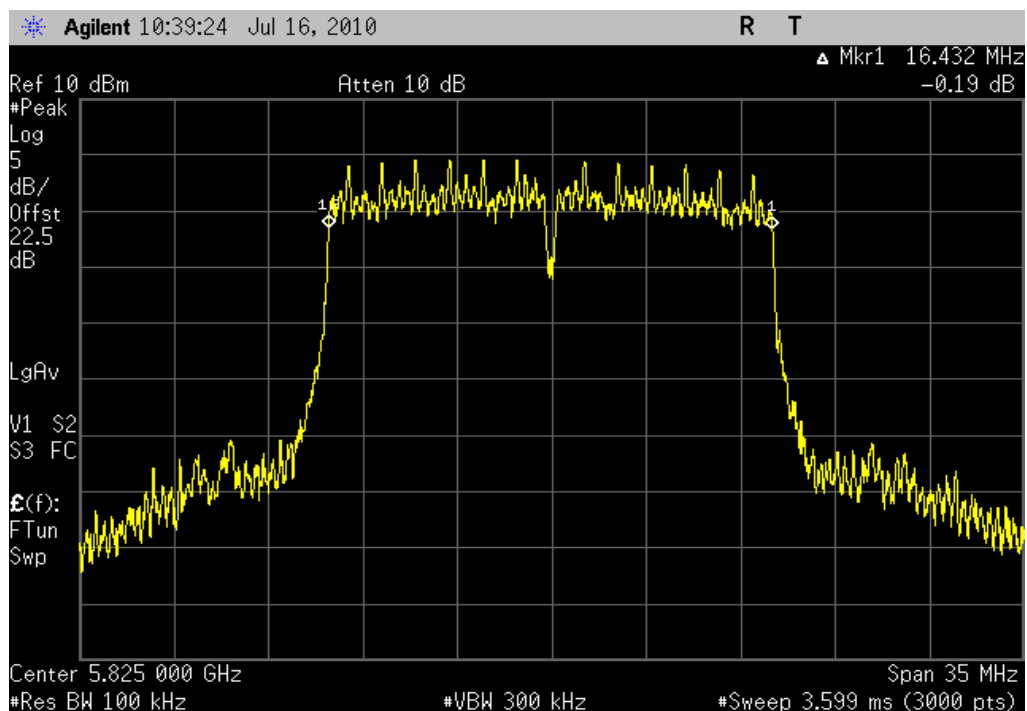


802.11(a) 36 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: 16.432 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
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
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 transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input. The amplitude accuracy of the spectrum analyzer was further enhanced by calibrating the setup using the power meter and synthesized signal generator.

Prior to measuring peak transmit power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. Both are required to determine the method of measuring Maximum Conducted Output Power. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

Method #3 found in ANSI C63.10 section 6.10.2.2 was used because the analyzer sweep time was greater than T for the operating mode which has the shortest transmission pulse duration and the Emission Bandwidth was greater than the largest RBW on the analyzer.

An external trigger from the EUT was used to ensure the measurement was only made during the pulse high time. Additionally, the gating function was used during 36 Mbps operation.

The spectrum analyzer settings were as follows:

- The span was set to encompass entire emission bandwidth (B), centered on the transmit channel.
- The RBW = 1 MHz, VBW = Autocoupled by analyzer firmware
- Sample detector mode because the bin width (span / number of spectral points) < 0.5 RBW.
- Power was integrated across "B", by using the channel power function of the analyzer.

EMC

OUTPUT POWER - CHANNEL POWER

EUT:	Summit FS848 Master Module (Wheeler)	Work Order:	FOCU0081
Serial Number:	A146	Date:	07/15/10
Customer:	Summit Semiconductor LLC	Temperature:	23°C
Attendees:	Alex Macdonald	Humidity:	45%
Project:	None	Barometric Pres.:	30.16 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

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

COMMENTS

Transmitting random audio data. External trigger from EUT, and gating on analyzer

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	2	Signature
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		Value	Limit	Results
802.11(g) 6 Mbps				
	Low Channel 149, 5745 MHz	15.0 dBm	30 dBm	Pass
	Mid Channel 157, 5785 MHz	13.5 dBm	30 dBm	Pass
	High Channel 165, 5825 MHz	15.2 dBm	30 dBm	Pass
802.11(g) 36 Mbps				
	Low Channel 149, 5745 MHz	14.7 dBm	30 dBm	Pass
	Mid Channel 157, 5785 MHz	13.4 dBm	30 dBm	Pass
	High Channel 165, 5825 MHz	14.8 dBm	30 dBm	Pass

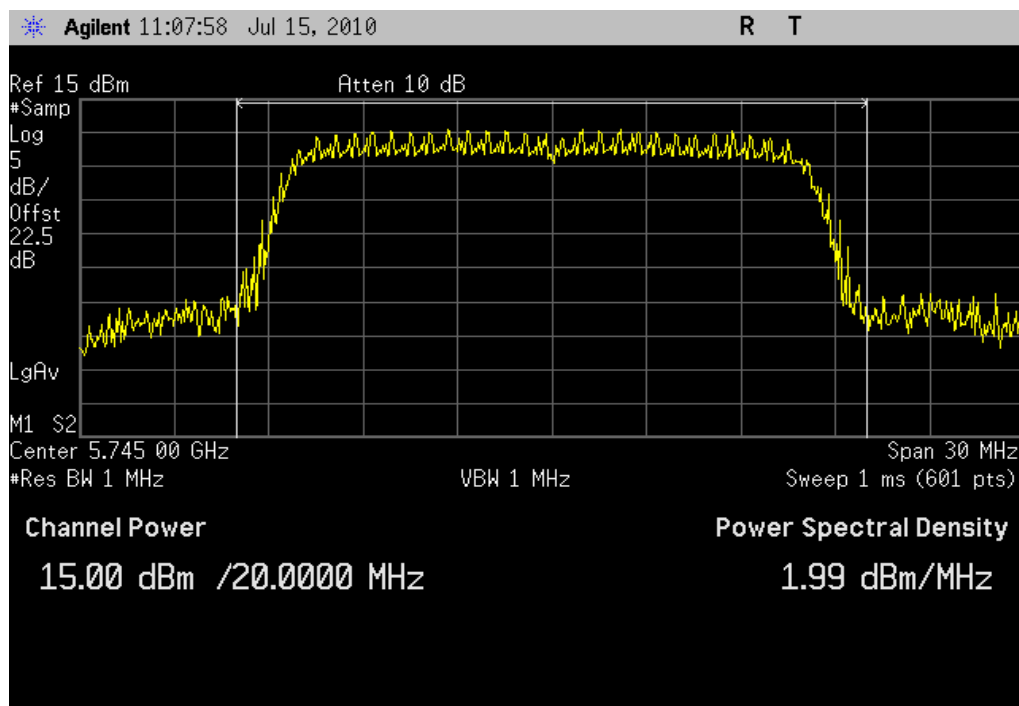
OUTPUT POWER - CHANNEL POWER

802.11(g) 6 Mbps, Low Channel 149, 5745 MHz

Result: Pass

Value: 15.0 dBm

Limit: 30 dBm

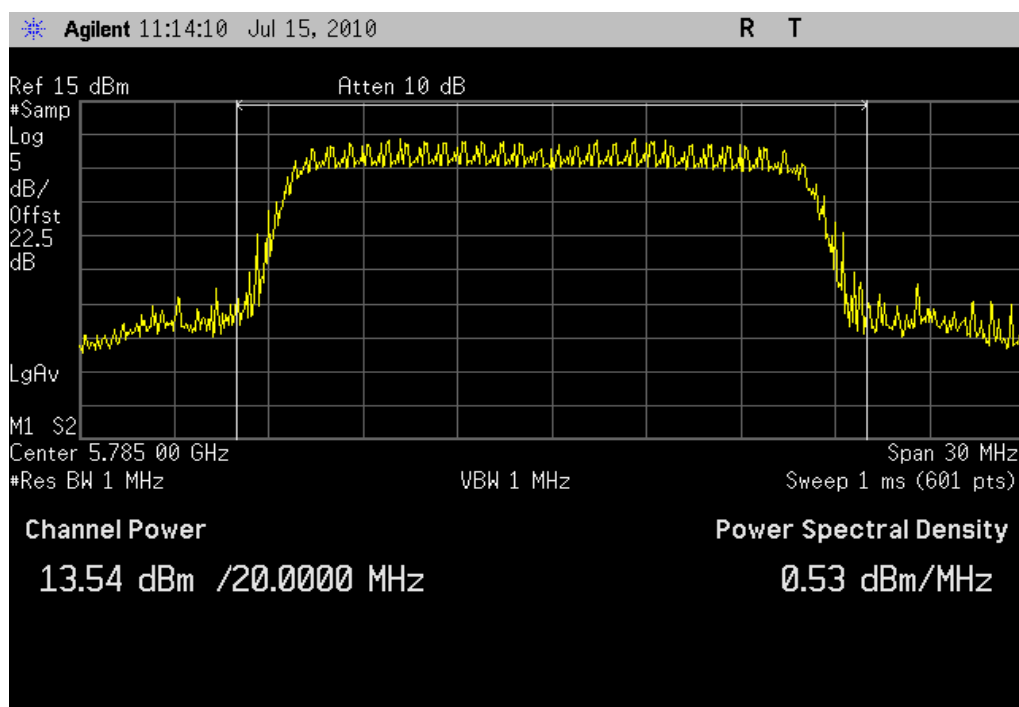


802.11(g) 6 Mbps, Mid Channel 157, 5785 MHz

Result: Pass

Value: 13.5 dBm

Limit: 30 dBm



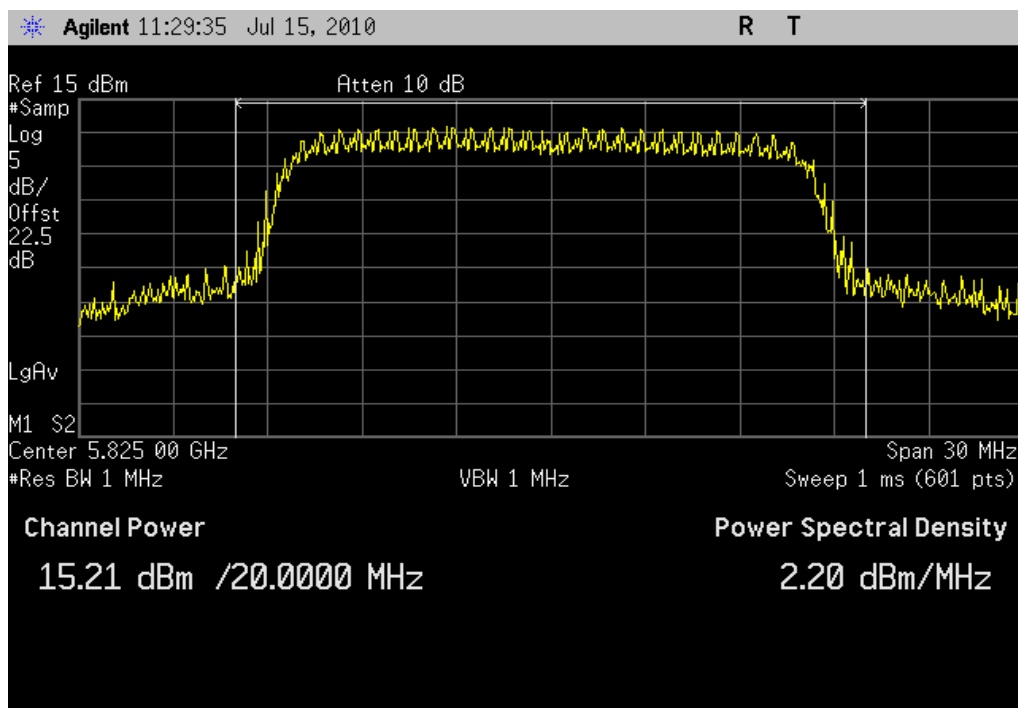
OUTPUT POWER - CHANNEL POWER

802.11(g) 6 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: 15.2 dBm

Limit: 30 dBm

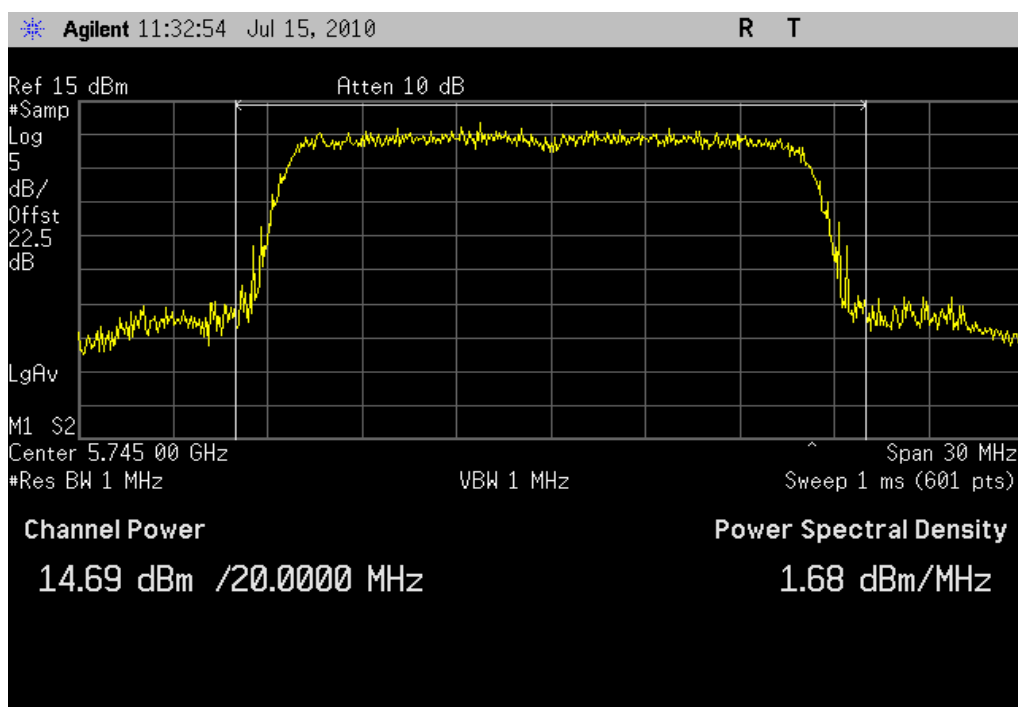


802.11(g) 36 Mbps, Low Channel 149, 5745 MHz

Result: Pass

Value: 14.7 dBm

Limit: 30 dBm



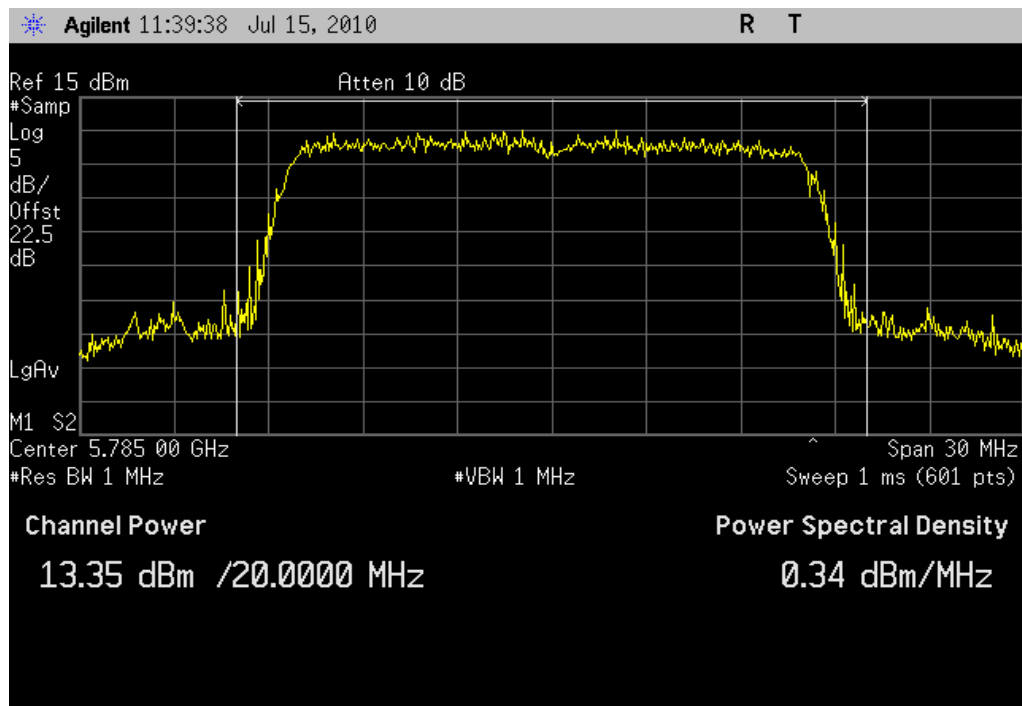
OUTPUT POWER - CHANNEL POWER

802.11(g) 36 Mbps, Mid Channel 157, 5785 MHz

Result: Pass

Value: 13.4 dBm

Limit: 30 dBm

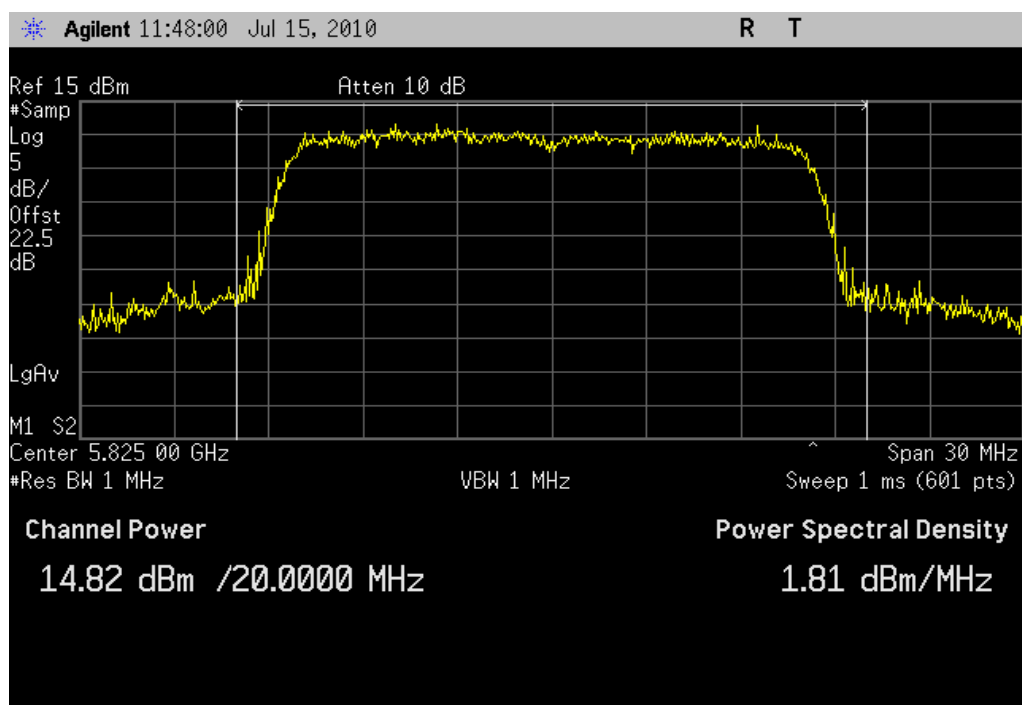


802.11(g) 36 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: 14.8 dBm

Limit: 30 dBm



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 band were measured with the EUT set to low and high transmit channels. 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 the required data rates available.

