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Report On

FCC and Industry Canada Testing of the
Frontier Silicon Ltd Minuet/FS5332
In accordance with FCC 47 CFR Part 15C, Industry Canada RSS-247
and Industry Canada RSS-GEN

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FCC ID: YYX-FS5332
IC: 11458A-FS5332

Document 75934517 Report 04 Issue 1 **August 2016**

Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
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REPORT ON

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Frontier Silicon Ltd Minuet/FS5332
In accordance with FCC 47 CFR Part 15C, Industry Canada RSS-247
and Industry Canada RSS-GEN

Document 75934517 Report 04 Issue 1

August 2016

PREPARED FOR

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PREPARED BY

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Senior Administrator, Project Support

APPROVED BY

Simon Bennett
Authorised Signatory

DATED 05 August 2016

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

M Choudhury G Lawler M Russell J Tuckwell

UKAS TESTING 0141

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SECTION 1

1REPORT SUMMARY

FCC and Industry Canada Testing of the
Frontier Silicon Ltd Minuet/FS5332
In accordance with FCC 47 CFR Part 15C, Industry Canada RSS-247
and Industry Canada RSS-GEN

Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show the verification of FCC and Industry Canada Testing of the Frontier Silicon Ltd Minuet/FS5332 to the requirements of FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Frontier Silicon Ltd
Model Number(s)	Minuet/FS5332
Serial Number(s)	RAD108620 (Module) and RAD108704 (Platform) – Conducted RAD108621 (Module) and RAD108181 (Platform) - Conducted RAD108624 (Module) and RAD108700 (Platform) - Radiated RAD108624 (Module) and RAD108703 (Platform) - Radiated
Number of Samples Tested	4
Test Specification/Issue/Date	FCC 47 CFR Part 15C (2015) Industry Canada RSS-247 (Issue 1, 2015) Industry Canada RSS-GEN (Issue 4, 2014)
Incoming Release Date	Application Form 27 June 2016
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	FS160438 08 April 2016
Start of Test	9 May 2016
Finish of Test	10 July 2016
Name of Engineer(s)	M Choudhury G Lawler M Russell J Tuckwell
Related Document(s)	ANSI C63.10: 2013

Product Service

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, Industry Canada RSS-247 and Industry Canada RSS-GEN is shown below.

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247	RSS-GEN			
Bluetooth Low Energy						
2.2	15.247 (e) a	5.2 (2)	-	Power Spectral Density	Pass	
2.3	15.247 (a)(2)	5.2(1)	-	6 dB Bandwidth	Pass	
2.4	15.247 (b)(3)	5.4(4)	-	Maximum Conducted Output Power	Pass	
2.5	15.247 (d), 15.205 and 15.209	5.5	-	Spurious Radiated Emissions	Pass	
2.6	15.205	-	8.10	Restricted Band Edges	Pass	
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	

Product Service

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247	RSS-GEN			
802.11b						
2.1	15.207	-	8.8	AC Line Conducted Emissions	Pass	
2.2	15.247 (e)	5.2 (2)	-	Power Spectral Density	Pass	
2.3	15.247 (a)(2)	5.2(1)	-	6 dB Bandwidth	Pass	
2.4	15.247 (b)(3)	5.4(4)	-	Maximum Conducted Output Power	Pass	
2.5	15.247 (d), 15.205 and 15.209 and 5.5			Spurious Radiated Emissions	Pass	
2.6	15.205	-	8.10	Restricted Band Edges	Pass	
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	
802.11g						
2.2	15.247 (e)	5.2 (2)	-	Power Spectral Density	Pass	
2.3	15.247 (a)(2)	5.2(1)	-	6 dB Bandwidth	Pass	
2.4	15.247 (b)(3)	5.4(4)	-	Maximum Conducted Output Power	Pass	
2.5	15.247 (d), 15.205 and 15.209	5.5	-	Spurious Radiated Emissions	Pass	
2.6	15.205	-	8.10	Restricted Band Edges	Pass	
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	

Product Service

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247	RSS-GEN			
802.11n 20 MHz Bandwidth						
2.2	15.247 (e)	5.2 (2)	-	Power Spectral Density	Pass	
2.3	15.247 (a)(2)	5.2(1)	-	6 dB Bandwidth	Pass	
2.4	15.247 (b)(3)	5.4(4)	-	Maximum Conducted Output Power	Pass	
2.5	15.247 (d), 15.205 and 15.209	5.5	-	Spurious Radiated Emissions	Pass	
2.6	15.205	-	8.10	Restricted Band Edges	Pass	
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	
802.11n 40 MHz Bandwidth						
2.2	15.247 (e)	5.2 (2)	-	Power Spectral Density	Pass	
2.3	15.247 (a)(2)	5.2(1)	-	6 dB Bandwidth	Pass	
2.4	15.247 (b)(3)	5.4(4)	-	Maximum Conducted Output Power	Pass	
2.6	15.205	-	8.10	Restricted Band Edges	Pass	
2.7	15.247 (d)	5.5	-	Authorised Band Edges	Pass	

Product Service

Section	Specification Clause			Test Description	Result	Comments/Base Standard
	Part 15C	RSS-247	RSS-GEN			
802.11b (2nd Diversity Antenna)						
2.5	15.247 (d), 15.205 and 15.209	5.5	-	Spurious Radiated Emissions	Pass	
802.11g (2nd Diversity Antenna)						
2.5	15.247 (d), 15.205 and 15.209	5.5	-	Spurious Radiated Emissions	Pass	
802.11n 20 MHz Bandwidth (2nd Diversity Antenna)						
2.5	15.247 (d), 15.205 and 15.209	5.5	-	Spurious Radiated Emissions	Pass	
Bluetooth Low Energy (2nd Diversity Antenna)						
2.5	15.247 (d), 15.205 and 15.209	5.5	-	Spurious Radiated Emissions	Pass	

Product Service

1.3 APPLICATION FORM

EQUIPMENT DESCRIPTION	
Model Name/Number	Minuet/FS5332
Part Number	HA-FS5332-xxxxxx (where xxxxxxx denotes the customer variant eg HA-FS5332-000001
Hardware Version	Rev6
Software Version	NS1.0.13
FCC ID (if applicable)	YYX-FS5332
Industry Canada ID (if applicable)	11458A-FS5332
Technical Description (Please provide a brief description of the intended use of the equipment)	Minuet is a module, which when installed in a consumer audio product enables high-quality audio streaming over Wi-Fi, Bluetooth and Ethernet.

Types of Modulations used by the Equipment		
☒	FHSS	
☒	Other forms of modulation	
In case of FHSS Modulation		
In case of non-Adaptive Frequency Hopping equipment:		
	Number of Hopping Frequencies: N/A	
In case of Adaptive Frequency Hopping Equipment:		
	Maximum number of Hopping Frequencies: 79	
	Minimum number of Hopping Frequencies: 20	
Dwell Time:		
Packet Type	Dwell Time ms (Adaptive)	Dwell Time ms (Non-adaptive)
XDH1	1.25	
XDH3	2.50	
XDH5	3.75	
Minimum Channel Occupation Time: Adaptive =1.25ms, Non-Adaptive = 0.625		
Adaptive / non-adaptive equipment:		
☐	non-adaptive Equipment	
☒	adaptive Equipment without the possibility to switch to a non-adaptive mode	
☐	adaptive Equipment which can also operate in a non-adaptive mode	
In case of adaptive equipment:		
The Channel Occupancy Time implemented by the equipment: 12.5 ms		
☒	The equipment has implemented an LBT based DAA mechanism	
In case of equipment using modulation different from FHSS:		
☒	The equipment is Frame Based equipment	
☒	The equipment is Load Based equipment	
☐	The equipment can switch dynamically between Frame Based and Load Based equipment	
The CCA time implemented by the equipment: 20 µs		
☒	The equipment has implemented an non-LBT based DAA mechanism	
☐	The equipment can operate in more than one adaptive mode	

Product Service

In case of non-adaptive Equipment:
The maximum RF Output Power (e.i.r.p.): N/A dBm
The maximum (corresponding) Duty Cycle: N/A %
Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):
The worst case operational mode for each of the following tests:
RF Output Power: BT:DH5, 802.11b:1Mbps, 802.11g:12Mbps, 802.11n(20MHz):MCS7, 802.11n(40MHz):MCS0
Power Spectral Density: 802.11b:1Mbps, 802.11g:12Mbps, 802.11n(20MHz):MCS7, 802.11n(40MHz):MCS0
Duty cycle, Tx-Sequence, Tx-gap: N/A
Accumulated Transmit Time, Frequency Occupation & Hopping Sequence (only for FHSS equipment): BT:DH5/DH3/DH1
Hopping Frequency Separation (only for FHSS equipment): BT:DH5/2DH5/3DH5
Medium Utilisation: N/A
Adaptivity & Receiver Blocking: 802.11b:1Mbps, 802.11g:6Mbps, 802.11n::MCS0
Nominal Channel Bandwidth: BT:DH5/2DH5/3DH5, 802.11b:1Mbps, 802.11g:12Mbps, 802.11n(20MHz):MCS7, 802.11n(40MHz):MCS0
Transmitter unwanted emissions in the OOB domain: BT:DH5, 802.11b:1Mbps, 802.11g:12Mbps, 802.11n(20MHz):MCS7, 802.11n(40MHz):MCS0
Transmitter unwanted emissions in the spurious domain: BT:DH5, 802.11b:1Mbps, 802.11g:12Mbps, 802.11n(20MHz):MCS7, 802.11n(40MHz):MCS0
Receiver spurious emissions: BT:DH5, 802.11b:1Mbps, 802.11g:12Mbps, 802.11n(20MHz):MCS7, 802.11n(40MHz):MCS0
The different transmit operating modes (tick all that apply):
☒ Operating mode 1: Single Antenna Equipment
☐ Equipment with only 1 antenna
☒ Equipment with 2 diversity antennas but only 1 antenna active at any moment in time
☐ Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [2012] legacy mode in smart antenna systems)
☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming
☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [2012] legacy mode)
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 3
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 4
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 5
NOTE: Add more lines if more channel bandwidths are supported.
☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
☐ Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [2012] legacy mode)
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 3
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 4
☐ High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 5
NOTE: Add more lines if more channel bandwidths are supported.