The spectrum was scanned across each band edge from 35 MHz below the band edge to 35 MHz above the band edge.

EMC

BAND EDGE COMPLIANCE

EUT:	Summit FS848 Master Module (Wheeler)	Work Order:	FOCU0081
Serial Number:	A146	Date:	07/16/10
Customer:	Summit Semiconductor LLC	Temperature:	23°C
Attendees:	Alex Macdonald	Humidity:	45%
Project:	None	Barometric Pres.:	30.16 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

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

COMMENTS

Transmitting random audio data

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	2	Signature 
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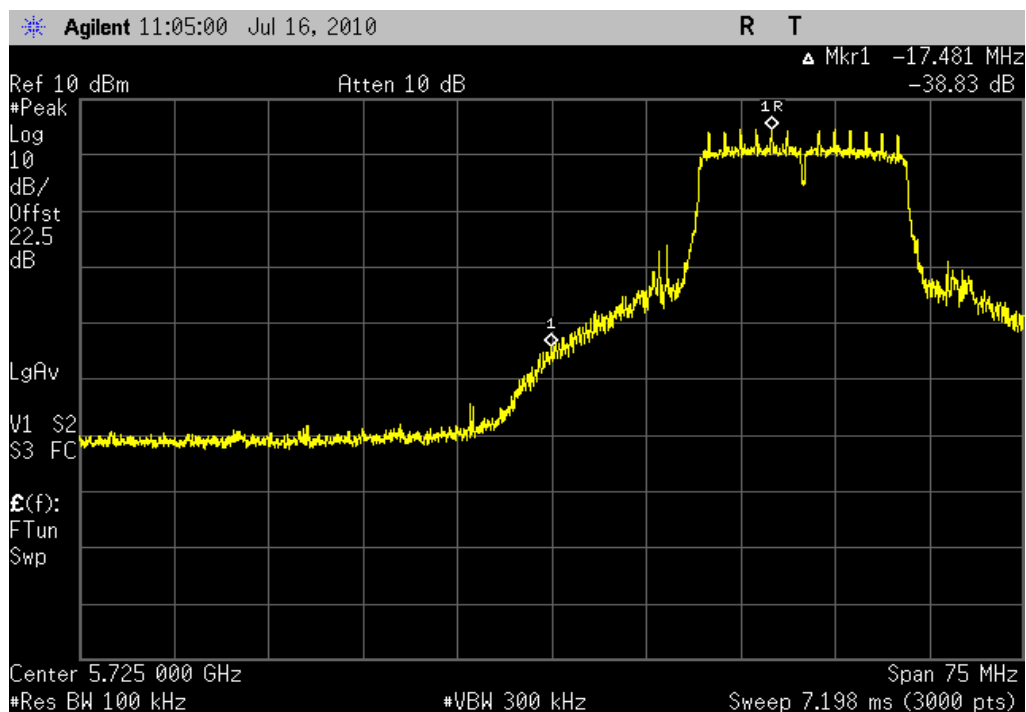
		Value	Limit	Results
802.11(a) 6 Mbps	Low Channel 149, 5745 MHz	-38.8 dBc	≤ -20 dBc	Pass
	High Channel 165, 5825 MHz	-44.2 dBc	≤ -20 dBc	Pass
802.11(a) 36 Mbps	Low Channel 149, 5745 MHz	-40.8 dBc	≤ -20 dBc	Pass
	High Channel 165, 5825 MHz	-44.8 dBc	≤ -20 dBc	Pass

BAND EDGE COMPLIANCE

802.11(a) 6 Mbps, Low Channel 149, 5745 MHz

Result: Pass

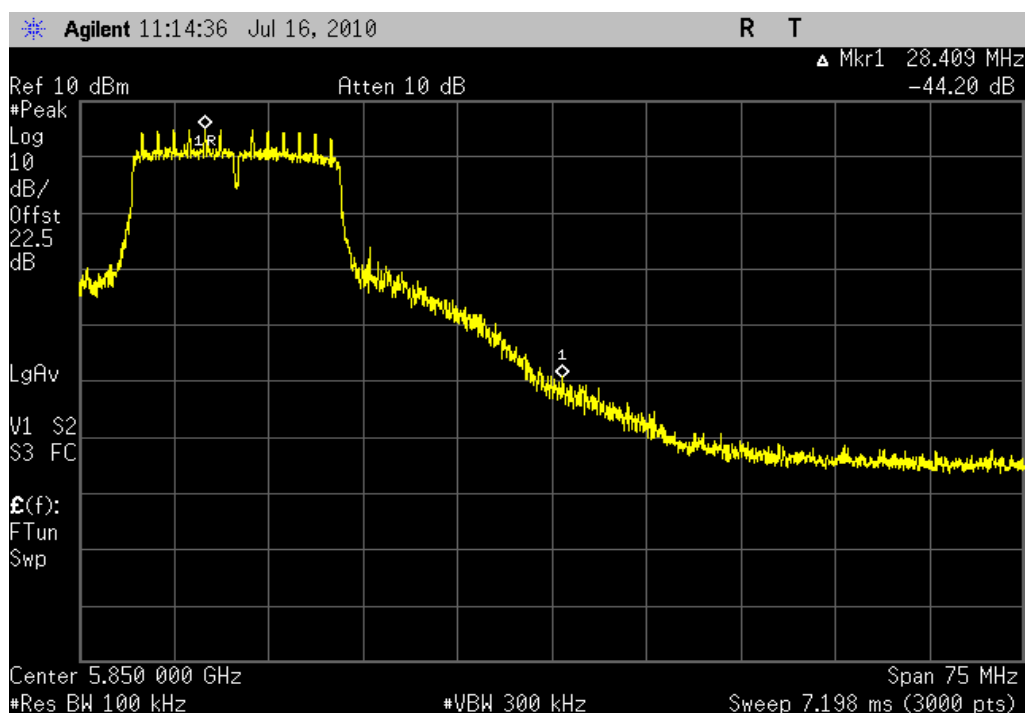
Value: -38.8 dBc

Limit: ≤ -20 dBc

802.11(a) 6 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: -44.2 dBc

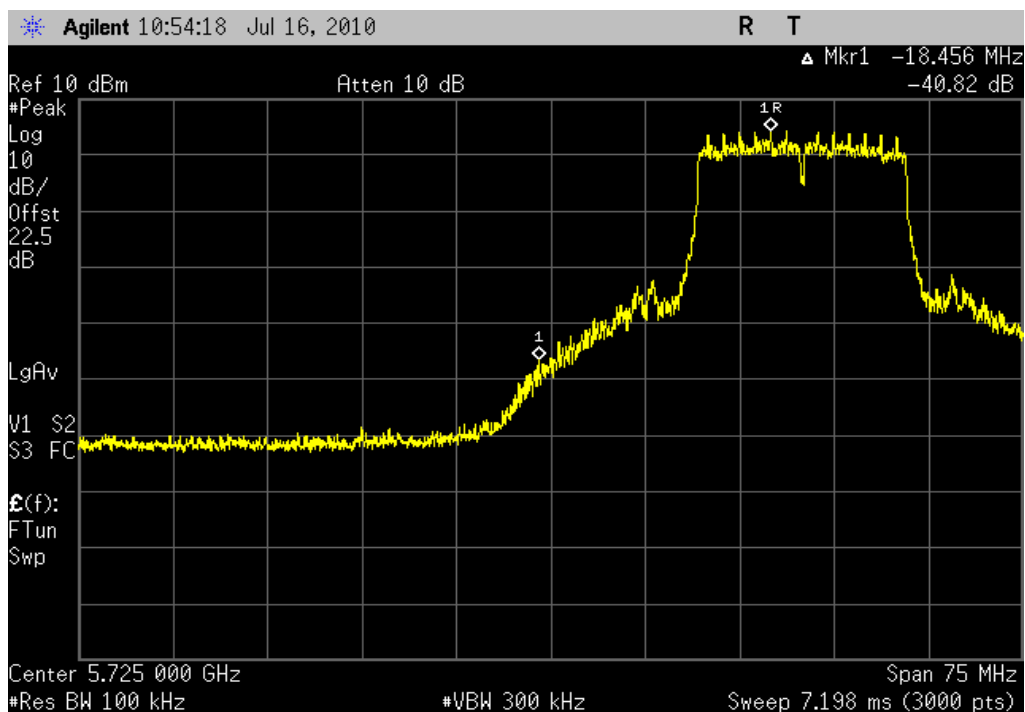
Limit: ≤ -20 dBc

BAND EDGE COMPLIANCE

802.11(a) 36 Mbps, Low Channel 149, 5745 MHz

Result: Pass

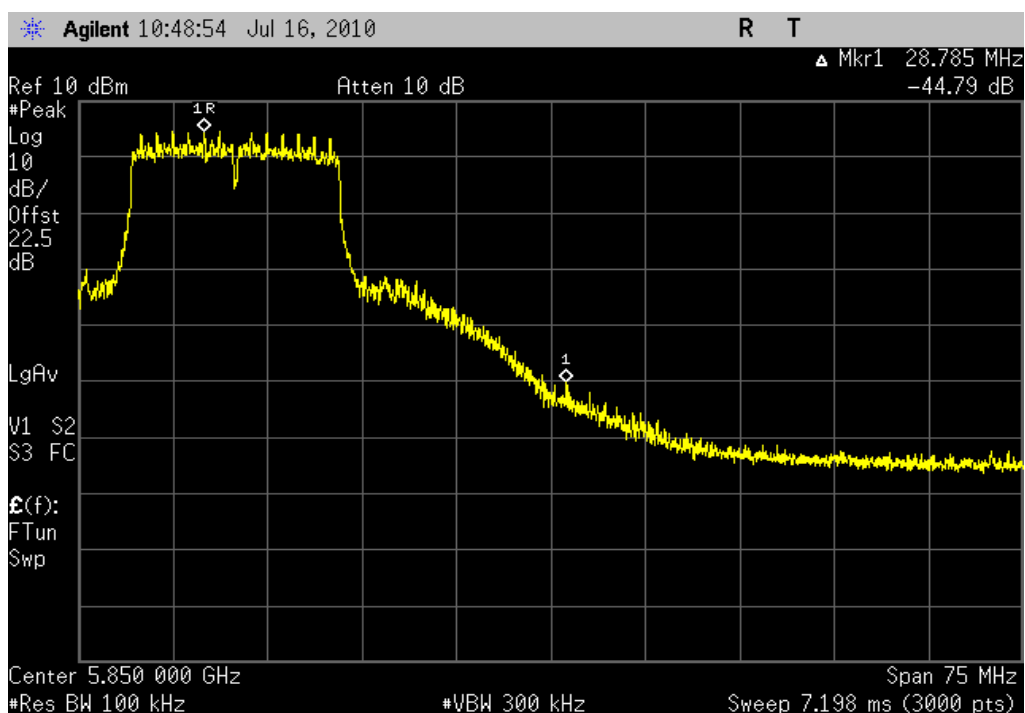
Value: -40.8 dBc

Limit: ≤ -20 dBc

802.11(a) 36 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: -44.8 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	E4446A	AAQ	1/6/2010	12
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
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECC	NCR	0

MEASUREMENT UNCERTAINTY

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

TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

EMC

SPURIOUS CONDUCTED EMISSIONS

EUT:	Summit FS848 Master Module (Wheeler)	Work Order:	FOCU0081
Serial Number:	A146 & 0265	Date:	07/27/10
Customer:	Summit Semiconductor LLC	Temperature:	23°C
Attendees:	Alex Macdonald	Humidity:	45%
Project:	None	Barometric Pres.:	30.16 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

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

COMMENTS

Transmitting random audio data. A146 used for 30 MHz - 26.5 GHz, 0265 used from 26.5 GHz - 40 GHz.

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	2	Signature 
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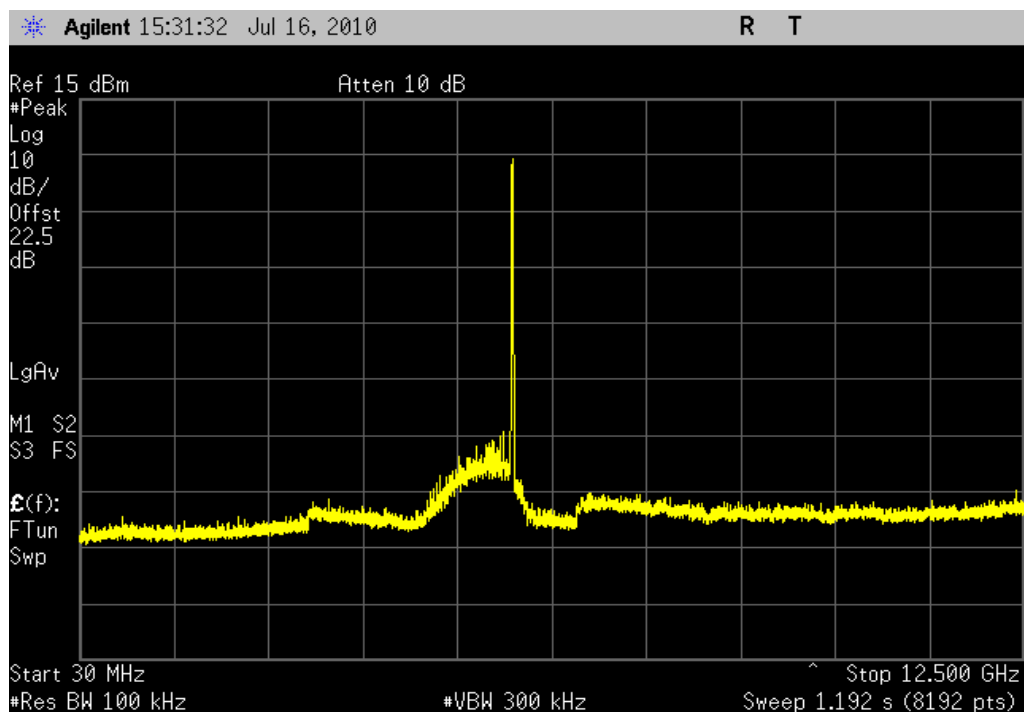
		Value	Limit	Results
6 Mbps				
	Low Channel 149, 5745 MHz			
	30 MHz - 12.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.5 GHz - 26.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	26.5 GHz - 31 GHz	< -40 dBc	≤ -20 dBc	Pass
	31 GHz - 40 GHz	< -40 dBc	≤ -20 dBc	Pass
	Mid Channel 157, 5785 MHz			
	30 MHz - 12.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.5 GHz - 26.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	26.5 GHz - 31 GHz	< -40 dBc	≤ -20 dBc	Pass
	31 GHz - 40 GHz	< -40 dBc	≤ -20 dBc	Pass
	High Channel 165, 5825 MHz			
	30 MHz - 12.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.5 GHz - 26.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	26.5 GHz - 31 GHz	< -40 dBc	≤ -20 dBc	Pass
	31 GHz - 40 GHz	< -40 dBc	≤ -20 dBc	Pass
36 Mbps				
	Low Channel 149, 5745 MHz			
	30 MHz - 12.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.5 GHz - 26.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	26.5 GHz - 31 GHz	< -40 dBc	≤ -20 dBc	Pass
	31 GHz - 40 GHz	< -40 dBc	≤ -20 dBc	Pass
	Mid Channel 157, 5785 MHz			
	30 MHz - 12.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.5 GHz - 26.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	26.5 GHz - 31 GHz	< -40 dBc	≤ -20 dBc	Pass
	31 GHz - 40 GHz	< -40 dBc	≤ -20 dBc	Pass
	High Channel 165, 5825 MHz			
	30 MHz - 12.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	12.5 GHz - 26.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	26.5 GHz - 31 GHz	< -40 dBc	≤ -20 dBc	Pass
	31 GHz - 40 GHz	< -40 dBc	≤ -20 dBc	Pass