Product Service

In case of Smart Antenna Systems:
The number of Receive chains:
The number of Transmit chains:
☐ symmetrical power distribution
☐ asymmetrical power distribution
In case of beam forming, the maximum (additional) beam forming gain: dB
NOTE: The additional beam forming gain does not include the basic gain of a single antenna.
Operating Frequency Range(s) of the equipment:
Operating Frequency Range 1: 2400 MHz to 2483.5 MHz
Operating Frequency Range 2: MHz to MHz
Operating Frequency Range 3: MHz to MHz
NOTE: Add more lines if more Frequency Ranges are supported.
Nominal Channel Bandwidth(s):
Nominal Channel Bandwidth1: BT: 1 - 2 MHz
Nominal Channel Bandwidth2: 802.11b,g,n: 20 - 40 MHz
Nominal Channel Bandwidth3: MHz
Nominal Channel Bandwidth4: MHz
Nominal Channel Bandwidth5: MHz
NOTE: Add more lines if more channel bandwidths are supported.
Type of Equipment (stand-alone, combined, plug-in radio device, etc.):
☐ Stand-alone
☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
☒ Plug-in radio device (Equipment intended for a variety of host systems)
☐ Other
The extreme operating conditions that apply to the equipment:
Operating temperature range: 0 °C to +70 °C
Details provided are for the:
☐ stand-alone equipment
☒ combined (or host) equipment
☒ test jig

Product Service

The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p levels:			
Antenna Type:			
☐ Integral Antenna			
Antenna Gain: dBi			
If applicable, additional beamforming gain (excluding basic antenna gain): dB			
☐ Temporary RF connector provided			
☐ No temporary RF connector provided			
☒ Dedicated Antennas (equipment with antenna connector)			
☐ Single power level with corresponding antenna(s)			
☐ Multiple power settings and corresponding antenna(s)			
Number of different Power Levels: 2			
Power Level 1: As reported dBm			
Power Level 2: As reported dBm			
Power Level 3: dBm			
NOTE 1: Add more lines in case the equipment has more power levels.			
NOTE 2: These power levels are conducted power levels (at antenna connector).			
For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable			
Power Level 1: As reported dBm			
Number of antenna assemblies provided for this power level:			
Assembly #	**Gain (dBi)**	**e.i.r.p (dBm)**	**Part number or model number**
1	2.3	WLAN:20 BT:9.9	N12-2128-R0A SW700M（SW750M）
2	1.9	WLAN:20 BT:9.9Bm	RFPCA431223IMLB301
3			
4			
NOTE: Add more rows in case more antenna assemblies are supported for this power level.			
Power Level 2: dBm			
Number of antenna assemblies provided for this power level:			
Assembly #	**Gain (dBi)**	**e.i.r.p (dBm)**	**Part number or model number**
1			
2			
3			
4			
NOTE: Add more rows in case more antenna assemblies are supported for this power level.			
Power Level 3: dBm			
Number of antenna assemblies provided for this power level:			
Assembly #	**Gain (dBi)**	**e.i.r.p (dBm)**	**Part number or model number**
1			
2			
3			
4			
NOTE: Add more rows in case more antenna assemblies are supported for this power level.			

Product Service

The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:	
Details provided are for the: ☐ stand-alone equipment	
☒ combined (or host) equipment	
☒ test jig	
Supply Voltage ☐ AC mains State AC voltage V	
☒ DC State DC voltage 5 V	
In case of DC, indicate the type of power source	
☐ Internal Power Supply	
☒ External Power Supply or AC/DC adapter	
☐ Battery	
☐ Other:	
Describe the test modes available which can facilitate testing:	
Continuous transmit test modes for Bluetooth and WLAN testing	
The equipment type (e.g. Bluetooth®, IEEE 802.11™ [2012] IEEE 802.15.4™ [2011], proprietary, etc.):	
Burst mode with >90% Duty Cycle	
If applicable, the statistical analysis referred in clause 5.3.1 q)	
To be provided as separate attachment, please state document name:	
If applicable, the statistical analysis referred in clause 5.3.1 r)	
To be provided as separate attachment, please state document name:	
Geo-location capability supported by the equipment:	
☐ Yes	
☐ The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user.	
☒ No	
Combination for testing (see clause 5.1.3.3 of EN 300 328 V1.9.1)	
From all combinations of conducted power settings and intended antenna assembly(ies) specified in clause 3.1 m), specify the combination resulting in the highest e.i.r.p. for the radio equipment. Unless otherwise specified in ETSI EN 300 328, this power setting is to be used for testing against the requirements of ETSI EN 300 328. In case there is more than one such conducted power setting resulting in the same (highest) e.i.r.p. level, the highest power setting is to be used for testing. See also ETS EN 300 328, clause 5.1.3.3.	
Highest overall e.i.r.p. value: dBm	
Corresponding Antenna assembly gain: dBi	Antenna Assembly #:
Corresponding conducted power setting: dB (also the power level to be used for testing)	Listed as Power Setting #:
Additional information provided by the applicant	
Modulation	
ITU Class(es) of emission: F1B	
Can the transmitter operate unmodulated? ☐ Yes ☒ No	
Duty Cycle	
The transmitter is intended for:	
☐ Continuous duty	
☒ Intermittent duty	
☐ Continuous operation possible for testing purposes	

Product Service

	About the UUT
☐	The equipment submitted are representative production models
☒	If not, the equipment submitted are pre-production models?
☒	If pre-production equipment are submitted, the final production equipment will be identical in all respects with the equipment tested
☐	If not, supply full details
☐	The equipment submitted is CE marked
☐	In addition to the CE mark, the Class-II identifier (Alert Sign) is affixed.
	Additional items and/or supporting equipment provided
☐	Spare batteries (e.g. for portable equipment)
☐	Battery charging device
☒	External Power Supply or AC/DC adapter
☒	Test Jig or interface box
☐	RF test fixture (for equipment with integrated antennas)
☐	Host System
	Manufacturer
	Model
	Model Name
☐	Combined equipment
	Manufacturer
	Model
	Model Name
☐	User Manual
☐	Technical documentation (Handbook and circuit diagrams)

I hereby declare that that the information supplied is correct and complete.

Name: Abdul Wahed Dewan Position held: Principal RF Engineer
Date: 27/06/2016

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Frontier Silicon Ltd Minuet/FS5332. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 5.00 V DC supply.

FCC Measurement Facility Registration Number
90987 Octagon House, Fareham Test Laboratory

Industry Canada Company Address Code
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

Product Service

SECTION 2

2TEST DETAILS

FCC and Industry Canada Testing of the
Frontier Silicon Ltd Minuet/FS5332
In accordance with FCC 47 CFR Part 15C, Industry Canada RSS-247
and Industry Canada RSS-GEN

2.1 AC LINE CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.207
Industry Canada RSS-GEN, Clause 8.8

2.1.2 Equipment Under Test and Modification State

Minuet/FS5332 S/N: RAD108621 (Module) & RAD108181 (Platform) - Modification State 0

2.1.3 Date of Test

5 July 2016

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

The test was performed in accordance with ANSI C63.10, Clause 6.2.

Remarks

A mains supply cable of 1 m length was used to supply mains power to the EUT from the LISN.

All final measurements were assessed against the Class B emission limits in FCC 47 CFR Part 15, Clause 15.207 and Industry Canada RSS-GEN, Clause 8.8.