SPURIOUS CONDUCTED EMISSIONS

6 Mbps, Low Channel 149, 5745 MHz, 30 MHz - 12.5 GHz

Result: Pass

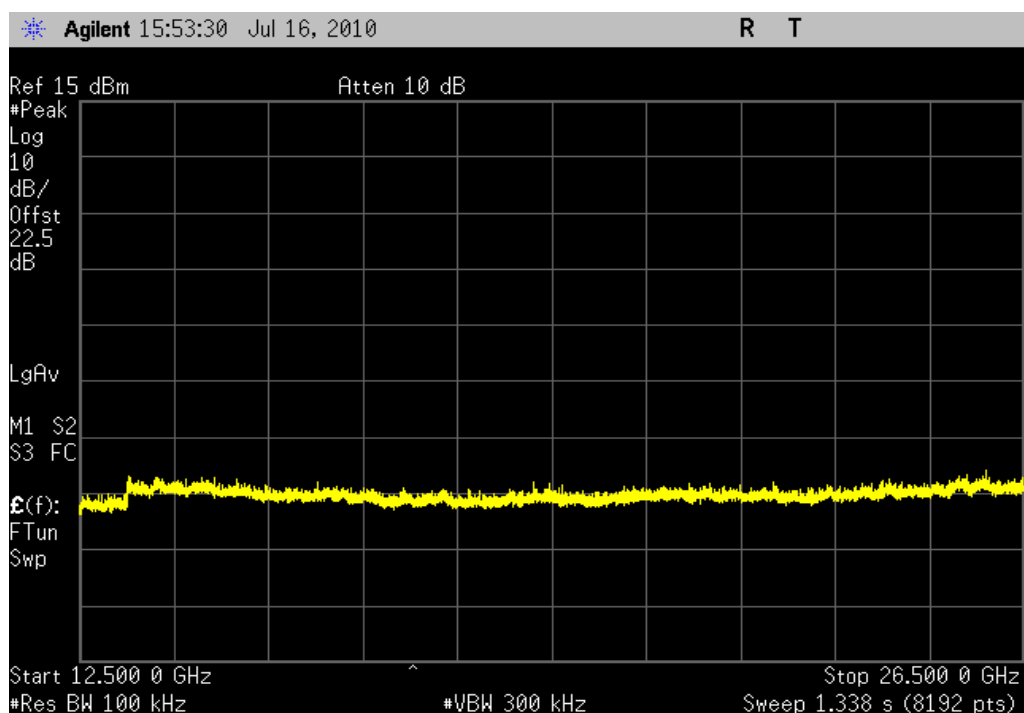
Value: < -40 dBc

Limit: ≤ -20 dBc

6 Mbps, Low Channel 149, 5745 MHz, 12.5 GHz - 26.5 GHz

Result: Pass

Value: < -40 dBc

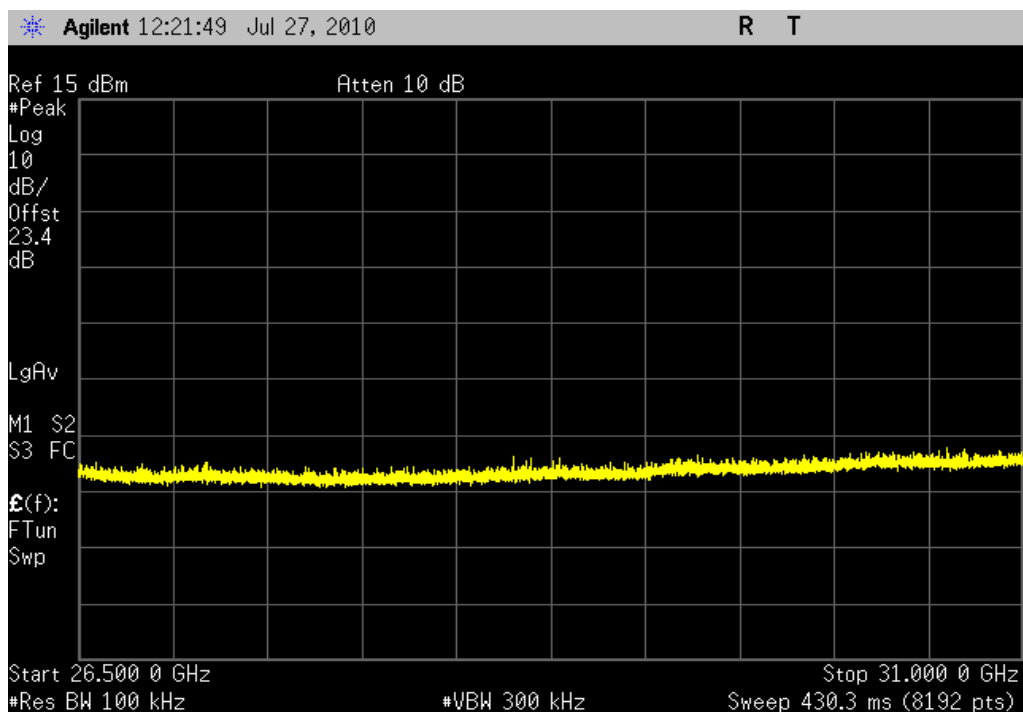
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

6 Mbps, Low Channel 149, 5745 MHz, 26.5 GHz - 31 GHz

Result: Pass

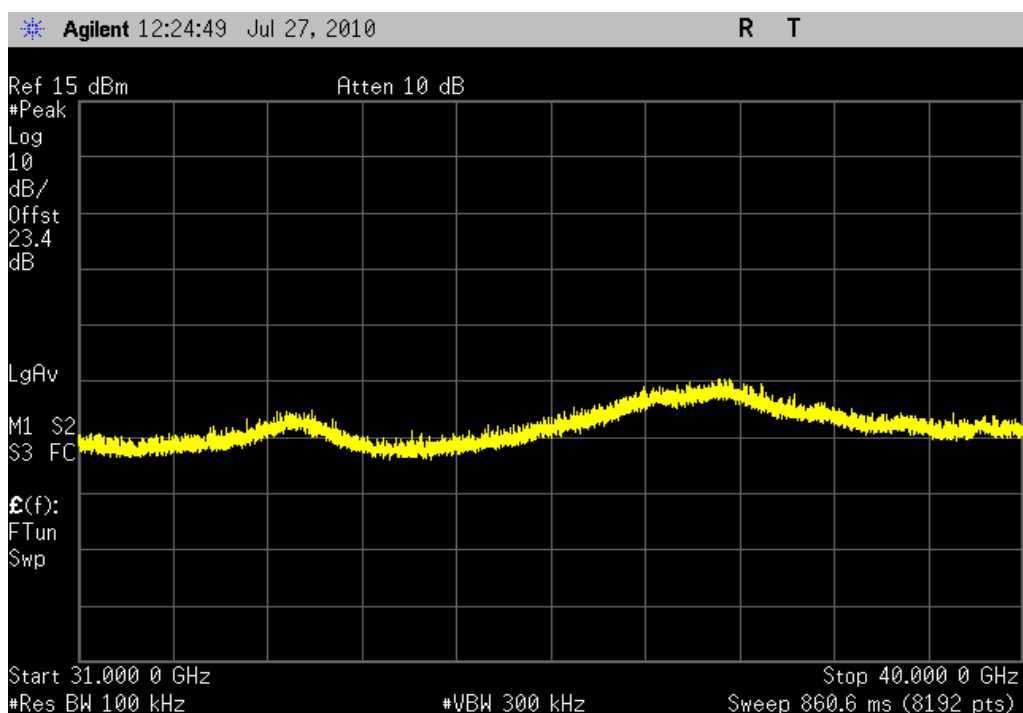
Value: < -40 dBc

Limit: ≤ -20 dBc

6 Mbps, Low Channel 149, 5745 MHz, 31 GHz - 40 GHz

Result: Pass

Value: < -40 dBc

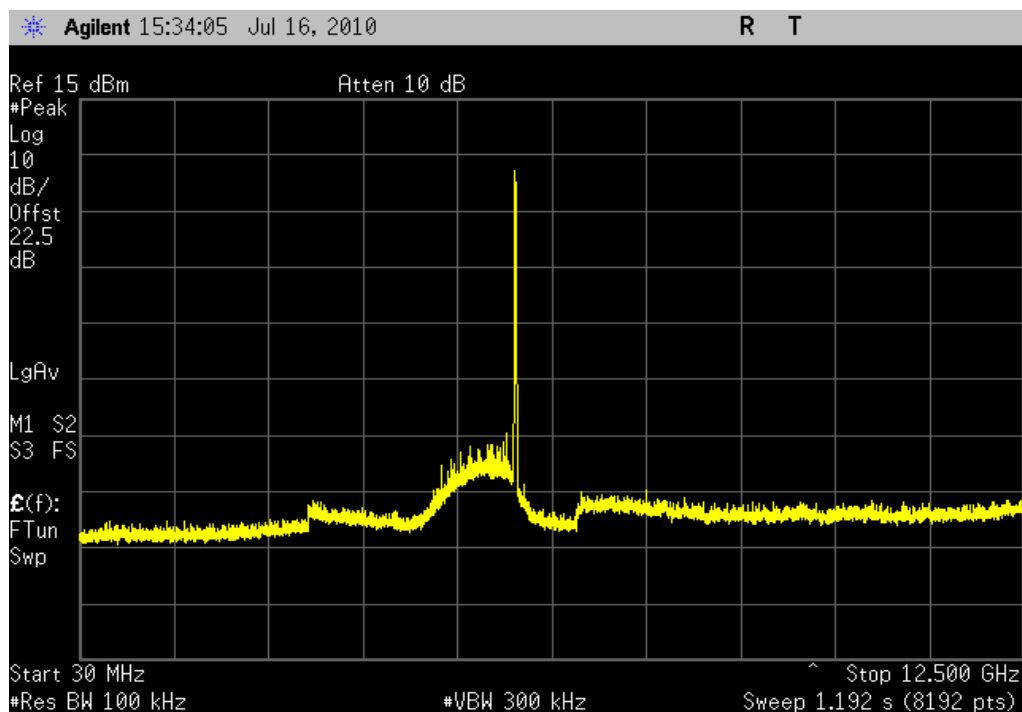
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

6 Mbps, Mid Channel 157, 5785 MHz, 30 MHz - 12.5 GHz

Result: Pass

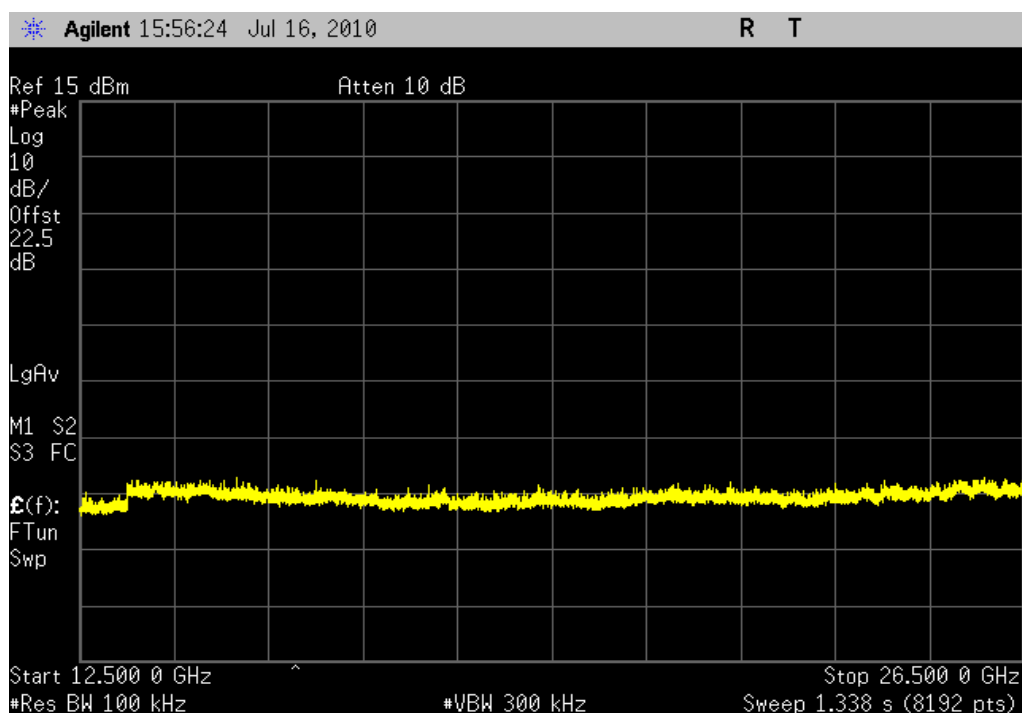
Value: < -40 dBc

Limit: ≤ -20 dBc

6 Mbps, Mid Channel 157, 5785 MHz, 12.5 GHz - 26.5 GHz

Result: Pass

Value: < -40 dBc

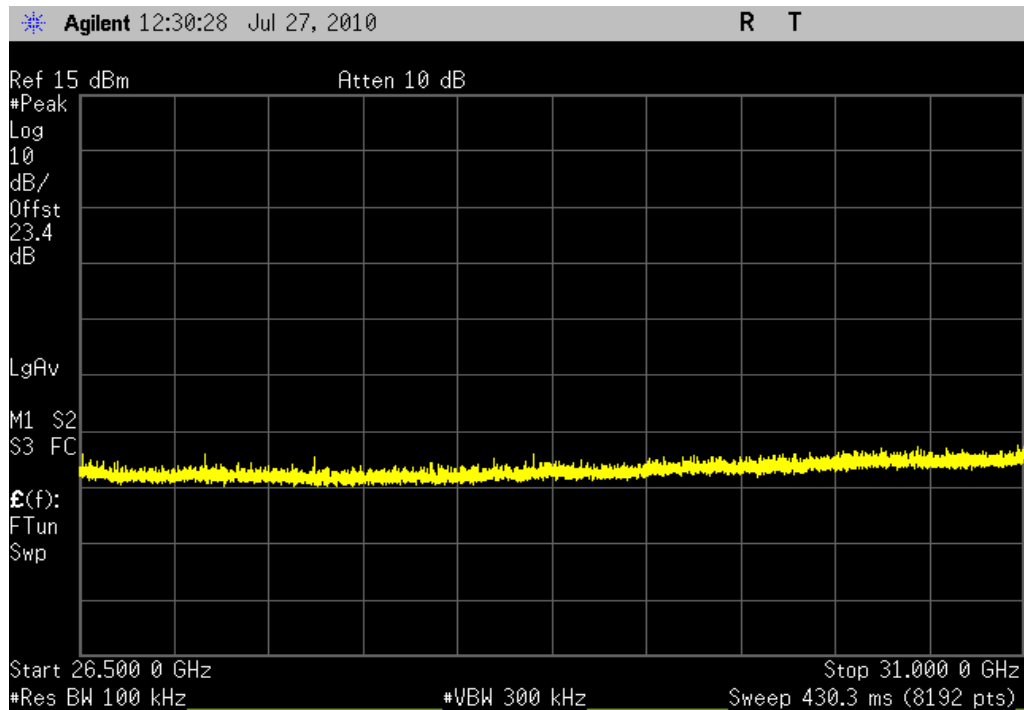
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