2.1.6 Environmental Conditions

Ambient Temperature	22.1°C
Relative Humidity	45.0%

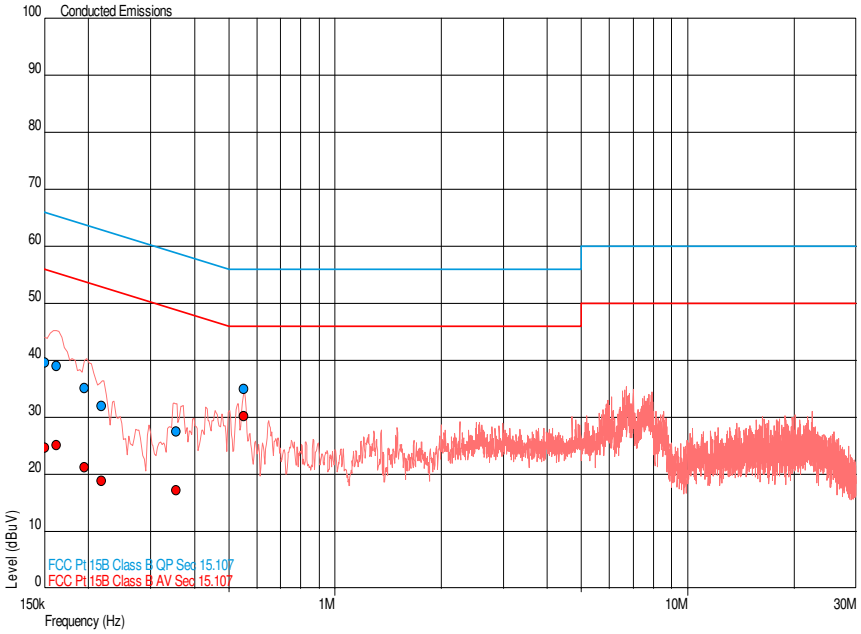
Product Service

2.1.7 Test Results

802.11b, Live Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.150	39.6	66.0	-26.4	24.6	56.0	-31.4
0.162	39.0	65.4	-26.4	25.2	55.4	-30.2
0.195	35.1	63.8	-28.7	21.3	53.8	-32.5
0.218	32.0	62.9	-30.9	18.8	52.9	-34.1
0.354	27.5	58.9	-31.3	17.3	48.9	-31.6
0.551	35.1	56.0	-20.9	30.2	46.0	-15.8

802.11b, Live Line, AC Line Conducted Emissions Plot

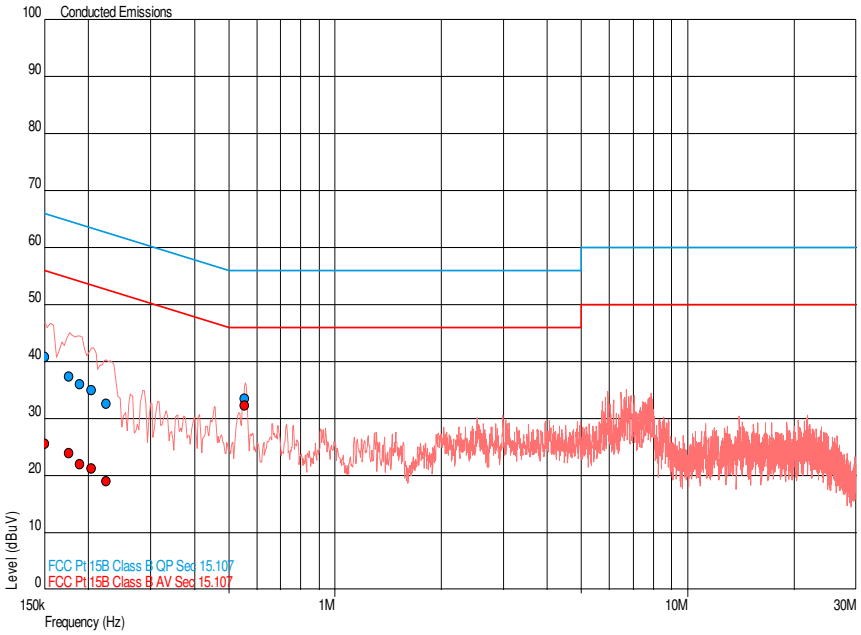


Product Service

802.11b, Neutral Line, AC Line Conducted Emissions Result

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBµV)	QP Margin (dBµV)	AV Level (dBµV)	AV Limit (dBµV)	AV Margin (dBµV)
0.150	40.8	66.0	-25.2	25.7	56.0	-30.3
0.176	37.4	64.7	-27.3	23.9	54.7	-30.8
0.189	36.1	64.1	-28.0	22.1	54.1	-32.0
0.204	35.1	63.5	-28.4	21.3	53.5	-32.2
0.225	32.6	62.6	-30.1	19.0	52.6	-33.7
0.554	33.5	56.0	-22.5	32.2	46.0	-13.8

802.11b, Neutral Line, AC Line Conducted Emissions Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.207

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

Industry Canada RSS-GEN, Limit Clause 8.8

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average**
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.
**A linear average detector is required

2.2 POWER SPECTRAL DENSITY

2.2.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (e)
Industry Canada RSS-247, Clause 5.2 (2)

2.2.2 Equipment Under Test and Modification State

Minuet/FS5332 S/N: RAD108620 (Module) and RAD108704 (Platform) and RAD108704 (Platform) - Modification State 0

2.2.3 Date of Test

9 May 2016 & 10 May 2016

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Procedure

The test was performed in accordance with KDB 558074 D01 V03r05, clause 8.2.

2.2.6 Environmental Conditions

Ambient Temperature	22.4 - 24.1°C
Relative Humidity	46.9 - 63.3%

Product Service

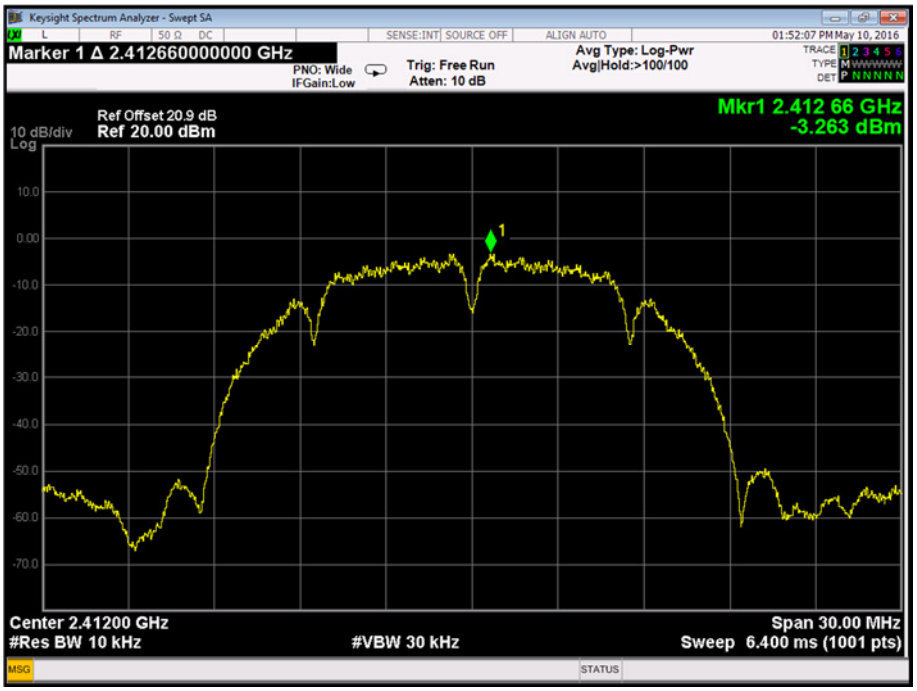
2.2.7 Test Results

5.00 V DC Supply

802.11b, OFDM, 1 Mbps, Power Spectral Density Results

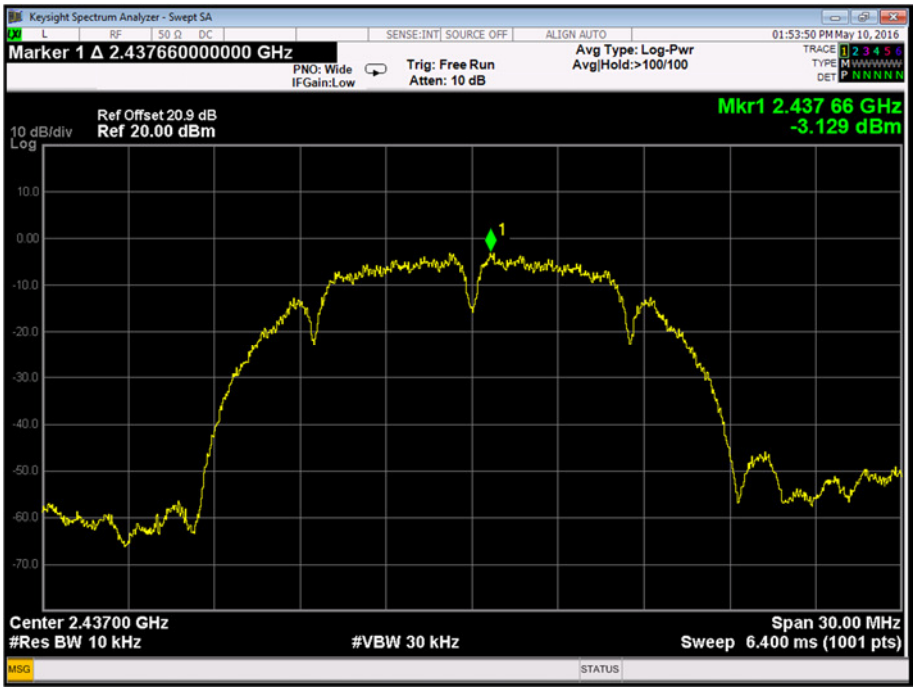
2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-3.263	-3.129	-3.126

802.11b, 2412 MHz, OFDM, 1 Mbps, Power Spectral Density Plot

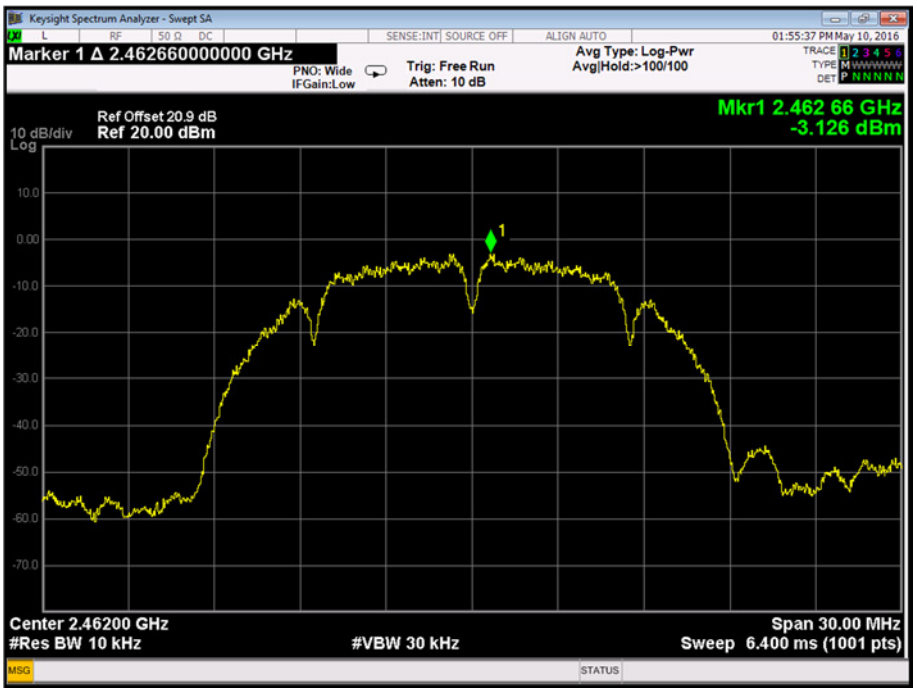


Product Service

802.11b, 2437 MHz, OFDM, 1 Mbps, Power Spectral Density Plot



802.11b, 2462 MHz, OFDM, 1 Mbps, Power Spectral Density Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Industry Canada RSS-247, Limit Clause, 5.2 (2)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

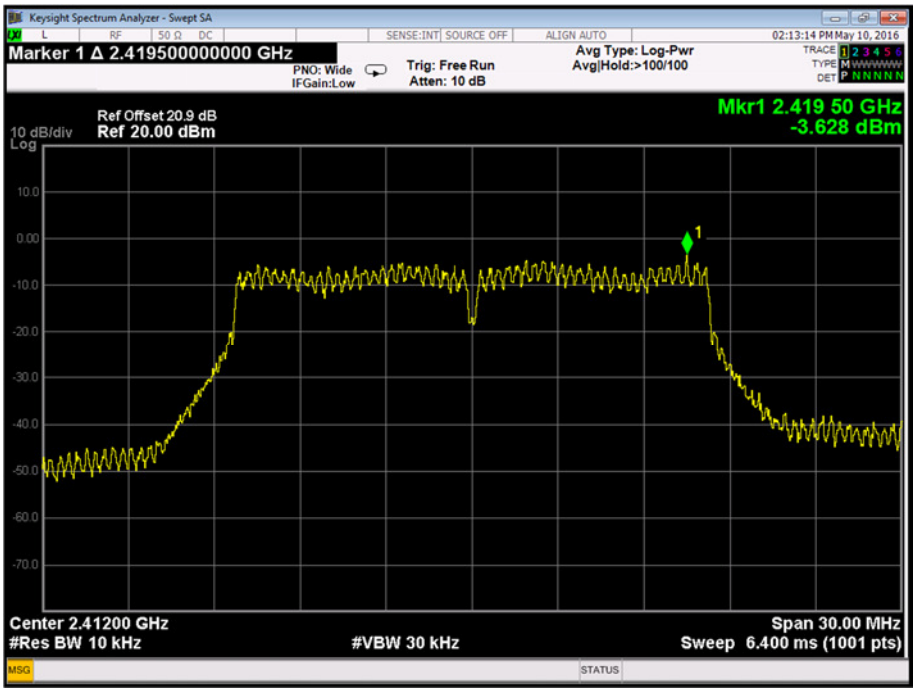
Product Service

5.00 V DC Supply

802.11g, OFDM, 12 Mbps, Power Spectral Density Results

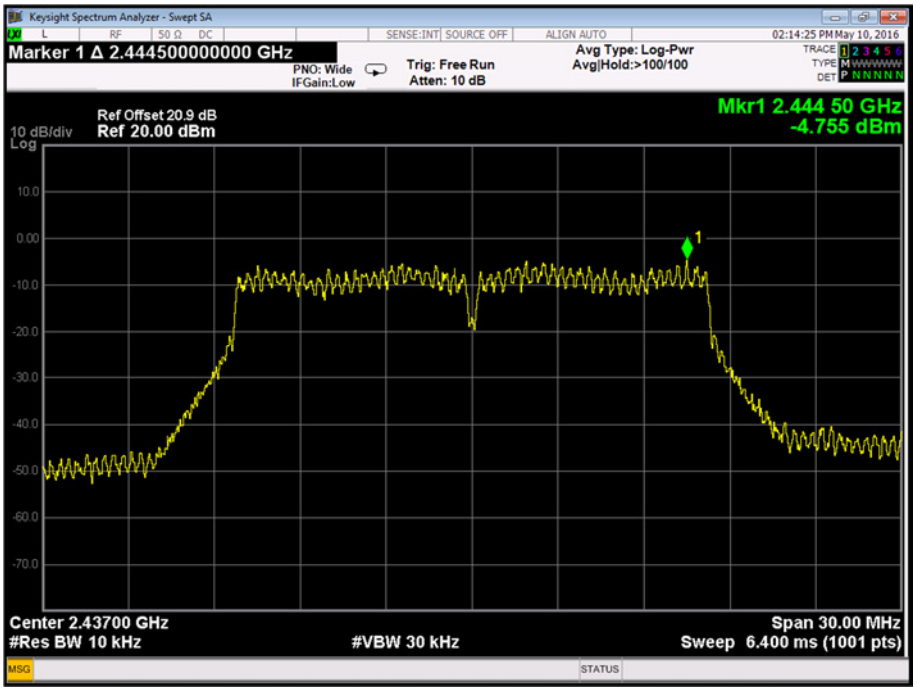
2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-3.628	-4.755	-4.492

802.11g, 2412 MHz, OFDM, 12 Mbps, Power Spectral Density Plot

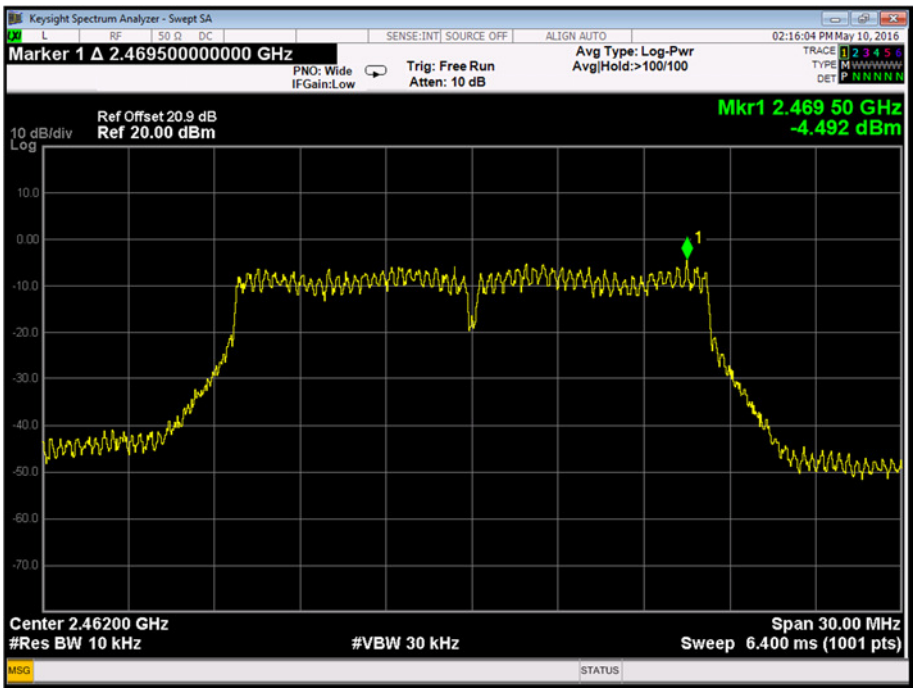


Product Service

802.11g, 2437 MHz, OFDM, 12 Mbps, Power Spectral Density Plot



802.11g, 2462 MHz, OFDM, 12 Mbps, Power Spectral Density Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Industry Canada RSS-247, Limit Clause, 5.2 (2)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