6 Mbps, Mid Channel 157, 5785 MHz, 26.5 GHz - 31 GHz

Result: Pass

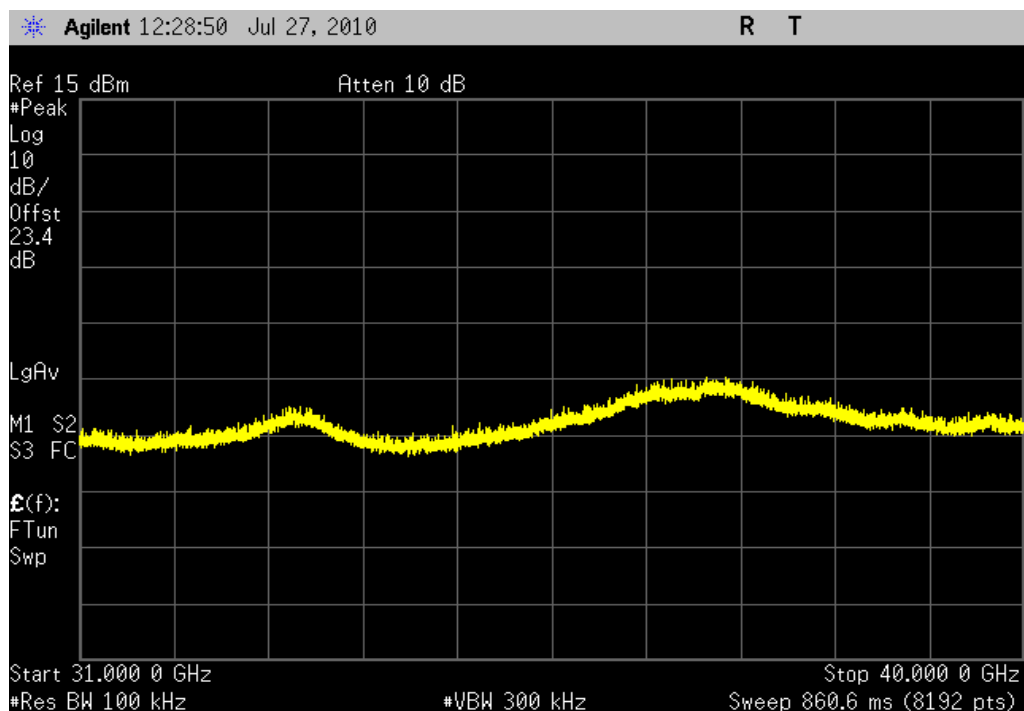
Value: < -40 dBc

Limit: ≤ -20 dBc

6 Mbps, Mid Channel 157, 5785 MHz, 31 GHz - 40 GHz

Result: Pass

Value: < -40 dBc

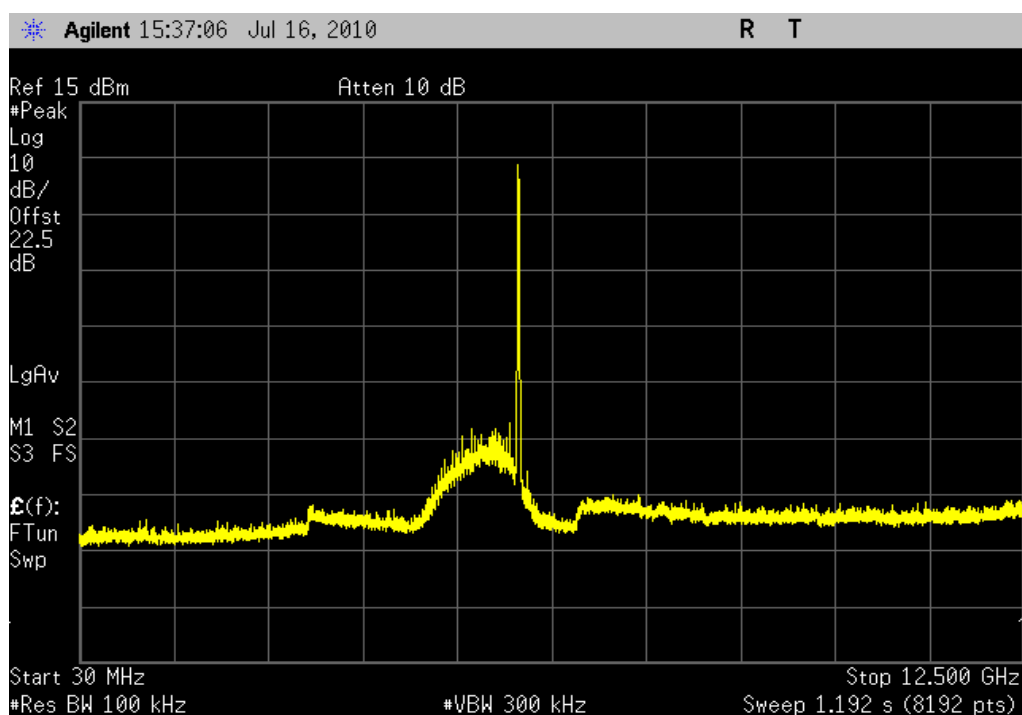
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

6 Mbps, High Channel 165, 5825 MHz, 30 MHz - 12.5 GHz

Result: Pass

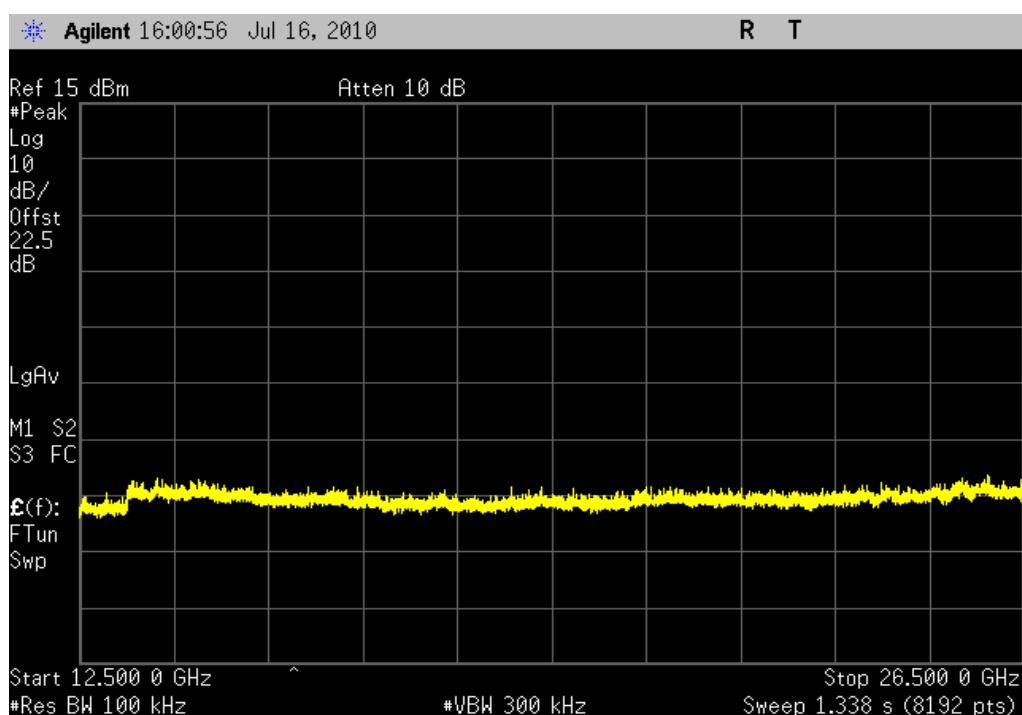
Value: < -40 dBc

Limit: ≤ -20 dBc

6 Mbps, High Channel 165, 5825 MHz, 12.5 GHz - 26.5 GHz

Result: Pass

Value: < -40 dBc

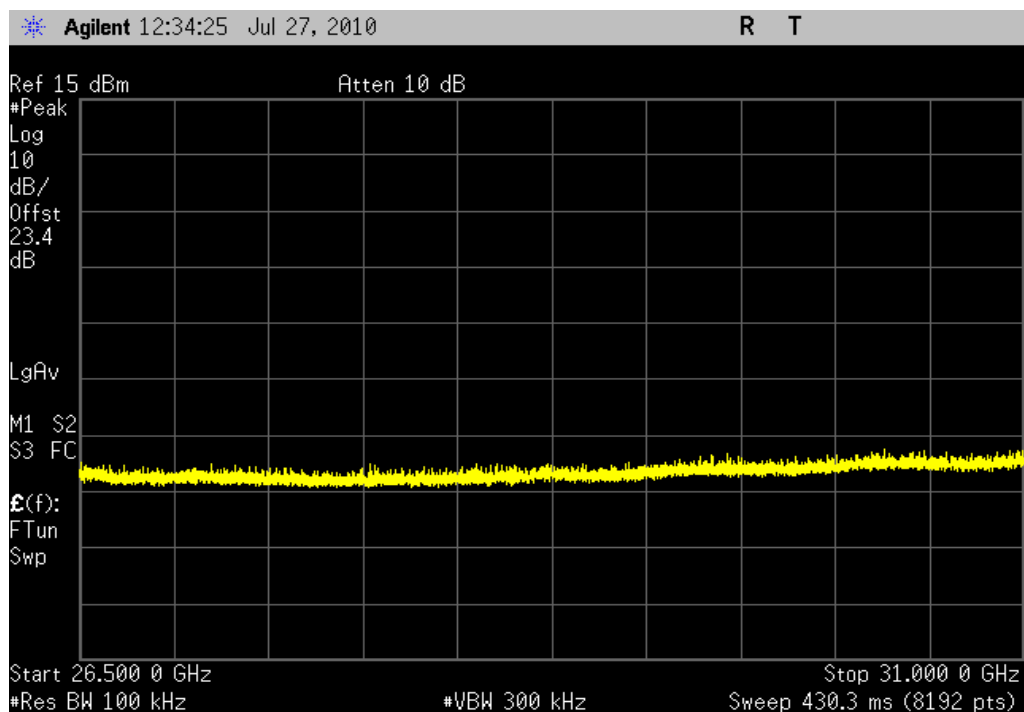
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

6 Mbps, High Channel 165, 5825 MHz, 26.5 GHz - 31 GHz

Result: Pass

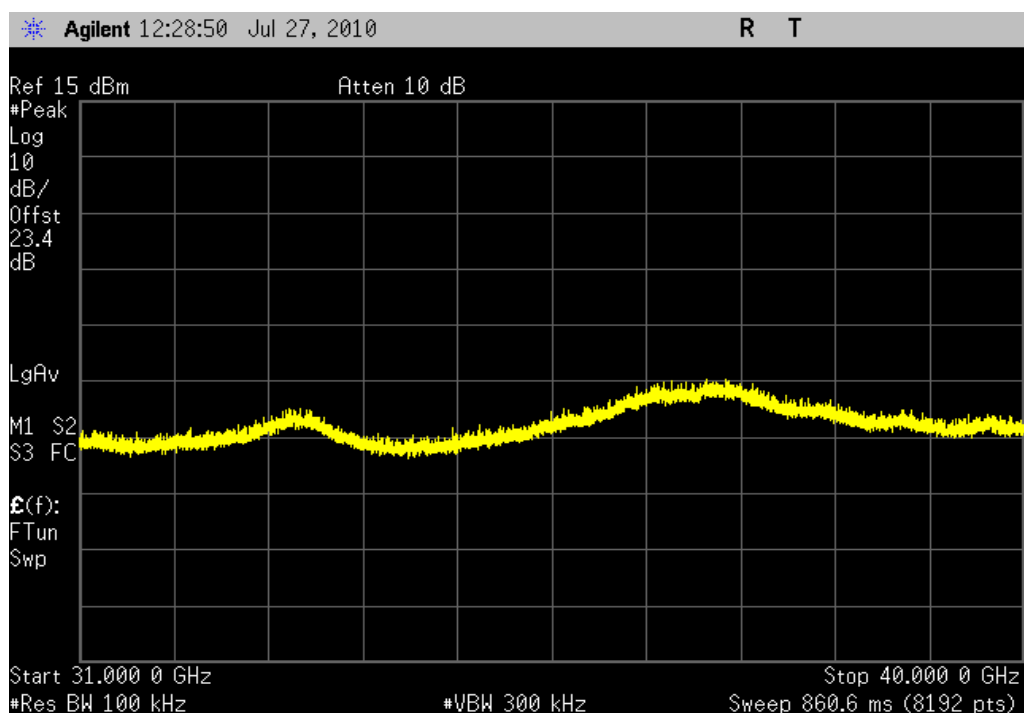
Value: < -40 dBc

Limit: ≤ -20 dBc

6 Mbps, High Channel 165, 5825 MHz, 31 GHz - 40 GHz

Result: Pass

Value: < -40 dBc

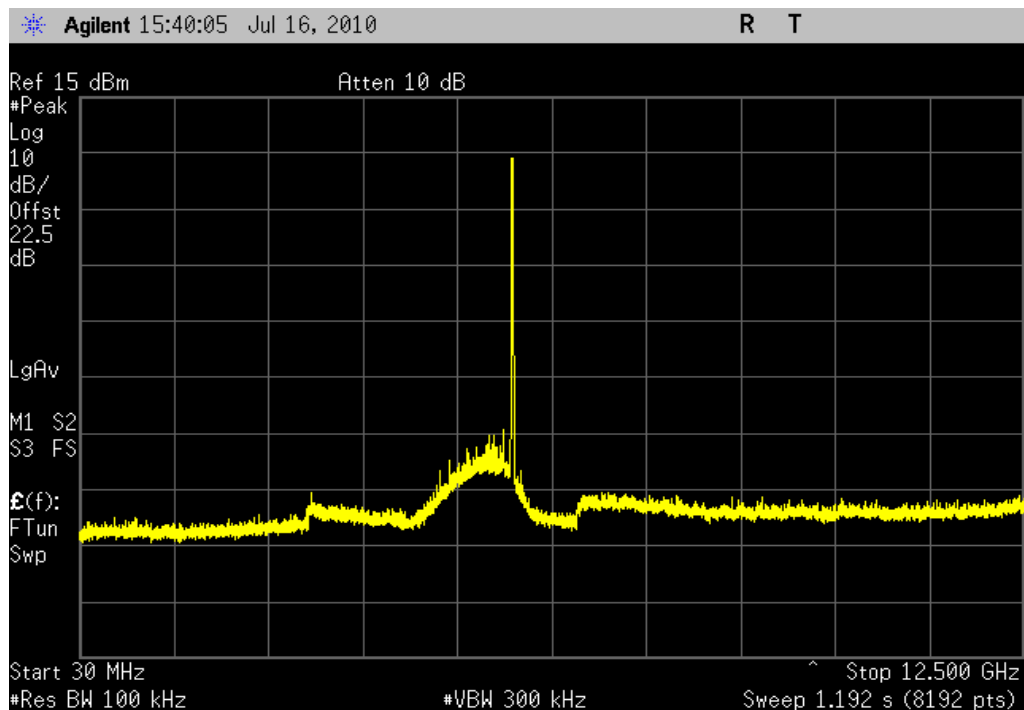
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

36 Mbps, Low Channel 149, 5745 MHz, 30 MHz - 12.5 GHz

Result: Pass

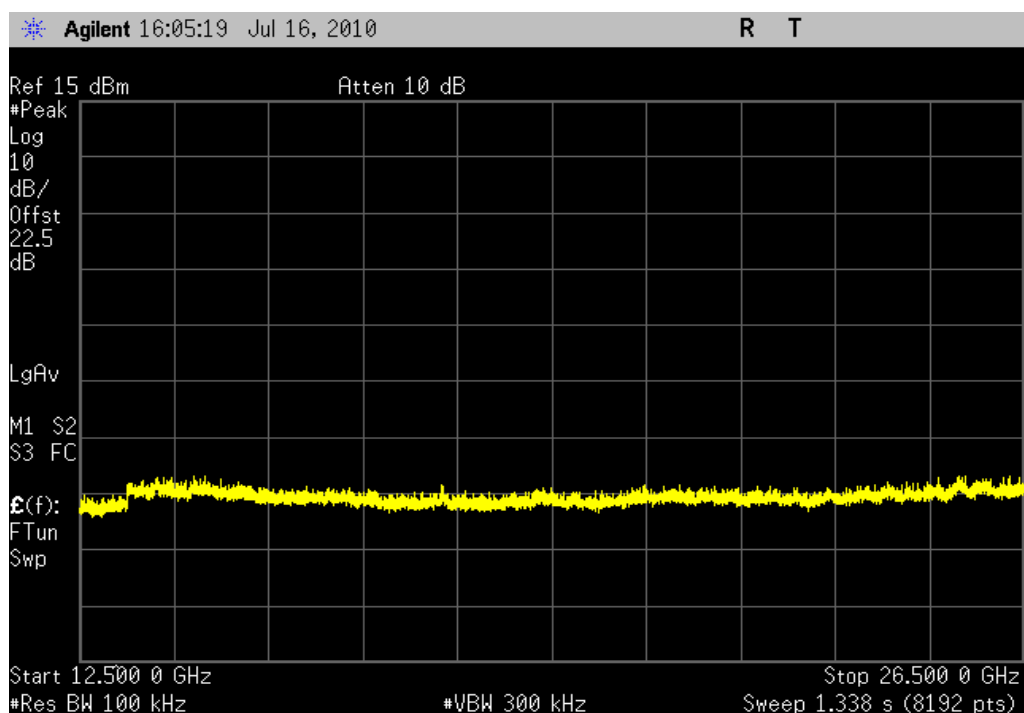
Value: < -40 dBc

Limit: ≤ -20 dBc

36 Mbps, Low Channel 149, 5745 MHz, 12.5 GHz - 26.5 GHz

Result: Pass

Value: < -40 dBc

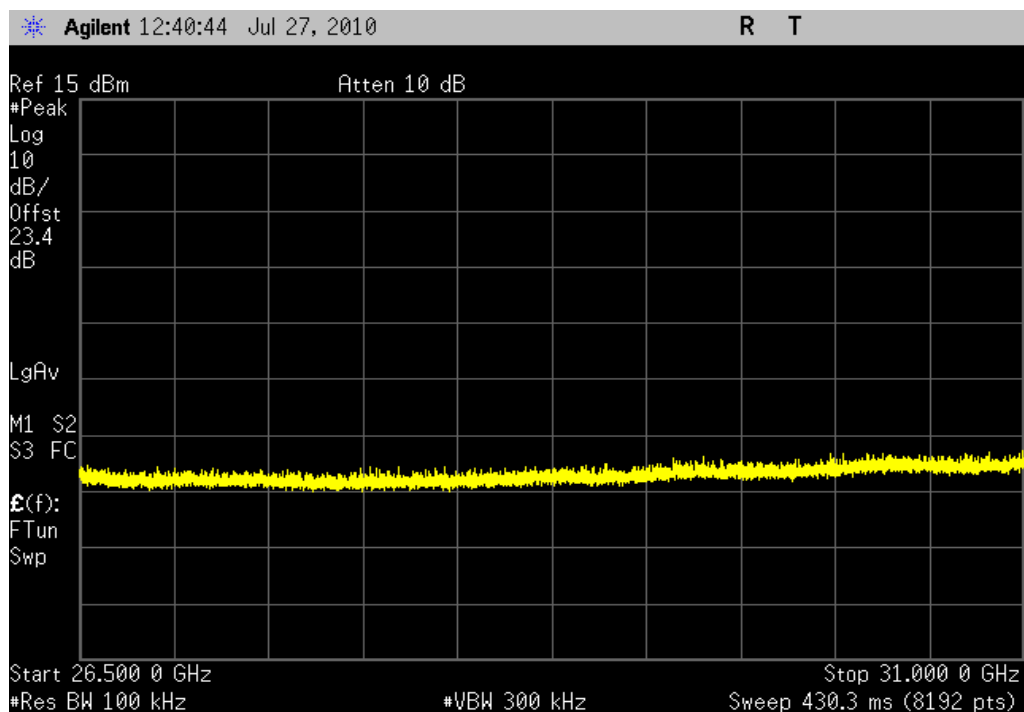
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