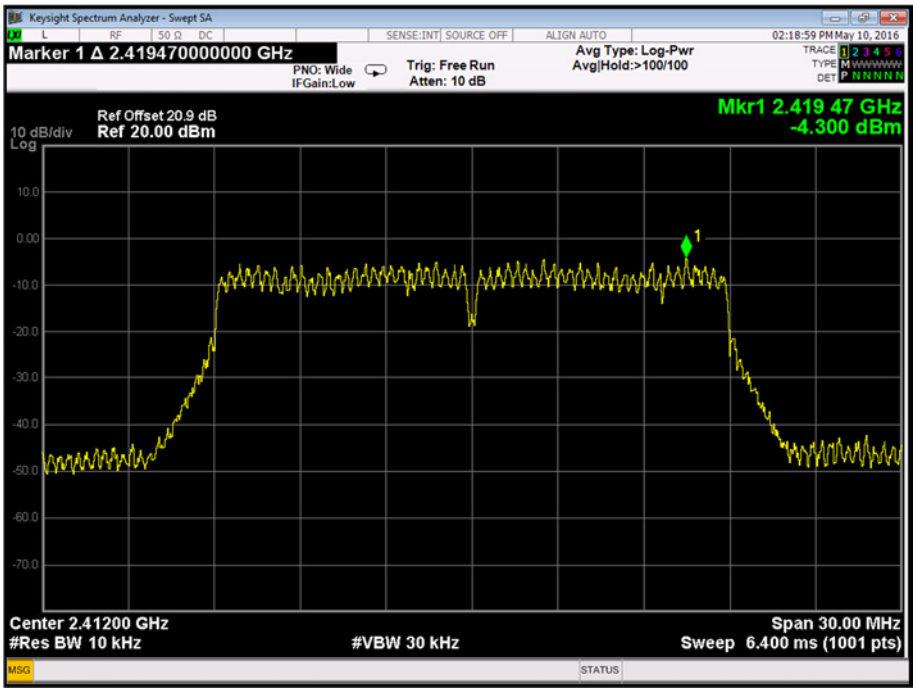
Product Service

5.00 V DC Supply

802.11n 20 MHz Bandwidth, OFDM, MCS7, Power Spectral Density Results

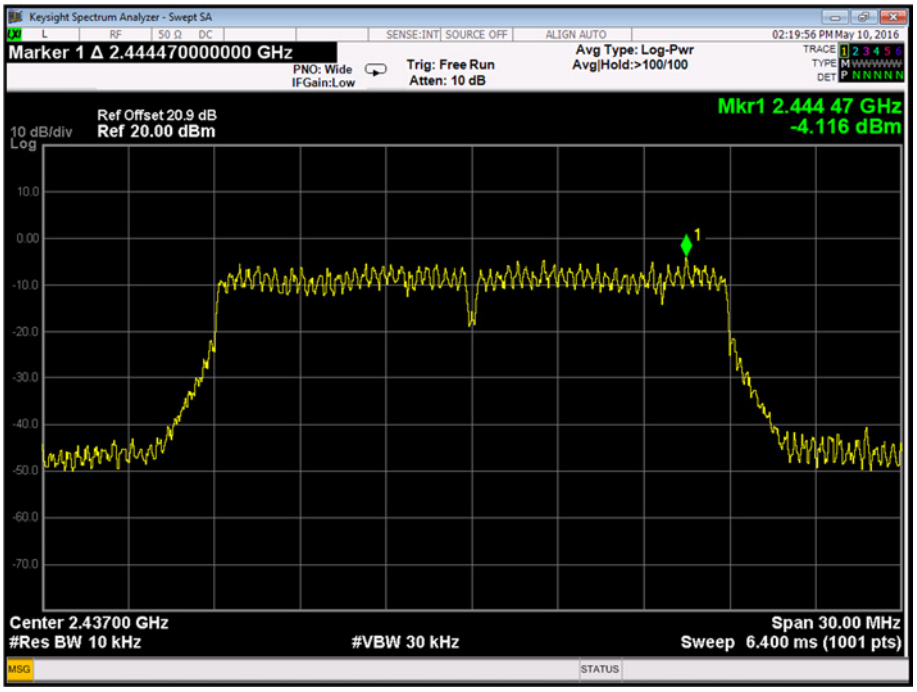
2412 MHz	2437 MHz	2462 MHz
dBm	dBm	dBm
-4.300	-4.116	-4.396

802.11n 20 MHz Bandwidth, 2412 MHz, OFDM, MCS7, Power Spectral Density Plot

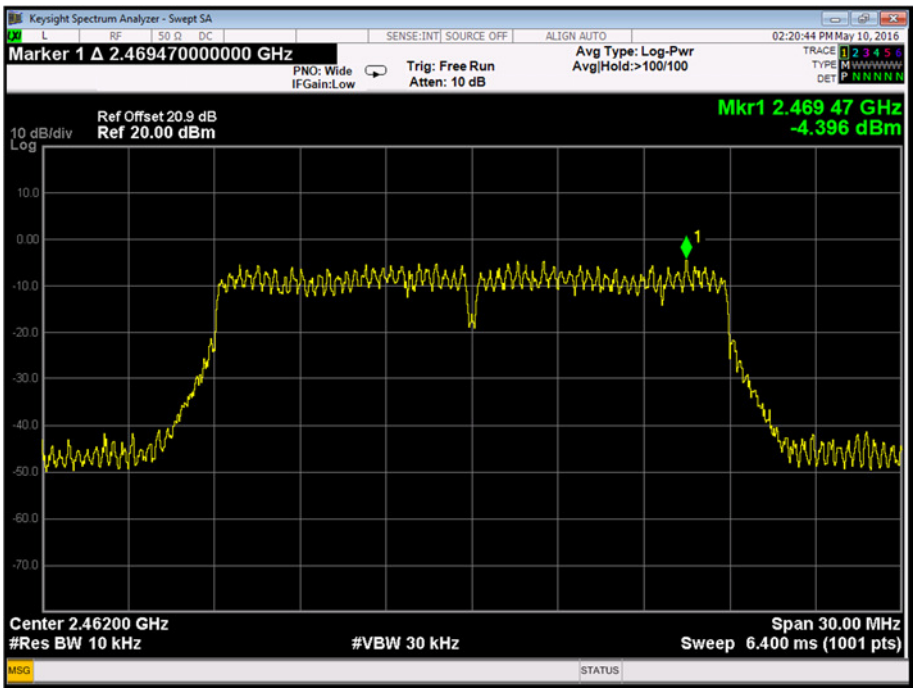


Product Service

802.11n 20 MHz Bandwidth, 2437 MHz, OFDM, MCS7, Power Spectral Density Plot



802.11n 20 MHz Bandwidth, 2462 MHz, OFDM, MCS7, Power Spectral Density Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Industry Canada RSS-247, Limit Clause, 5.2 (2)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

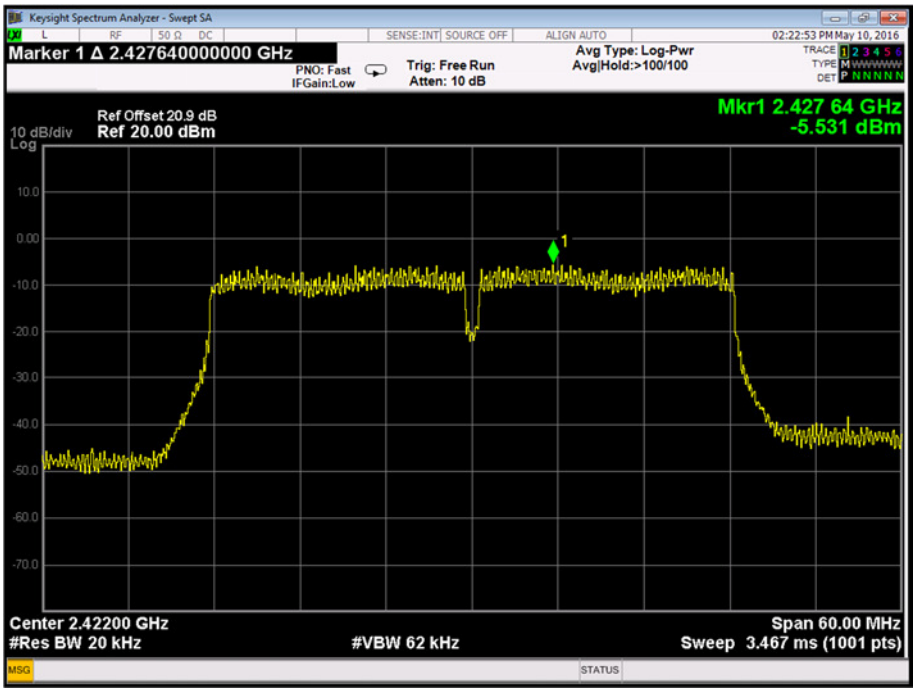
Product Service

5.00 V DC Supply

802.11n 40 MHz Bandwidth, OFDM, MCS0, Power Spectral Density Results

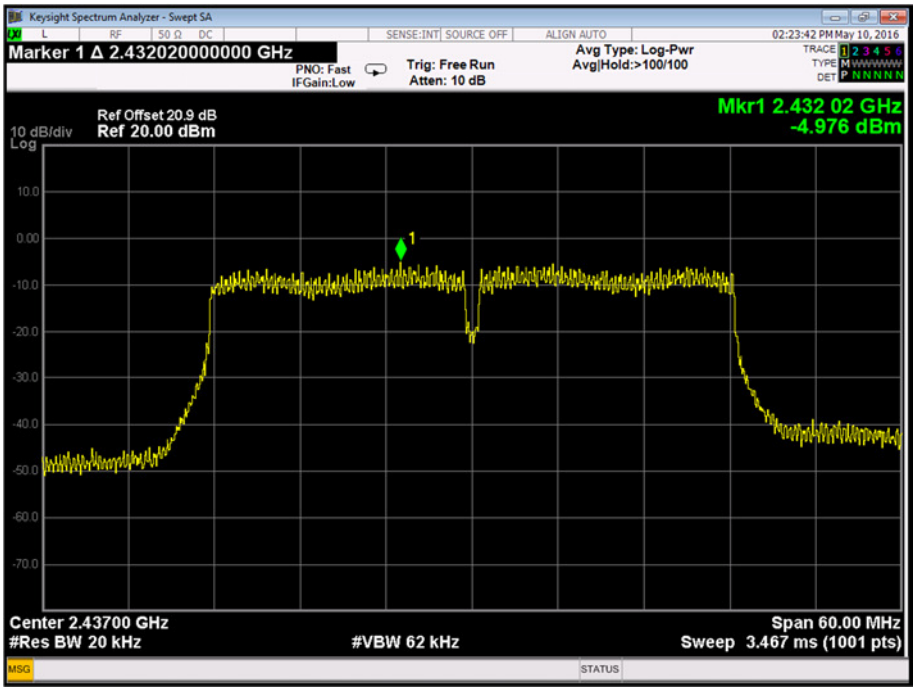
2422 MHz	2437 MHz	2452 MHz
dBm	dBm	dBm
-5.531	-4.976	-5.332