36 Mbps, Low Channel 149, 5745 MHz, 26.5 GHz - 31 GHz

Result: Pass

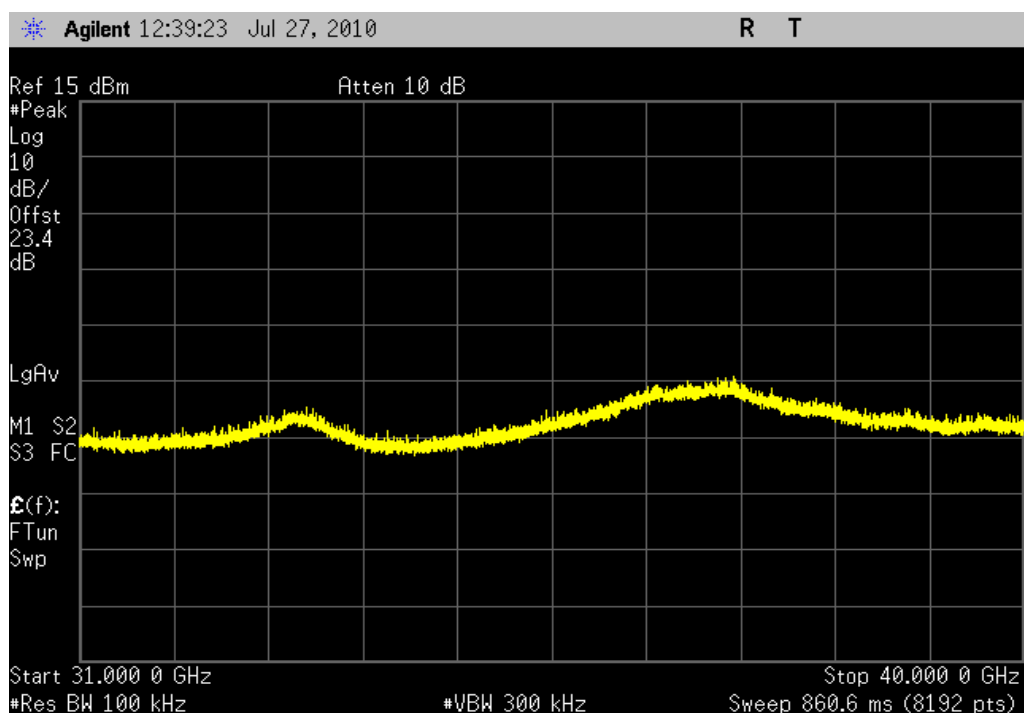
Value: < -40 dBc

Limit: ≤ -20 dBc

36 Mbps, Low Channel 149, 5745 MHz, 31 GHz - 40 GHz

Result: Pass

Value: < -40 dBc

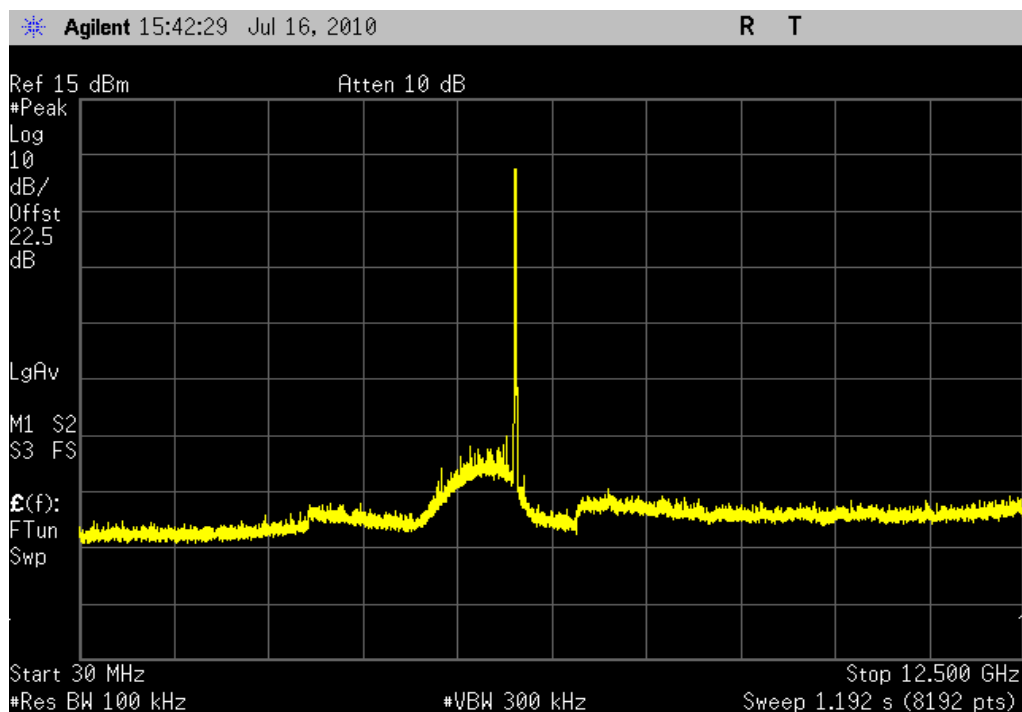
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

36 Mbps, Mid Channel 157, 5785 MHz, 30 MHz - 12.5 GHz

Result: Pass

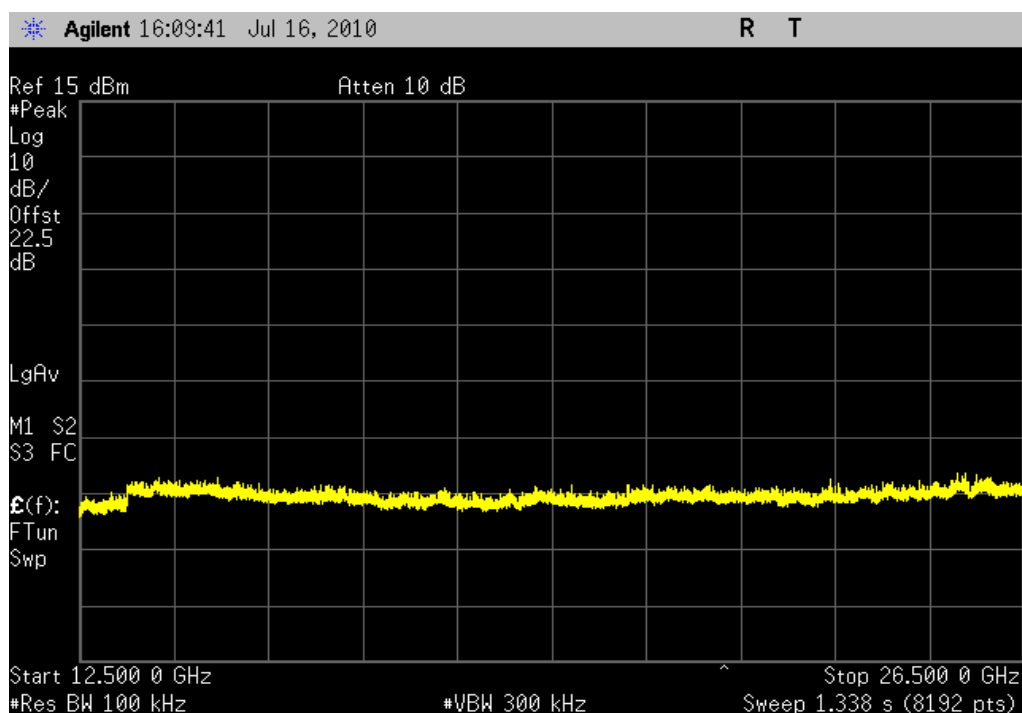
Value: < -40 dBc

Limit: ≤ -20 dBc

36 Mbps, Mid Channel 157, 5785 MHz, 12.5 GHz - 26.5 GHz

Result: Pass

Value: < -40 dBc

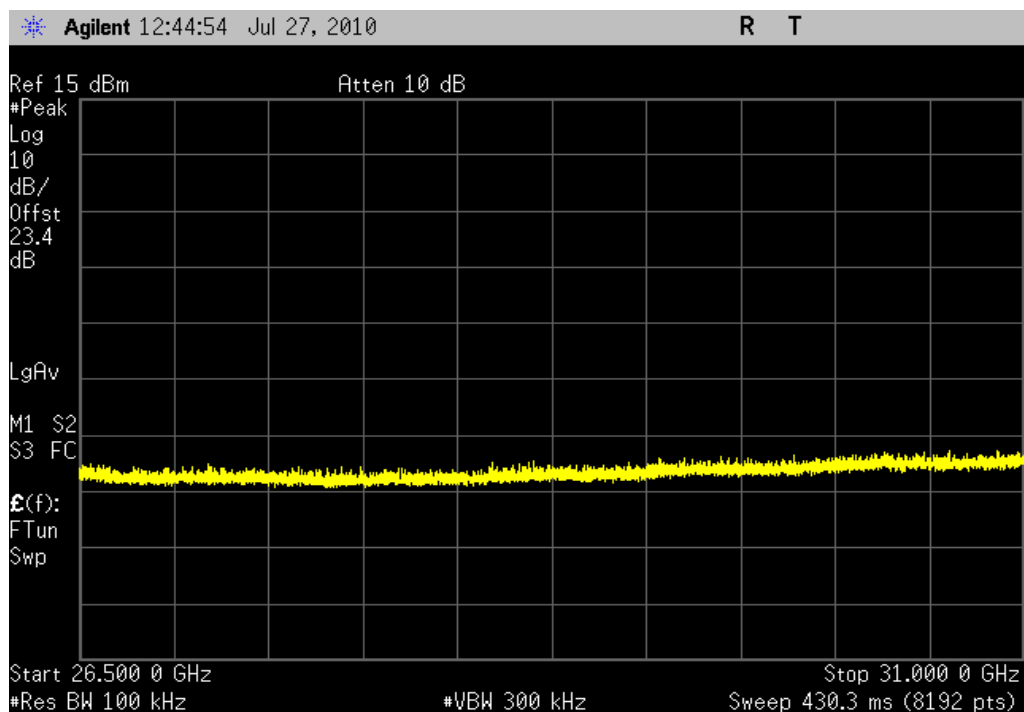
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

36 Mbps, Mid Channel 157, 5785 MHz, 26.5 GHz - 31 GHz

Result: Pass

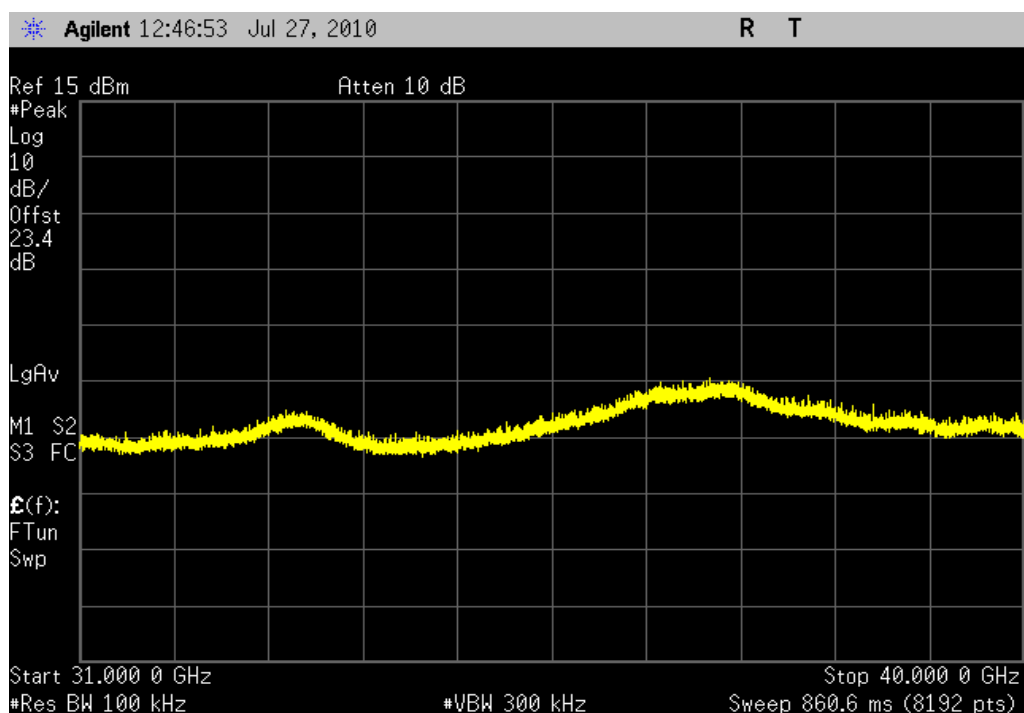
Value: < -40 dBc

Limit: ≤ -20 dBc

36 Mbps, Mid Channel 157, 5785 MHz, 31 GHz - 40 GHz

Result: Pass

Value: < -40 dBc

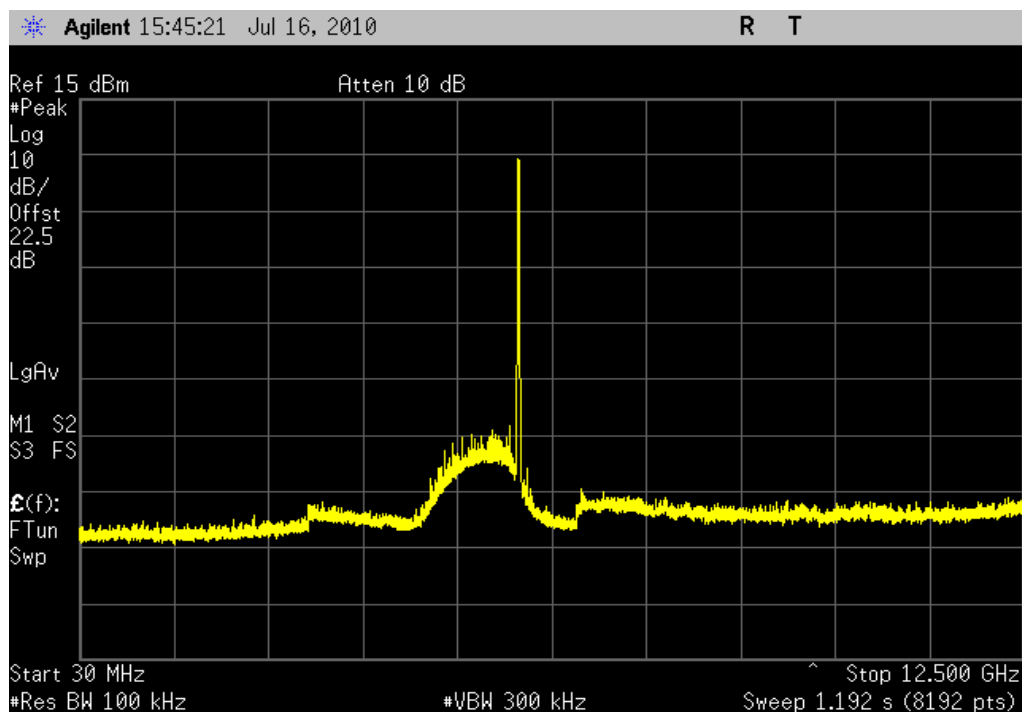
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

36 Mbps, High Channel 165, 5825 MHz, 30 MHz - 12.5 GHz

Result: Pass

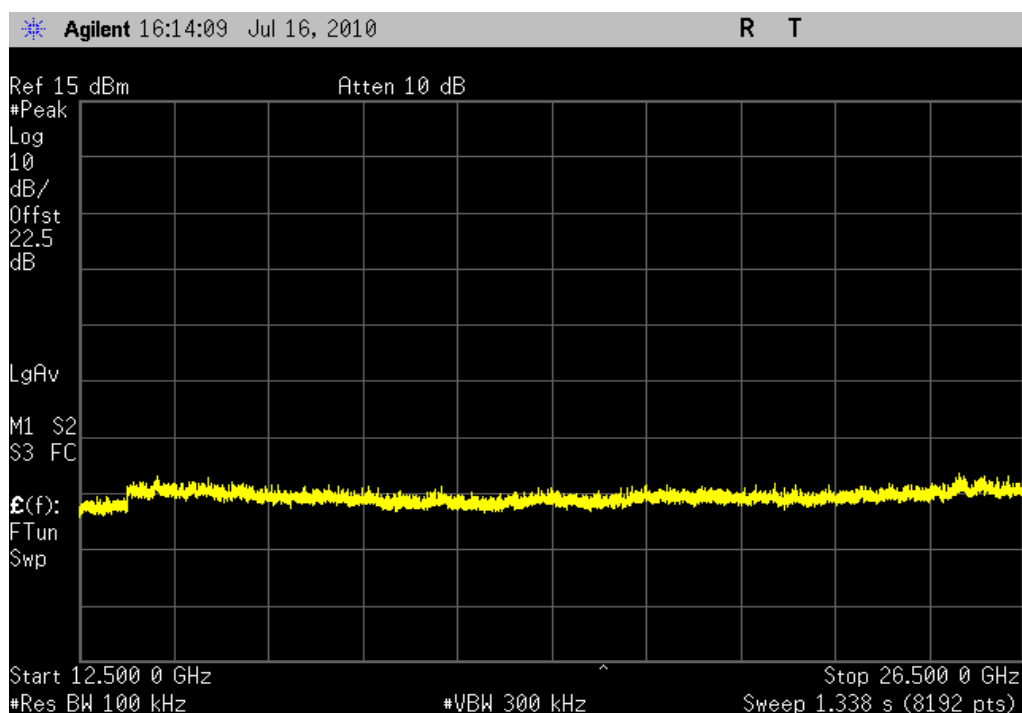
Value: < -40 dBc

Limit: ≤ -20 dBc

36 Mbps, High Channel 165, 5825 MHz, 12.5 GHz - 26.5 GHz

Result: Pass

Value: < -40 dBc

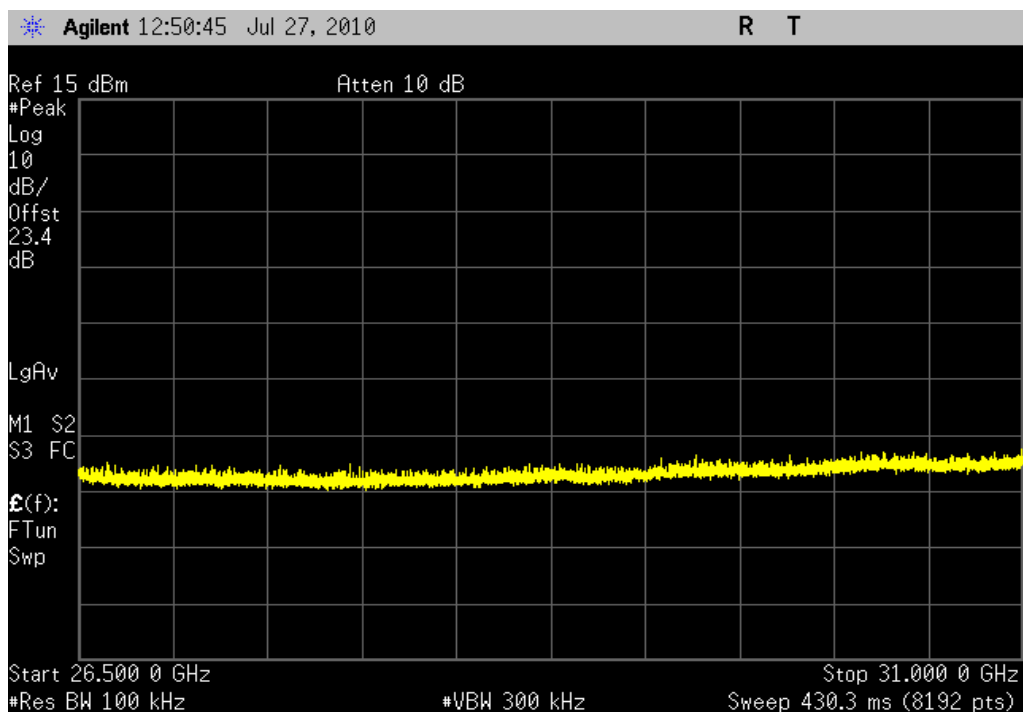
Limit: ≤ -20 dBc

SPURIOUS CONDUCTED EMISSIONS

36 Mbps, High Channel 165, 5825 MHz, 26.5 GHz - 31 GHz

Result: Pass

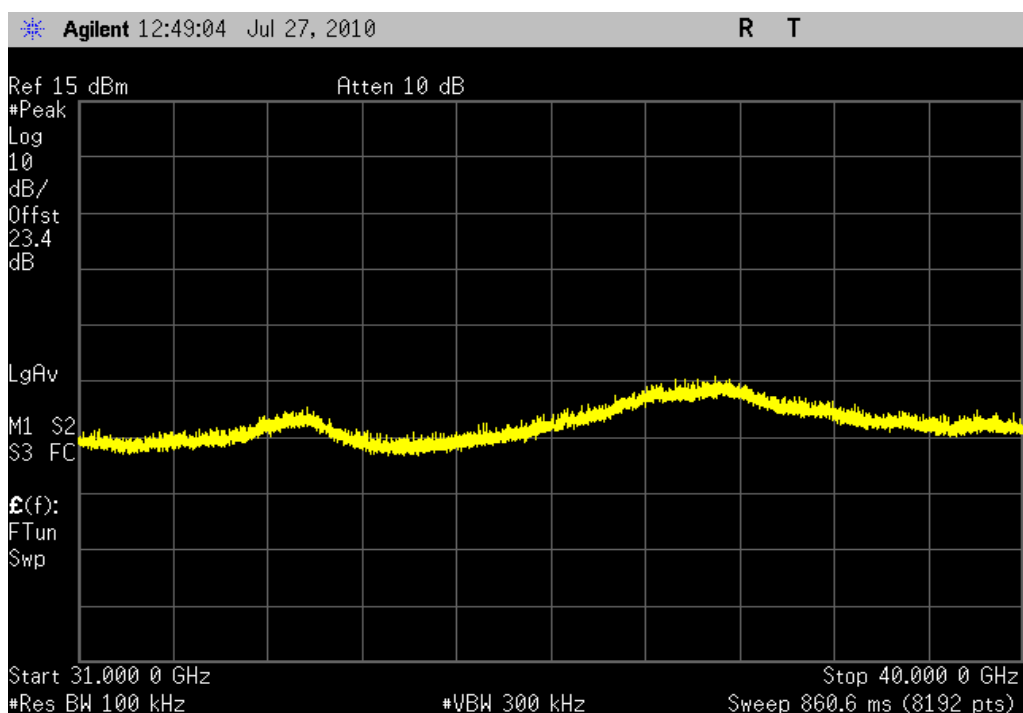
Value: < -40 dBc

Limit: ≤ -20 dBc

36 Mbps, High Channel 165, 5825 MHz, 31 GHz - 40 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
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
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 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:	Summit FS848 Master Module (Wheeler)	Work Order:	FOCU0081
Serial Number:	A146	Date:	07/16/10
Customer:	Summit Semiconductor LLC	Temperature:	23°C
Attendees:	Alex Macdonald	Humidity:	45%
Project:	None	Barometric Pres.:	30.16 in
Tested by:	Rod Peloquin	Power:	120VAC/60Hz
		Job Site:	EV06

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

COMMENTS

Transmitting random audio data. External trigger from EUT, and gating on analyzer

DEVIATIONS FROM TEST STANDARD

No Deviations

Configuration #	2	Signature
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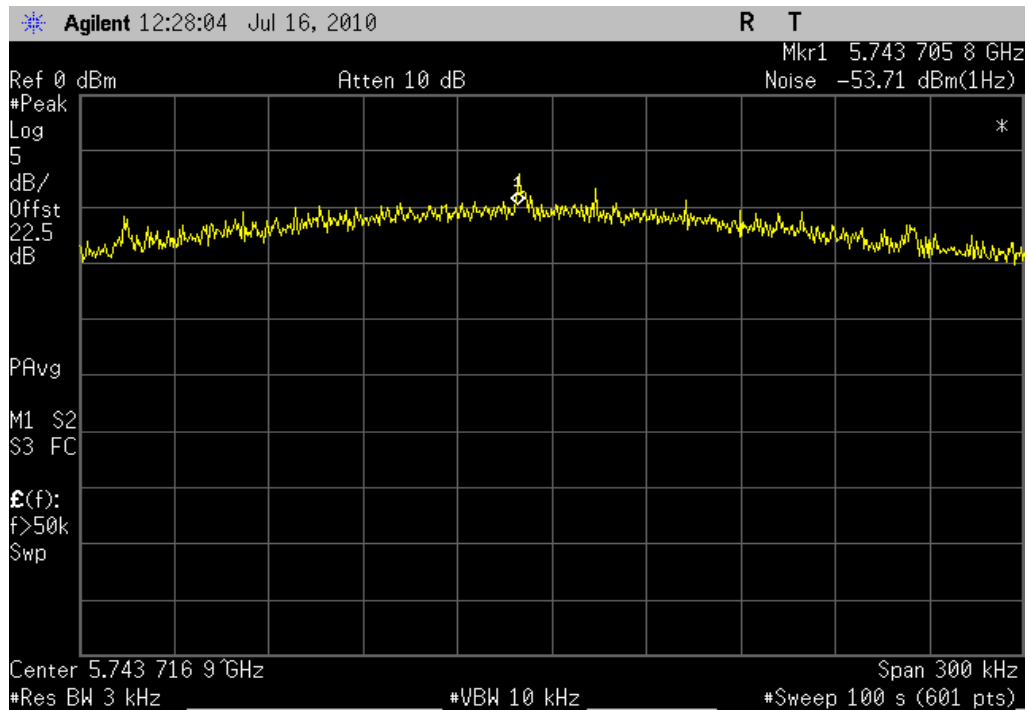
		Value	Limit	Results
6 Mbps	Low Channel 149, 5745 MHz	-18.9 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel 157, 5785 MHz	-20.0 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel 165, 5825 MHz	-18.5 dBm / 3 kHz	8 dBm / 3 kHz	Pass
36 Mbps	Low Channel 149, 5745 MHz	-20.2 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	Mid Channel 157, 5785 MHz	-21.3 dBm / 3 kHz	8 dBm / 3 kHz	Pass
	High Channel 165, 5825 MHz	-20.1 dBm / 3 kHz	8 dBm / 3 kHz	Pass

6 Mbps, Low Channel 149, 5745 MHz

Result: Pass

Value: -18.9 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

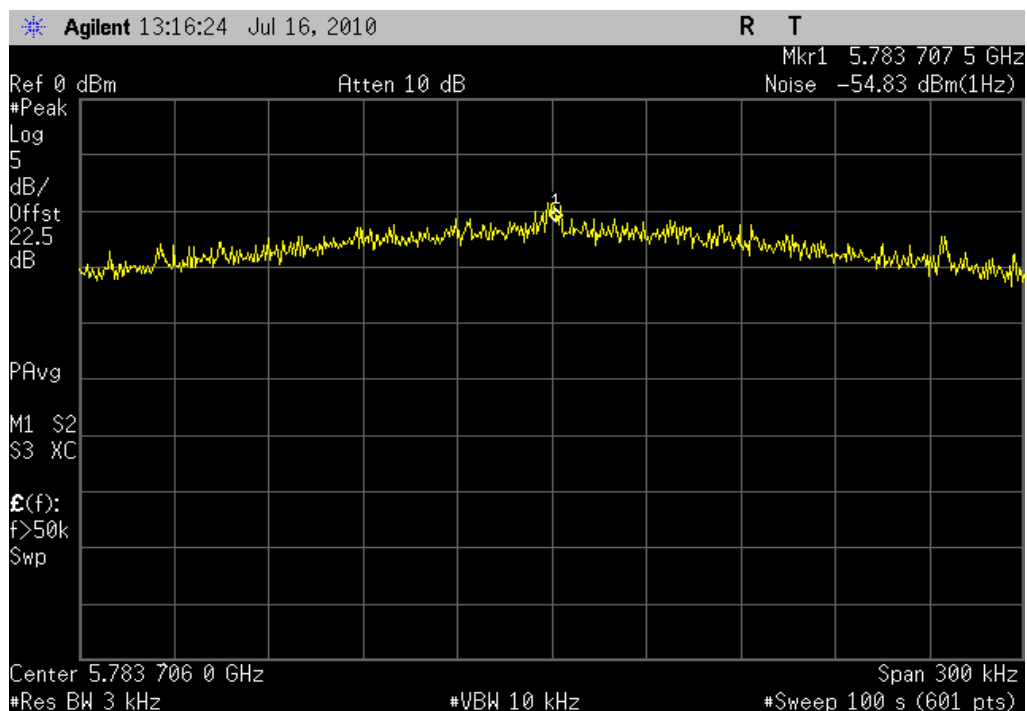


6 Mbps, Mid Channel 157, 5785 MHz

Result: Pass

Value: -20.0 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

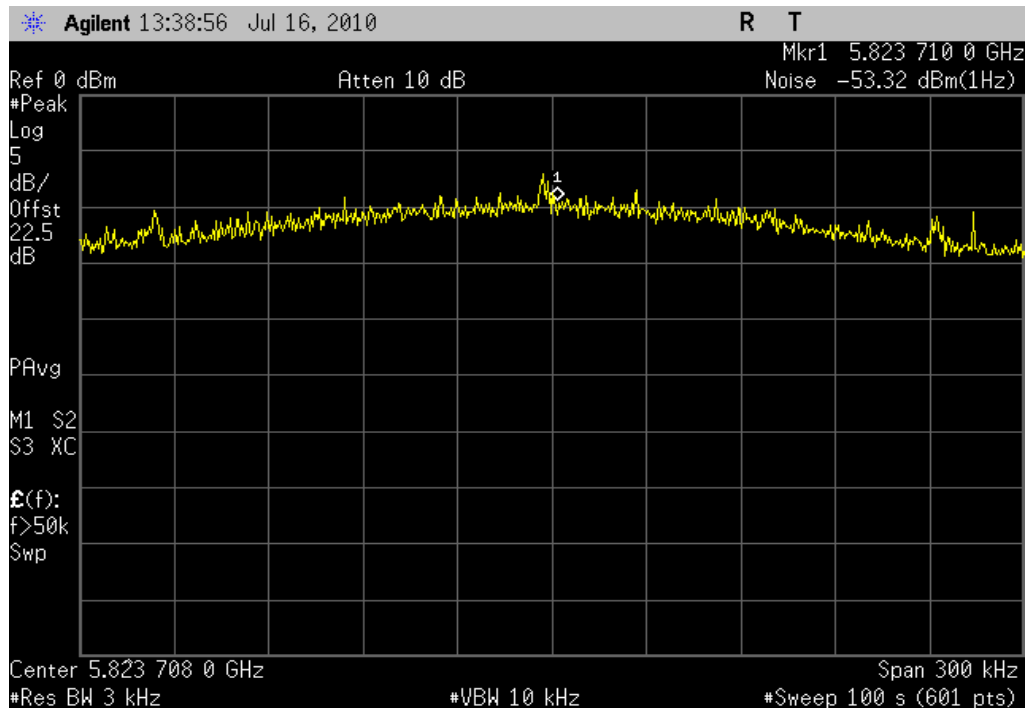


6 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: -18.5 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