802.11n 40 MHz Bandwidth, 2422 MHz, OFDM, MCS0, Power Spectral Density Plot

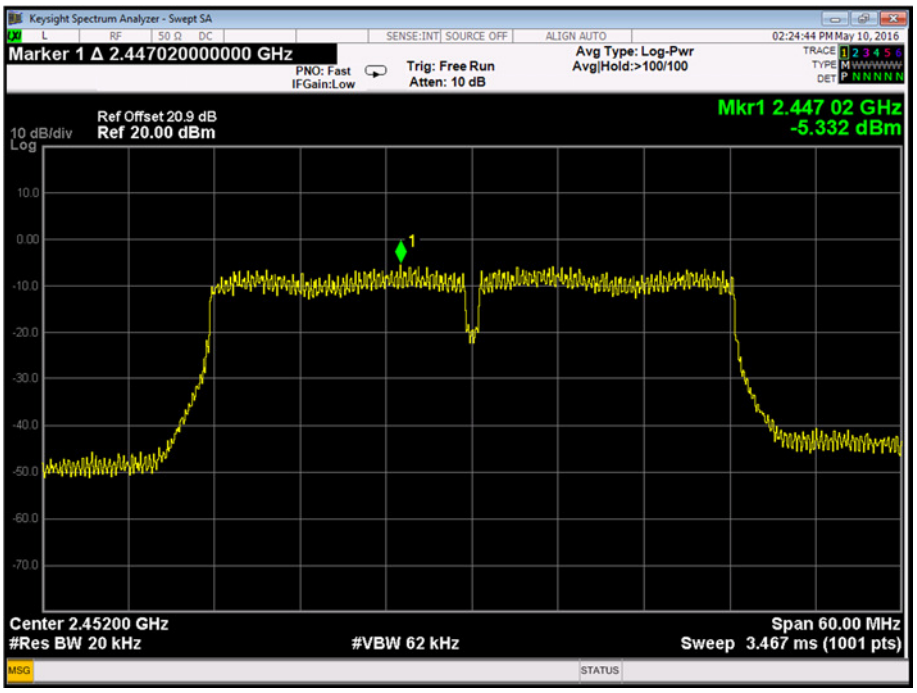


Product Service

802.11n 40 MHz Bandwidth, 2437 MHz, OFDM, MCS0, Power Spectral Density Plot



802.11n 40 MHz Bandwidth, 2452 MHz, OFDM, MCS0, Power Spectral Density Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Industry Canada RSS-247, Limit Clause, 5.2 (2)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

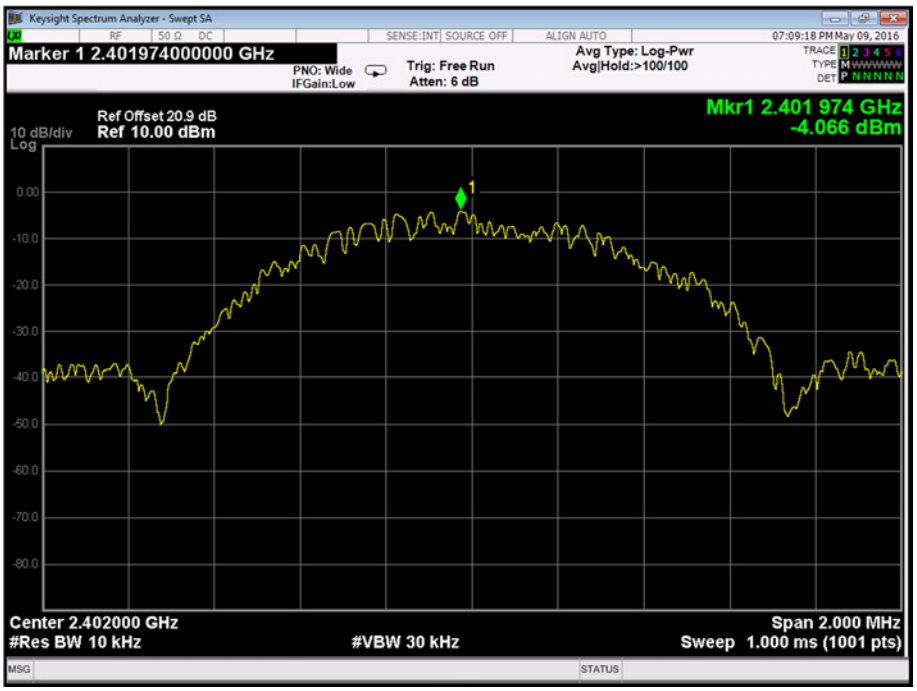
Product Service

5.00 V DC Supply

Bluetooth Low Energy, GFSK, Power Spectral Density Results

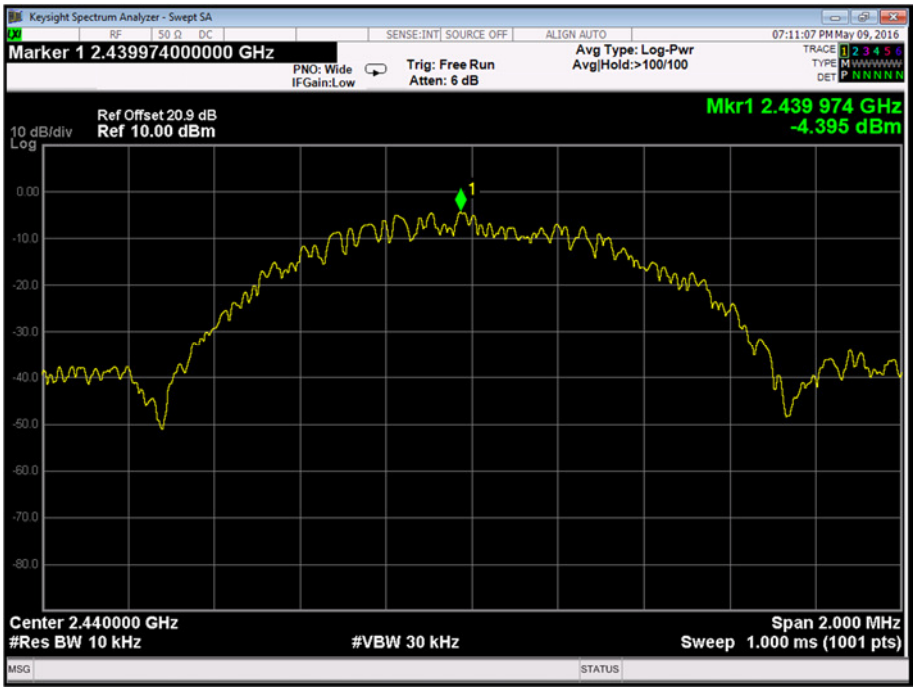
2402 MHz	2440 MHz	2480 MHz
dBm	dBm	dBm
-4.066	-4.395	-4.505

Bluetooth Low Energy, 2402 MHz, GFSK, Power Spectral Density Plot

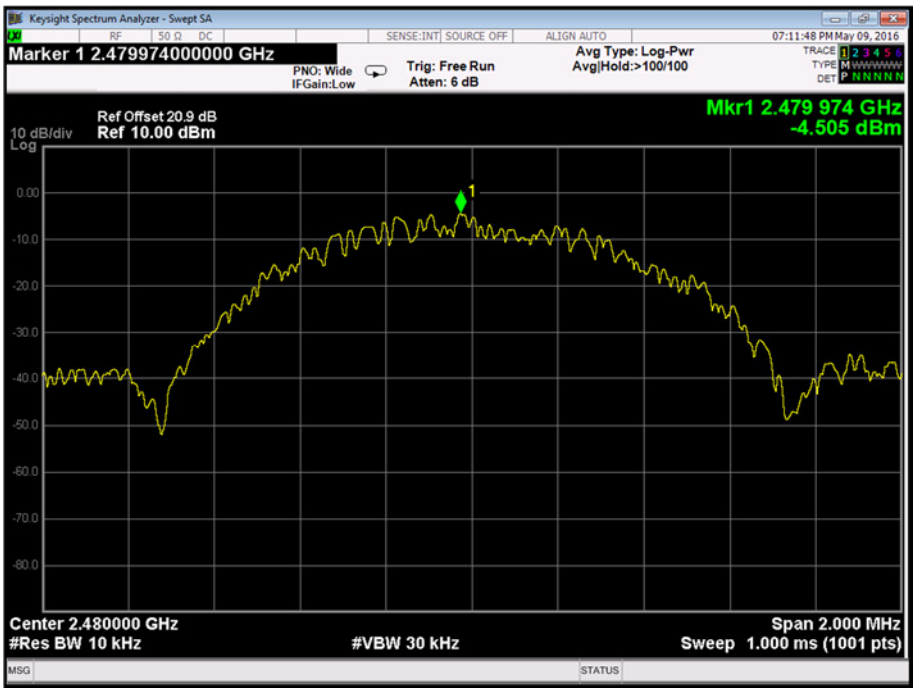


Product Service

Bluetooth Low Energy, 2440 MHz, GFSK, Power Spectral Density Plot



Bluetooth Low Energy, 2480 MHz, GFSK, Power Spectral Density Plot



Product Service

FCC 47 CFR Part 15, Limit Clause 15.247 (e)

The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Industry Canada RSS-247, Limit Clause, 5.2 (2)

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Product Service

2.3 6 dB BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (a)(2)
Industry Canada RSS-247, Clause 5.2(1)

2.3.2 Equipment Under Test and Modification State

Minuet/FS5332 S/N: RAD108620 (Module) and RAD108704 (Platform) - Modification State 0

2.3.3 Date of Test

9 May 2016 & 10 May 2016

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Procedure

The test was performed in accordance with KDB 558074 D01 v03r05, clause 8.2

Remarks

Preliminary checks were performed to determine the data rate with the widest bandwidth.