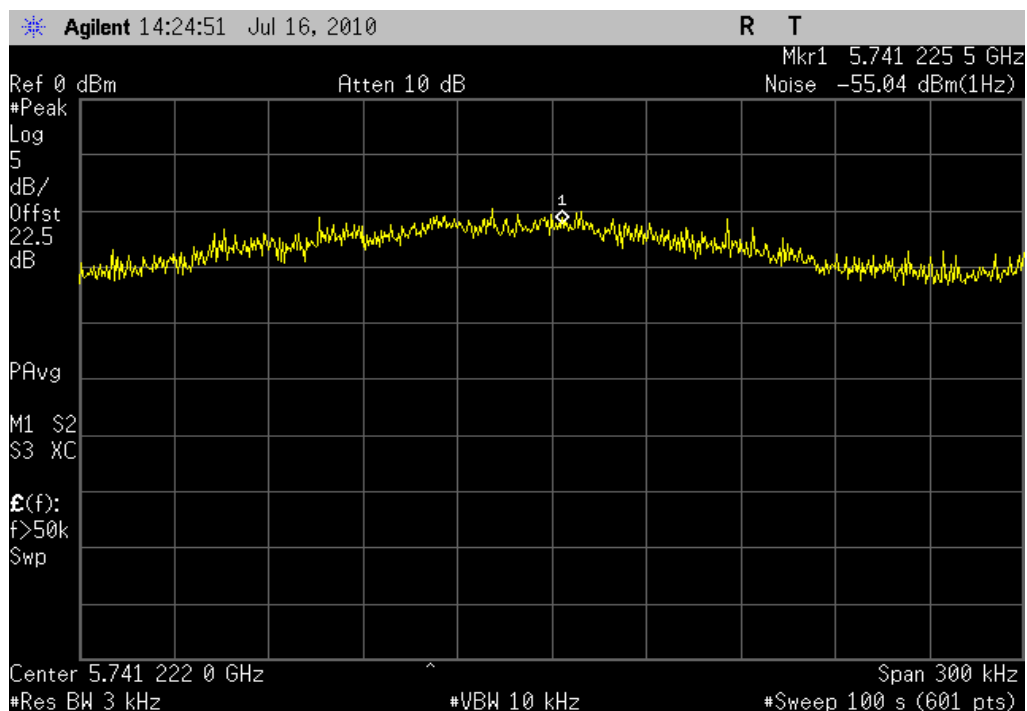


36 Mbps, Low Channel 149, 5745 MHz

Result: Pass

Value: -20.2 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

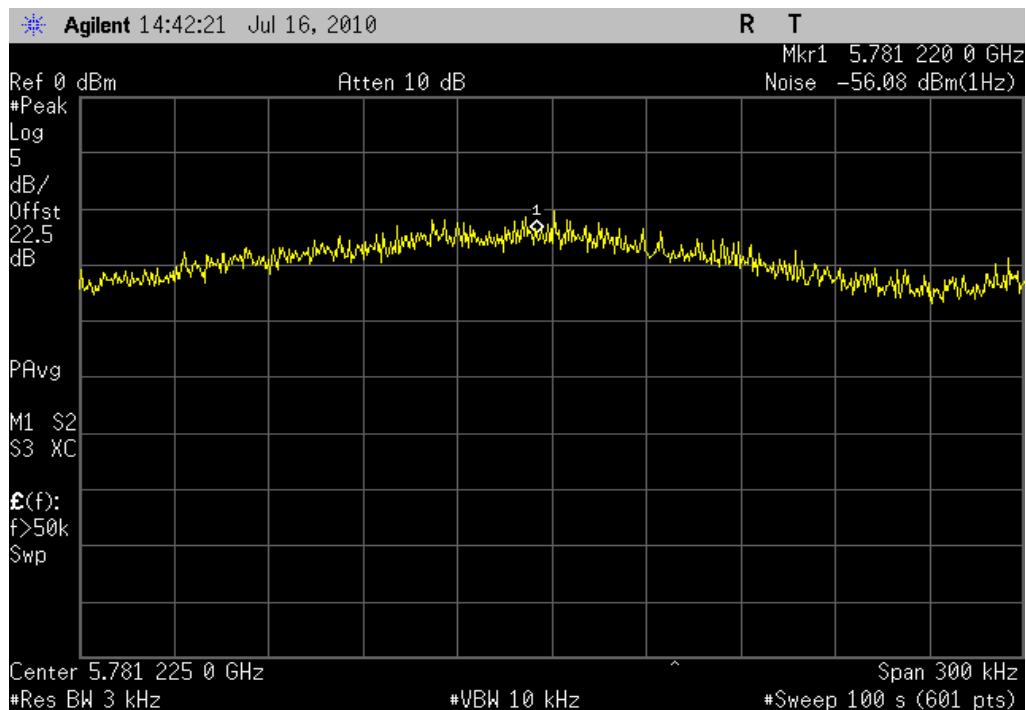


36 Mbps, Mid Channel 157, 5785 MHz

Result: Pass

Value: -21.3 dBm / 3 kHz

Limit: 8 dBm / 3 kHz

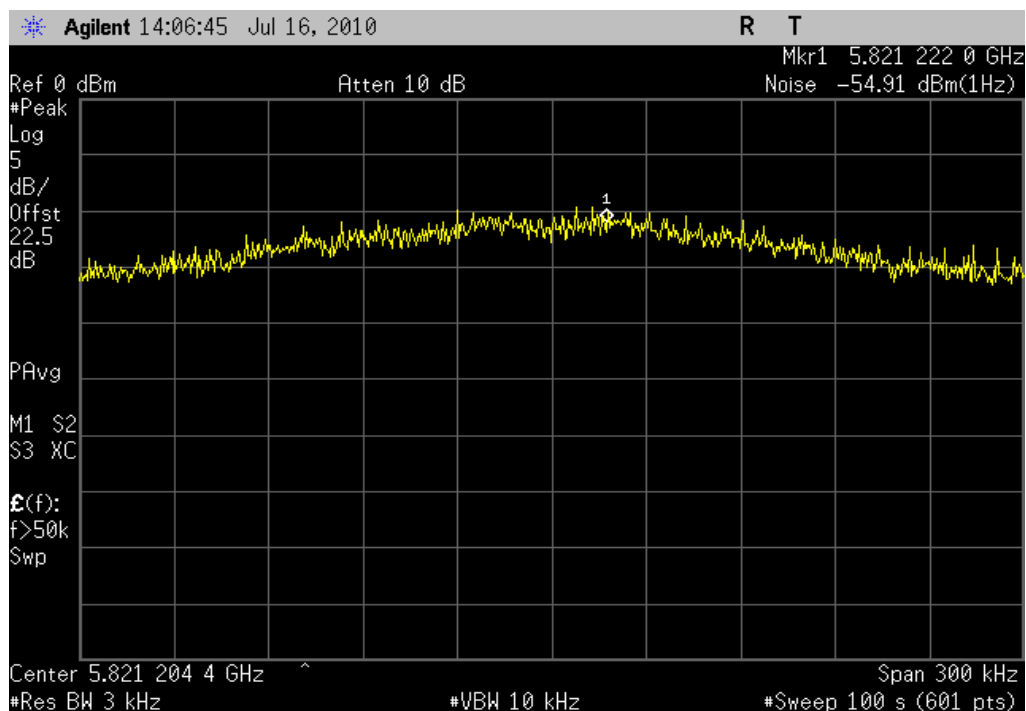


36 Mbps, High Channel 165, 5825 MHz

Result: Pass

Value: -20.1 dBm / 3 kHz

Limit: 8 dBm / 3 kHz



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

MODES OF OPERATION

Continuous Transmitting at 6 Mbps
Continuous Transmitting at 36 Mbps

CHANNELS TESTED

Channel 149, 5745 MHz
Channel 157, 5785 MHz
Channel 165, 5825 MHz

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	40 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
5.725-5.875 Notch Filter	Micro-Tronics	BRC50705	HGJ	7/31/2009	13
Spectrum Analyzer	Agilent	E4446A	AAQ	1/6/2010	12
EV01 Cables	N/A	Bilog Cables	EVA	7/9/2010	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	7/9/2010	13
Antenna, Biconilog	EMCO	3141	AXE	1/14/2010	13
EV01 Cables	N/A	Double Ridge Horn Cables	EVB	7/9/2010	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	7/9/2010	13
Antenna, Horn	EMCO	3115	AHC	7/8/2010	24
EV01 Cables	N/A	Standard Gain Horns Cables	EVF	4/2/2010	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
Cable	ESM Cable Corp.	KMKM-72	EVY	11/3/2009	13
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	5/19/2009	16
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
OC Cable	ESM Cable Corp.	KMKM-72	OCV	11/3/2009	13
Pre-Amplifier	Miteq	JSW45-26004000-40-5P	AVR	6/22/2010	13
Antenna, Horn	ETS	3160-10	AIC	NCR	0

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


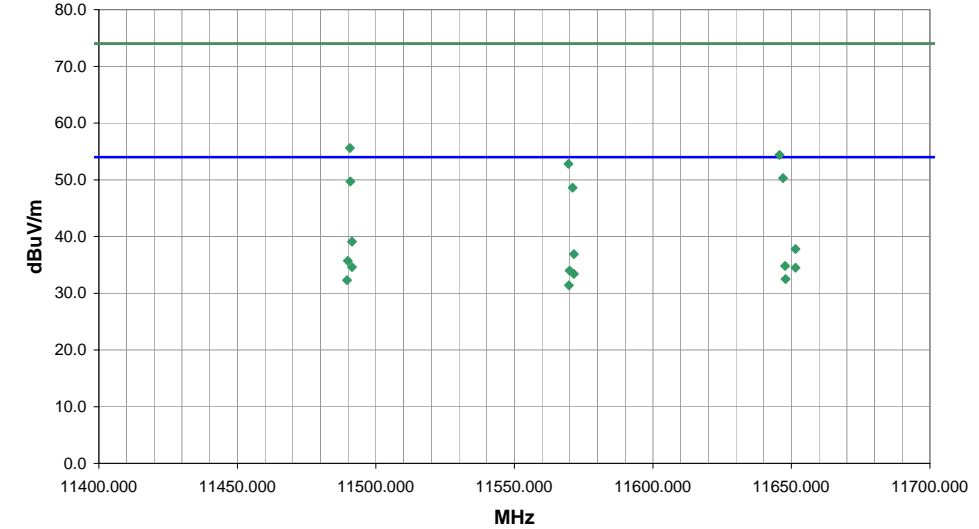
Measurements were made using the bandwidths and detectors specified. No video filter was used.

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 axes, 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		SPURIOUS RADIATED EMISSIONS		PSA 2008.07.21																																																																																																																																																																																																																																																																											
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EUT: Summit FS848 Master Module (Wheeler)				Work Order: FOCU0081																																																																																																																																																																																																																																																																											
Serial Number: 0265				Date: 07/20/10																																																																																																																																																																																																																																																																											
Customer: Summit Semiconductor LLC				Temperature: 22.9 °C																																																																																																																																																																																																																																																																											
Attendees: None				Humidity: 45%																																																																																																																																																																																																																																																																											
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Tested by: Dan Haas		Power: 120VAC/60Hz		Job Site: EV01																																																																																																																																																																																																																																																																											
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<table><tr><th>Freq (MHz)</th><th>Amplitude (dBuV)</th><th>Factor (dB)</th><th>Azimuth (degrees)</th><th>Height (meters)</th><th>Distance (meters)</th><th>External Attenuation (dB)</th><th>Polarity</th><th>Detector</th><th>Distance Adjustment (dB)</th><th>Adjusted dBuV/m</th><th>Spec. Limit dBuV/m</th><th>Compared to Spec. (dB)</th><th>Comments</th></tr><tr><td>11491.400</td><td>45.8</td><td>-6.7</td><td>205.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>AV</td><td>0.0</td><td>39.1</td><td>54.0</td><td>-14.9</td><td>CH:149, 36Mbps, EUT Vertical.</td></tr><tr><td>11651.500</td><td>43.6</td><td>-5.8</td><td>207.0</td><td>1.3</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>AV</td><td>0.0</td><td>37.8</td><td>54.0</td><td>-16.2</td><td>CH:165, 36Mbps, EUT Vertical.</td></tr><tr><td>11571.500</td><td>43.2</td><td>-6.3</td><td>324.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>AV</td><td>0.0</td><td>36.9</td><td>54.0</td><td>-17.1</td><td>CH:157, 36Mbps, EUT Vertical.</td></tr><tr><td>11489.900</td><td>42.4</td><td>-6.7</td><td>205.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>AV</td><td>0.0</td><td>35.7</td><td>54.0</td><td>-18.3</td><td>CH:149, 6Mbps, EUT Vertical.</td></tr><tr><td>11490.650</td><td>62.3</td><td>-6.7</td><td>205.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>PK</td><td>0.0</td><td>55.6</td><td>74.0</td><td>-18.4</td><td>CH:149, 6Mbps, EUT Vertical.</td></tr><tr><td>11647.700</td><td>40.6</td><td>-5.8</td><td>207.0</td><td>1.3</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>AV</td><td>0.0</td><td>34.8</td><td>54.0</td><td>-19.2</td><td>CH:165, 6Mbps, EUT Vertical.</td></tr><tr><td>11491.400</td><td>41.3</td><td>-6.7</td><td>219.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>AV</td><td>0.0</td><td>34.6</td><td>54.0</td><td>-19.4</td><td>CH:149, 36Mbps, EUT Horizontal.</td></tr><tr><td>11651.500</td><td>40.3</td><td>-5.8</td><td>36.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>AV</td><td>0.0</td><td>34.5</td><td>54.0</td><td>-19.5</td><td>CH:165, 36Mbps, EUT Horizontal.</td></tr><tr><td>11645.700</td><td>60.2</td><td>-5.8</td><td>207.0</td><td>1.3</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>PK</td><td>0.0</td><td>54.4</td><td>74.0</td><td>-19.6</td><td>CH:165, 6Mbps, EUT Vertical.</td></tr><tr><td>11569.950</td><td>40.3</td><td>-6.3</td><td>324.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>AV</td><td>0.0</td><td>34.0</td><td>54.0</td><td>-20.0</td><td>CH:157, 6Mbps, EUT Vertical.</td></tr><tr><td>11571.500</td><td>39.7</td><td>-6.3</td><td>216.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>AV</td><td>0.0</td><td>33.4</td><td>54.0</td><td>-20.6</td><td>CH:157, 36Mbps, EUT Horizontal.</td></tr><tr><td>11569.550</td><td>59.1</td><td>-6.3</td><td>324.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>H-Horn</td><td>PK</td><td>0.0</td><td>52.8</td><td>74.0</td><td>-21.2</td><td>CH:157, 6Mbps, EUT Vertical.</td></tr><tr><td>11647.900</td><td>38.3</td><td>-5.8</td><td>36.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>AV</td><td>0.0</td><td>32.5</td><td>54.0</td><td>-21.5</td><td>CH:165, 6Mbps, EUT Horizontal.</td></tr><tr><td>11489.600</td><td>39.0</td><td>-6.7</td><td>219.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>AV</td><td>0.0</td><td>32.3</td><td>54.0</td><td>-21.7</td><td>CH:149, 6Mbps, EUT Horizontal.</td></tr><tr><td>11569.700</td><td>37.7</td><td>-6.3</td><td>216.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>AV</td><td>0.0</td><td>31.4</td><td>54.0</td><td>-22.6</td><td>CH:157, 6Mbps, EUT Horizontal.</td></tr><tr><td>11647.000</td><td>56.1</td><td>-5.8</td><td>36.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>PK</td><td>0.0</td><td>50.3</td><td>74.0</td><td>-23.7</td><td>CH:165, 6Mbps, EUT Horizontal.</td></tr><tr><td>11490.800</td><td>56.4</td><td>-6.7</td><td>219.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>PK</td><td>0.0</td><td>49.7</td><td>74.0</td><td>-24.3</td><td>CH:149, 6Mbps, EUT Horizontal.</td></tr><tr><td>11571.000</td><td>54.9</td><td>-6.3</td><td>216.0</td><td>1.1</td><td>3.0</td><td>0.0</td><td>V-Horn</td><td>PK</td><td>0.0</td><td>48.6</td><td>74.0</td><td>-25.4</td><td>CH:157, 6Mbps, EUT Horizontal.</td></tr></table>						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	11491.400	45.8	-6.7	205.0	1.1	3.0	0.0	H-Horn	AV	0.0	39.1	54.0	-14.9	CH:149, 36Mbps, EUT Vertical.	11651.500	43.6	-5.8	207.0	1.3	3.0	0.0	H-Horn	AV	0.0	37.8	54.0	-16.2	CH:165, 36Mbps, EUT Vertical.	11571.500	43.2	-6.3	324.0	1.1	3.0	0.0	H-Horn	AV	0.0	36.9	54.0	-17.1	CH:157, 36Mbps, EUT Vertical.	11489.900	42.4	-6.7	205.0	1.1	3.0	0.0	H-Horn	AV	0.0	35.7	54.0	-18.3	CH:149, 6Mbps, EUT Vertical.	11490.650	62.3	-6.7	205.0	1.1	3.0	0.0	H-Horn	PK	0.0	55.6	74.0	-18.4	CH:149, 6Mbps, EUT Vertical.	11647.700	40.6	-5.8	207.0	1.3	3.0	0.0	H-Horn	AV	0.0	34.8	54.0	-19.2	CH:165, 6Mbps, EUT Vertical.	11491.400	41.3	-6.7	219.0	1.1	3.0	0.0	V-Horn	AV	0.0	34.6	54.0	-19.4	CH:149, 36Mbps, EUT Horizontal.	11651.500	40.3	-5.8	36.0	1.1	3.0	0.0	V-Horn	AV	0.0	34.5	54.0	-19.5	CH:165, 36Mbps, EUT Horizontal.	11645.700	60.2	-5.8	207.0	1.3	3.0	0.0	H-Horn	PK	0.0	54.4	74.0	-19.6	CH:165, 6Mbps, EUT Vertical.	11569.950	40.3	-6.3	324.0	1.1	3.0	0.0	H-Horn	AV	0.0	34.0	54.0	-20.0	CH:157, 6Mbps, EUT Vertical.	11571.500	39.7	-6.3	216.0	1.1	3.0	0.0	V-Horn	AV	0.0	33.4	54.0	-20.6	CH:157, 36Mbps, EUT Horizontal.	11569.550	59.1	-6.3	324.0	1.1	3.0	0.0	H-Horn	PK	0.0	52.8	74.0	-21.2	CH:157, 6Mbps, EUT Vertical.	11647.900	38.3	-5.8	36.0	1.1	3.0	0.0	V-Horn	AV	0.0	32.5	54.0	-21.5	CH:165, 6Mbps, EUT Horizontal.	11489.600	39.0	-6.7	219.0	1.1	3.0	0.0	V-Horn	AV	0.0	32.3	54.0	-21.7	CH:149, 6Mbps, EUT Horizontal.	11569.700	37.7	-6.3	216.0	1.1	3.0	0.0	V-Horn	AV	0.0	31.4	54.0	-22.6	CH:157, 6Mbps, EUT Horizontal.	11647.000	56.1	-5.8	36.0	1.1	3.0	0.0	V-Horn	PK	0.0	50.3	74.0	-23.7	CH:165, 6Mbps, EUT Horizontal.	11490.800	56.4	-6.7	219.0	1.1	3.0	0.0	V-Horn	PK	0.0	49.7	74.0	-24.3	CH:149, 6Mbps, EUT Horizontal.	11571.000	54.9	-6.3	216.0	1.1	3.0	0.0	V-Horn	PK	0.0	48.6	74.0	-25.4	CH:157, 6Mbps, EUT Horizontal.
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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

Continuous Tx 5825MHz, (Ch.165)

Continuous Tx 5785MHz, (Ch.157)

Continuous Tx 5745MHz, (Ch.149)

POWER SETTINGS INVESTIGATED

120VAC/60Hz

CONFIGURATIONS INVESTIGATED

FOCU0081 - 4

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Receiver	Rohde & Schwarz	ESCI	ARE	4/29/2010	12 mo
EV07 Cables	N/A	Conducted Cables	EVG	6/21/2010	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	2/16/2010	13 mo
Attenuator	Coaxicom	66702 2910-20	ATO	7/21/2009	13 mo
LISN	Solar	9252-50-R-24-BNC	LIN	5/27/2010	12 mo

MEASUREMENT BANDWIDTHS

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


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

MEASUREMENT UNCERTAINTY

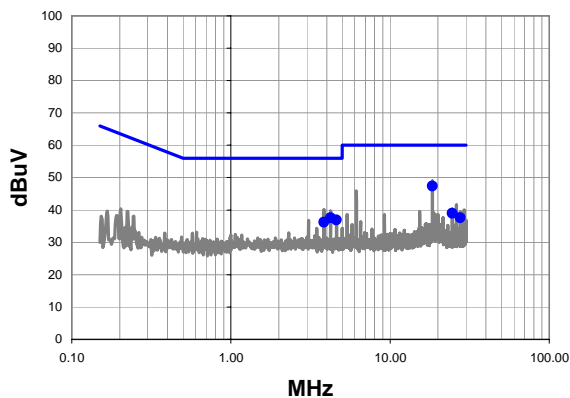
A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/-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

TEST DESCRIPTION

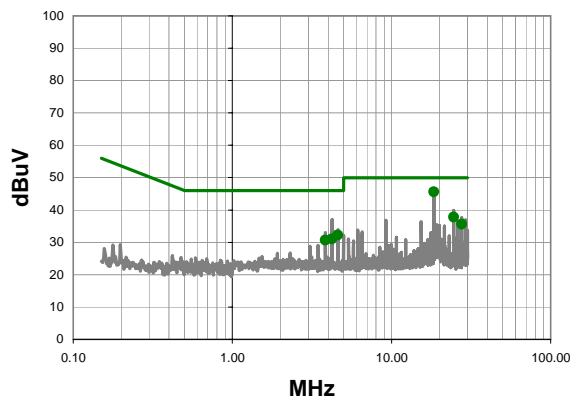
Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to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