2.3.6 Environmental Conditions

Ambient Temperature	22.4 - 24.1°C
Relative Humidity	46.9 - 63.6%

Product Service

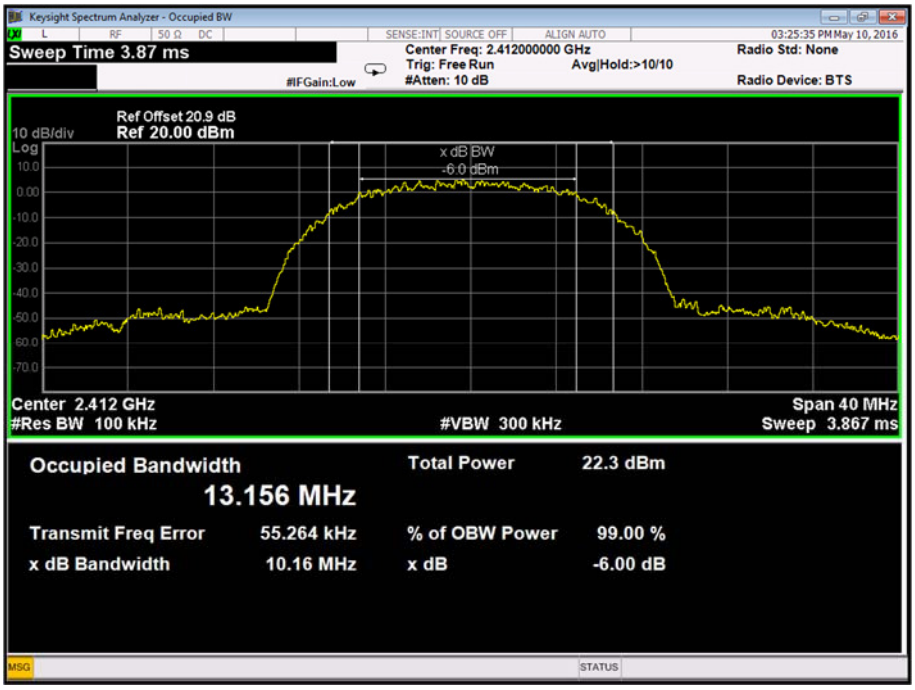
2.3.7 Test Results

5.00 V DC Supply

802.11b, OFDM, 5.5 Mbps, 6 dB Bandwidth Results

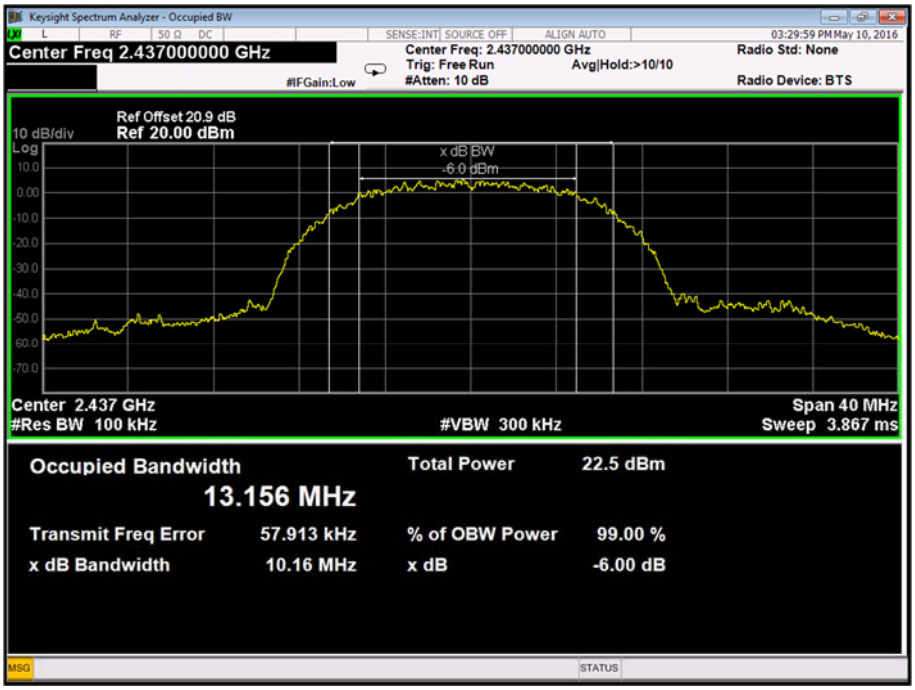
2412 MHz	2437 MHz	2462 MHz
kHz	kHz	kHz
10160	10160	10160

802.11b, 2412 MHz, OFDM, 5.5 Mbps, 6 dB Bandwidth Plot

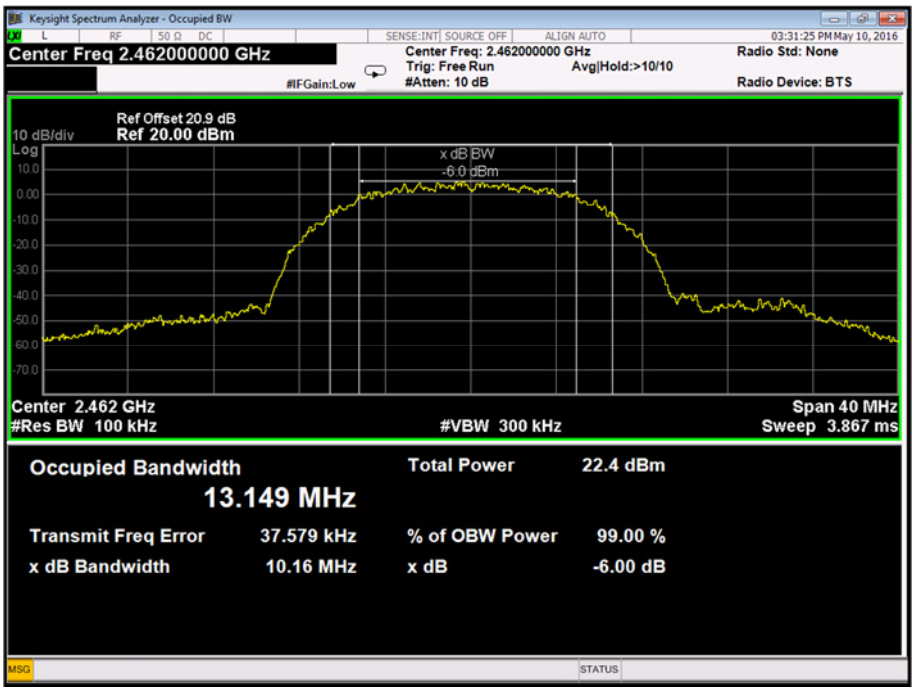


Product Service

802.11b, 2437 MHz, OFDM, 5.5 Mbps, 6 dB Bandwidth Plot



802.11b, 2462 MHz, OFDM, 5.5 Mbps, 6 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(2)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

Industry Canada RSS-247, Limit Clause, 5.2(1)

The minimum 6 dB bandwidth shall be 500 kHz.