Work Order:	FOCU0081	Date:	07/21/10		
Project:	None	Temperature:	24.4 °C		
Job Site:	EV07	Humidity:	44.7		
Serial Number:	0265	Barometric Pres.:	1015.9 mb	Tested by: Dan Haas	
EUT:	Summit FS848 Master Module (Wheeler)				
Configuration:	4 - AC powerline conducted emissions				
Customer:	Summit Semiconductor LLC				
Attendees:	None				
EUT Power:	120VAC/60Hz				
Operating Mode:	Continuous Tx 5745MHz, (Ch.149)				
Deviations:	No deviations.				
Comments:	Aeon C627-510004A antennas with 4 inch antenna cables. 12 inch ribbon cable: small donut ferrites on Antenna cables with two turns:				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	19	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

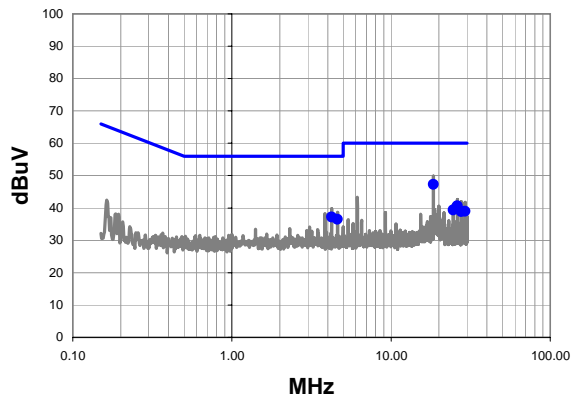
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.432	26.6	20.8	47.4	60.0	-12.6
4.224	17.3	20.2	37.5	56.0	-18.5
4.608	16.6	20.3	36.9	56.0	-19.2
3.840	16.0	20.2	36.2	56.0	-19.8
24.576	17.8	21.1	38.9	60.0	-21.1
27.650	16.3	21.3	37.6	60.0	-22.4

Average Data - vs - Average Limit

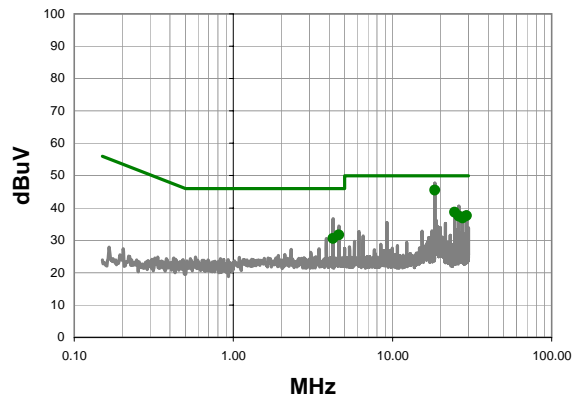
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.432	24.8	20.8	45.6	50.0	-4.4
24.576	16.6	21.1	37.7	50.0	-12.3
4.608	12.0	20.3	32.3	46.0	-13.8
27.650	14.3	21.3	35.6	50.0	-14.4
4.224	10.8	20.2	31.0	46.0	-15.0
3.840	10.4	20.2	30.6	46.0	-15.4

Work Order:	FOCU0081	Date:	07/21/10		
Project:	None	Temperature:	24.4 °C		
Job Site:	EV07	Humidity:	44.7		
Serial Number:	0265	Barometric Pres.:	1015.9 mb		
Tested by: Dan Haas					
EUT:	Summit FS848 Master Module (Wheeler)				
Configuration:	4 - AC powerline conducted emissions				
Customer:	Summit Semiconductor LLC				
Attendees:	None				
EUT Power:	120VAC/60Hz				
Operating Mode:	Continuous Tx 5745MHz, (Ch.149)				
Deviations:	No deviations.				
Comments:	Aeon C627-510004A antennas with 4 inch antenna cables. 12 inch ribbon cable: small donut ferrites on Antenna cables with two turns:				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	20	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

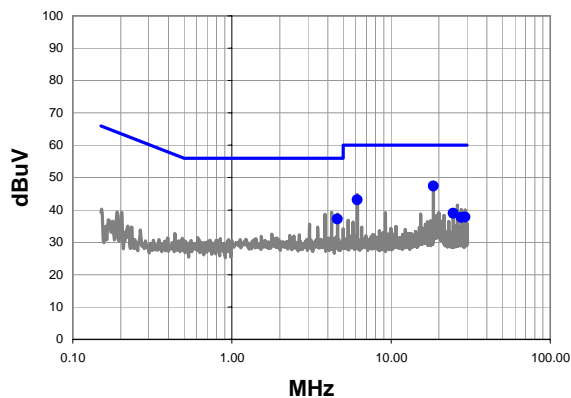
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.434	26.5	20.8	47.3	60.0	-12.7
4.224	17.0	20.2	37.2	56.0	-18.8
26.114	19.4	21.2	40.6	60.0	-19.4
4.608	16.2	20.3	36.5	56.0	-19.6
24.576	18.2	21.1	39.3	60.0	-20.7
29.186	17.5	21.4	38.9	60.0	-21.1
27.650	17.6	21.3	38.9	60.0	-21.1

Average Data - vs - Average Limit

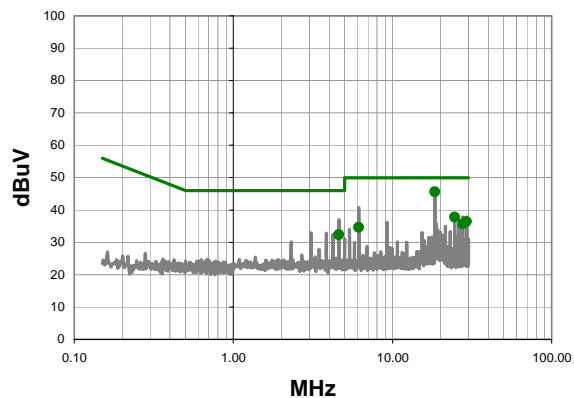
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.434	24.7	20.8	45.5	50.0	-4.5
24.576	17.5	21.1	38.6	50.0	-11.4
29.186	16.1	21.4	37.5	50.0	-12.5
26.114	16.3	21.2	37.5	50.0	-12.5
27.650	15.6	21.3	36.9	50.0	-13.1
4.608	11.4	20.3	31.7	46.0	-14.4
4.224	10.3	20.2	30.5	46.0	-15.5

Work Order:	FOCU0081	Date:	07/21/10				
Project:	None	Temperature:	24.4 °C				
Job Site:	EV07	Humidity:	44.7				
Serial Number:	0265	Barometric Pres.:	1015.9 mb				
Tested by: Dan Haas							
EUT:	Summit FS848 Master Module (Wheeler)						
Configuration:	4 - AC powerline conducted emissions						
Customer:	Summit Semiconductor LLC						
Attendees:	None						
EUT Power:	120VAC/60Hz						
Operating Mode:	Continuous Tx 5785MHz, (Ch.157)						
Deviations:	No deviations.						
Comments:	Aeon C627-510004A antennas with 4 inch antenna cables. 12 inch ribbon cable: small donut ferrites on Antenna cables with two turns:						
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009				
Run #	21	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

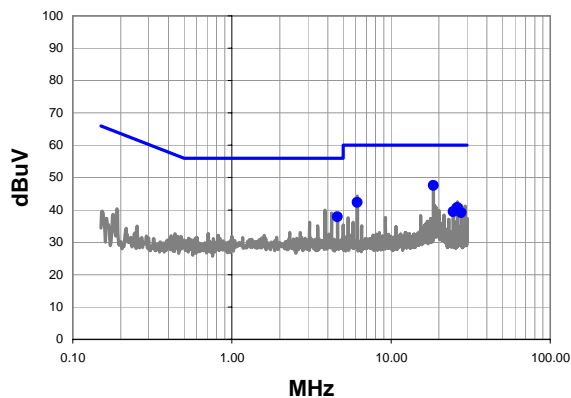
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.432	26.6	20.8	47.4	60.0	-12.6
6.144	22.8	20.3	43.1	60.0	-16.9
4.608	16.9	20.3	37.2	56.0	-18.9
24.576	17.8	21.1	38.9	60.0	-21.1
29.186	16.3	21.4	37.7	60.0	-22.3
27.650	16.4	21.3	37.7	60.0	-22.3

Average Data - vs - Average Limit

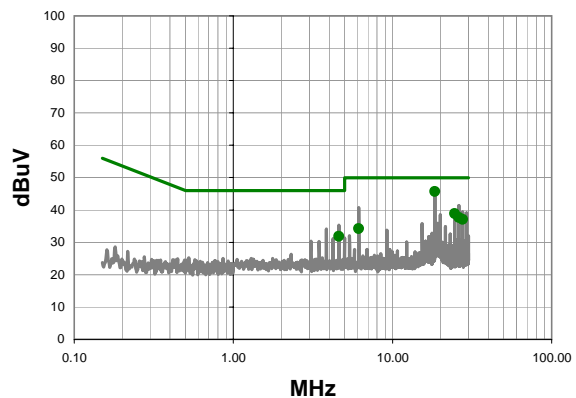
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.432	24.8	20.8	45.6	50.0	-4.4
24.576	16.6	21.1	37.7	50.0	-12.3
29.186	15.0	21.4	36.4	50.0	-13.6
4.608	12.1	20.3	32.4	46.0	-13.7
27.650	14.4	21.3	35.7	50.0	-14.3
6.144	14.3	20.3	34.6	50.0	-15.4

Work Order:	FOCU0081	Date:	07/21/10		
Project:	None	Temperature:	24.4 °C		
Job Site:	EV07	Humidity:	44.7		
Serial Number:	0265	Barometric Pres.:	1015.9 mb	Tested by: Dan Haas	
EUT:	Summit FS848 Master Module (Wheeler)				
Configuration:	4 - AC powerline conducted emissions				
Customer:	Summit Semiconductor LLC				
Attendees:	None				
EUT Power:	120VAC/60Hz				
Operating Mode:	Continuous Tx 5785MHz, (Ch.157)				
Deviations:	No deviations.				
Comments:	Aeon C627-510004A antennas with 4 inch antenna cables. 12 inch ribbon cable: small donut ferrites on Antenna cables with two turns:				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	22	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

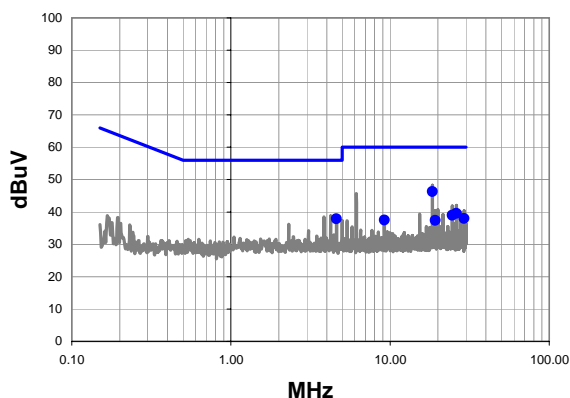
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.432	26.8	20.8	47.6	60.0	-12.4
6.144	22.1	20.3	42.4	60.0	-17.6
4.608	17.6	20.3	37.9	56.0	-18.2
26.114	19.5	21.2	40.7	60.0	-19.3
24.576	18.3	21.1	39.4	60.0	-20.6
27.650	17.9	21.3	39.2	60.0	-20.8

Average Data - vs - Average Limit

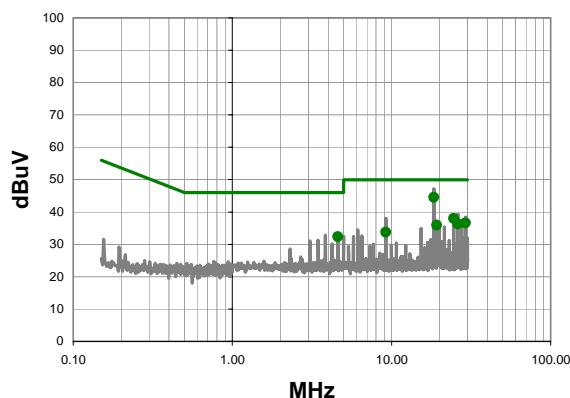
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.432	24.9	20.8	45.7	50.0	-4.3
24.576	17.7	21.1	38.8	50.0	-11.2
26.114	16.5	21.2	37.7	50.0	-12.3
27.650	15.8	21.3	37.1	50.0	-12.9
4.608	11.6	20.3	31.9	46.0	-14.2
6.144	13.9	20.3	34.2	50.0	-15.8

Work Order:	FOCU0081	Date:	07/21/10		
Project:	None	Temperature:	24.4 °C		
Job Site:	EV07	Humidity:	44.7		
Serial Number:	0265	Barometric Pres.:	1015.9 mb	Tested by: Dan Haas	
EUT:	Summit FS848 Master Module (Wheeler)				
Configuration:	4 - AC powerline conducted emissions				
Customer:	Summit Semiconductor LLC				
Attendees:	None				
EUT Power:	120VAC/60Hz				
Operating Mode:	Continuous Tx 5825MHz, (Ch.165)				
Deviations:	No deviations.				
Comments:	Aeon C627-510004A antennas with 4 inch antenna cables. 12 inch ribbon cable: small donut ferrites on Antenna cables with two turns:				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	23	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

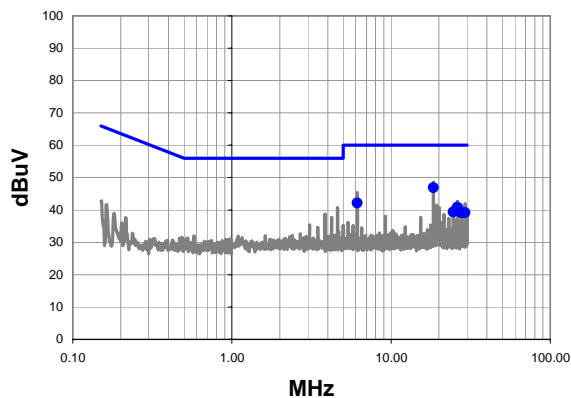
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.434	25.5	20.8	46.3	60.0	-13.7
4.608	17.6	20.3	37.9	56.0	-18.2
26.114	18.3	21.2	39.5	60.0	-20.5
24.576	17.8	21.1	38.9	60.0	-21.1
29.186	16.5	21.4	37.9	60.0	-22.1
9.216	17.1	20.4	37.5	60.0	-22.5
19.200	16.5	20.9	37.4	60.0	-22.6

Average Data - vs - Average Limit

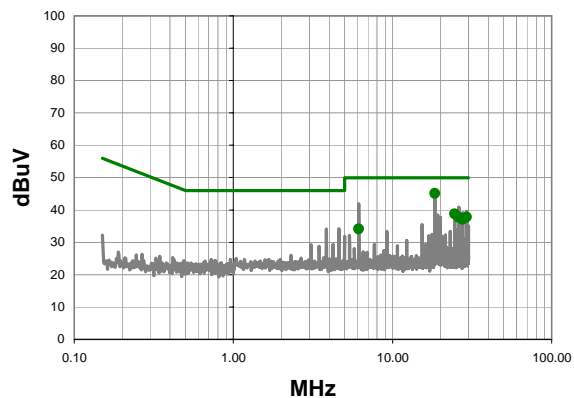
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.434	23.7	20.8	44.5	50.0	-5.5
24.576	16.8	21.1	37.9	50.0	-12.1
29.186	15.2	21.4	36.6	50.0	-13.4
4.608	12.1	20.3	32.4	46.0	-13.7
26.114	15.1	21.2	36.3	50.0	-13.7
19.200	15.0	20.9	35.9	50.0	-14.1
9.216	13.3	20.4	33.7	50.0	-16.3

Work Order:	FOCU0081	Date:	07/21/10		
Project:	None	Temperature:	24.4 °C		
Job Site:	EV07	Humidity:	44.7		
Serial Number:	0265	Barometric Pres.:	1015.9 mb	Tested by: Dan Haas	
EUT:	Summit FS848 Master Module (Wheeler)				
Configuration:	4 - AC powerline conducted emissions				
Customer:	Summit Semiconductor LLC				
Attendees:	None				
EUT Power:	120VAC/60Hz				
Operating Mode:	Continuous Tx 5825MHz, (Ch.165)				
Deviations:	No deviations.				
Comments:	Aeon C627-510004A antennas with 4 inch antenna cables. 12 inch ribbon cable: small donut ferrites on Antenna cables with two turns:				
Test Specifications FCC 15.207:2010			Test Method ANSI C63.10:2009		
Run #	24	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)
18.434	26.1	20.8	46.9	60.0	-13.1
6.144	21.9	20.3	42.2	60.0	-17.8
26.114	19.6	21.2	40.8	60.0	-19.2
24.576	18.2	21.1	39.3	60.0	-20.7
27.650	17.9	21.3	39.2	60.0	-20.8
29.186	17.7	21.4	39.1	60.0	-20.9

Average Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
18.434	24.3	20.8	45.1	50.0	-4.9
24.576	17.6	21.1	38.7	50.0	-11.3
29.186	16.3	21.4	37.7	50.0	-12.3
26.114	16.5	21.2	37.7	50.0	-12.3
27.650	15.8	21.3	37.1	50.0	-12.9
6.144	13.8	20.3	34.1	50.0	-15.9