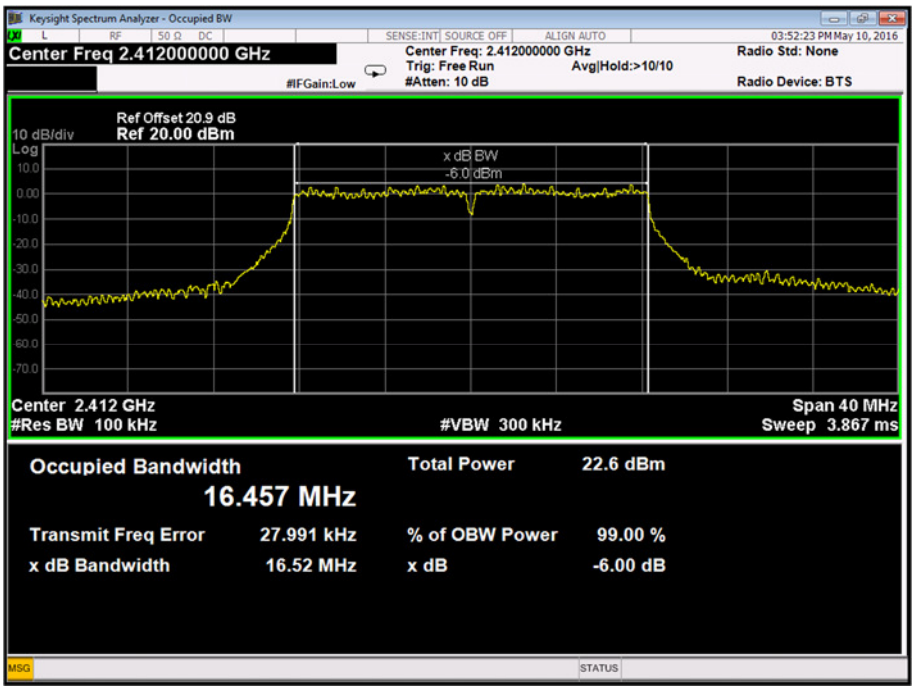
Product Service

5.00 V DC Supply

802.11g, OFDM, 36 Mbps, 6 dB Bandwidth Results

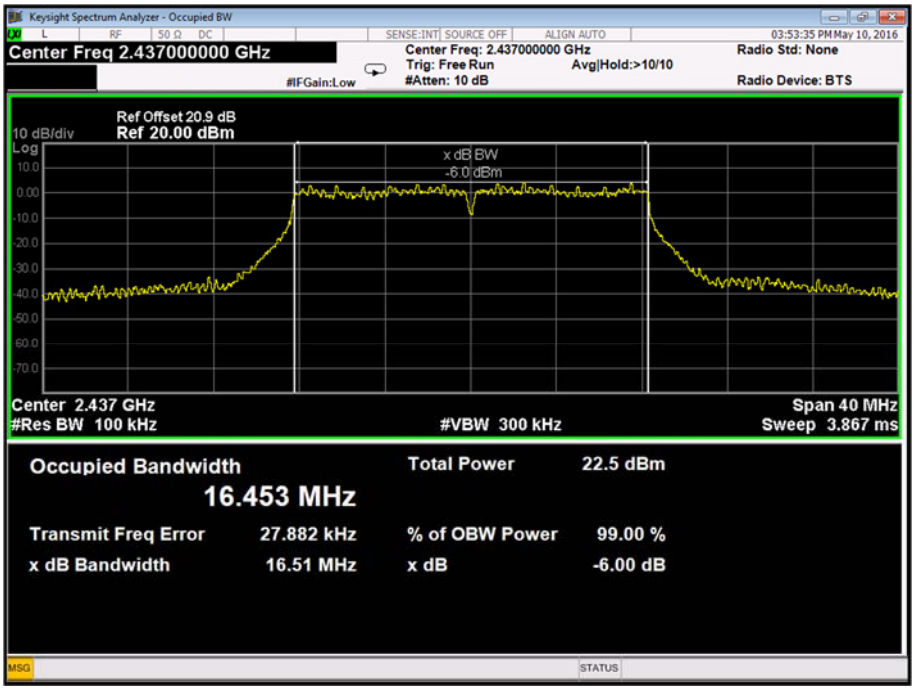
2412 MHz	2437 MHz	2462 MHz
kHz	kHz	kHz
16520	16510	16520

802.11g, 2412 MHz, OFDM, 36 Mbps, 6 dB Bandwidth Plot

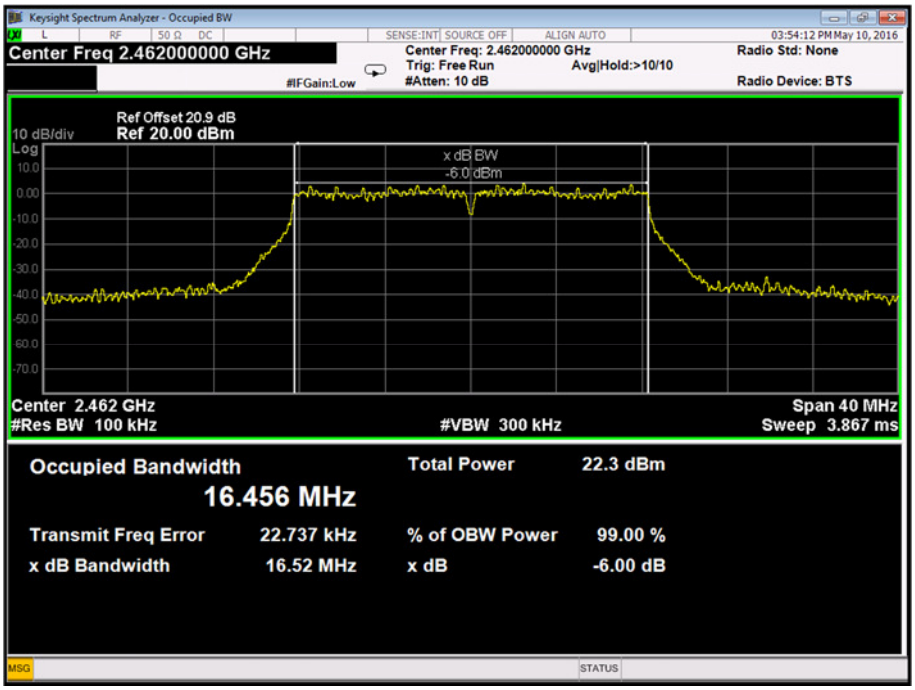


Product Service

802.11g, 2437 MHz, OFDM, 36 Mbps, 6 dB Bandwidth Plot



802.11g, 2462 MHz, OFDM, 36 Mbps, 6 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(2)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

Industry Canada RSS-247, Limit Clause, 5.2(1)

The minimum 6 dB bandwidth shall be 500 kHz.

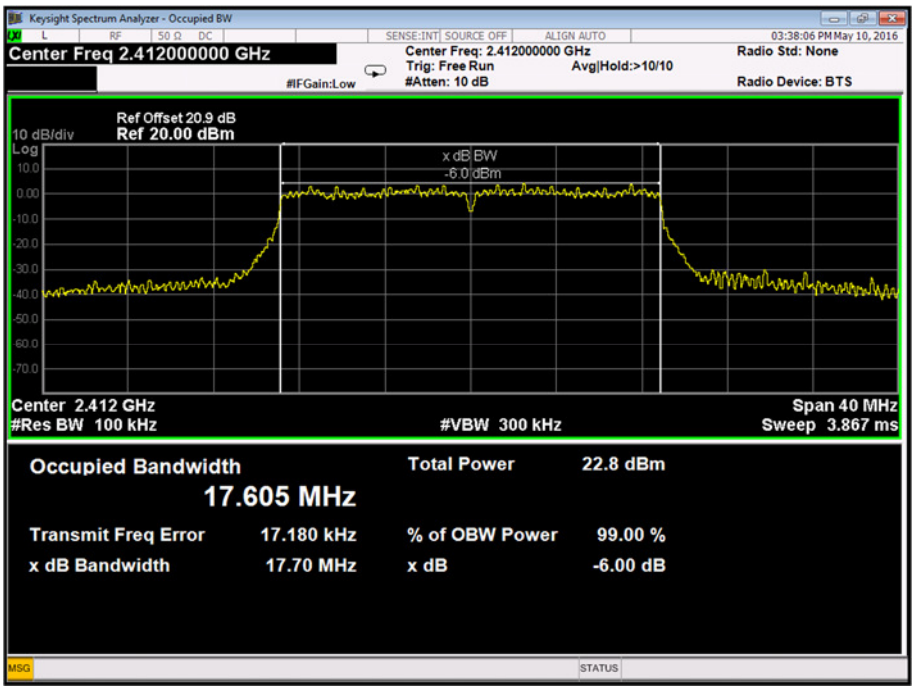
Product Service

5.00 V DC Supply

802.11n 20 MHz Bandwidth, OFDM, MCS7, 6 dB Bandwidth Results

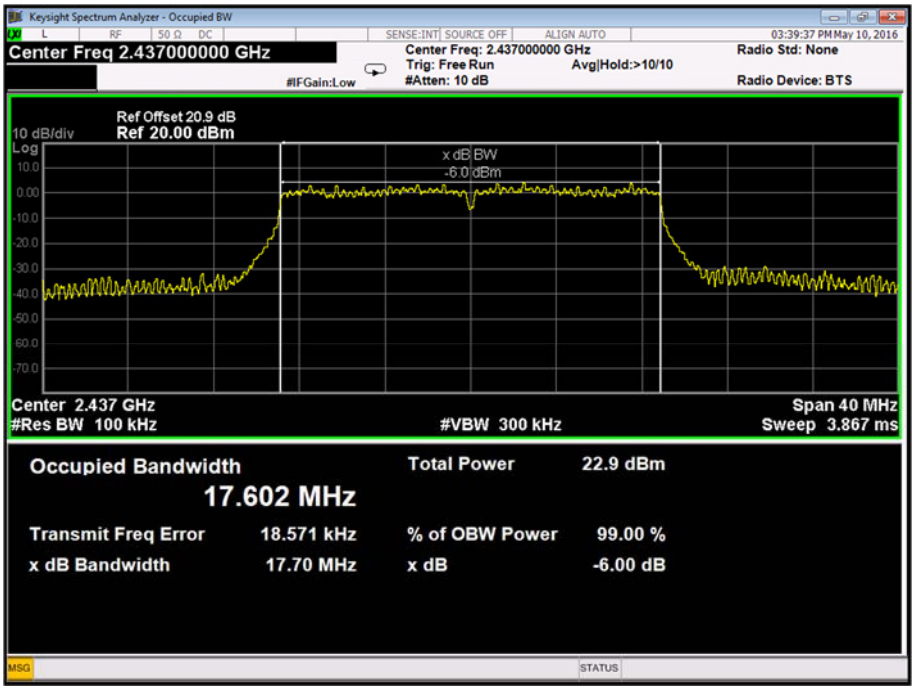
2412 MHz	2437 MHz	2462 MHz
kHz	kHz	kHz
17700	17700	17710

802.11n 20 MHz Bandwidth, 2412 MHz, OFDM, MCS7, 6 dB Bandwidth Plot

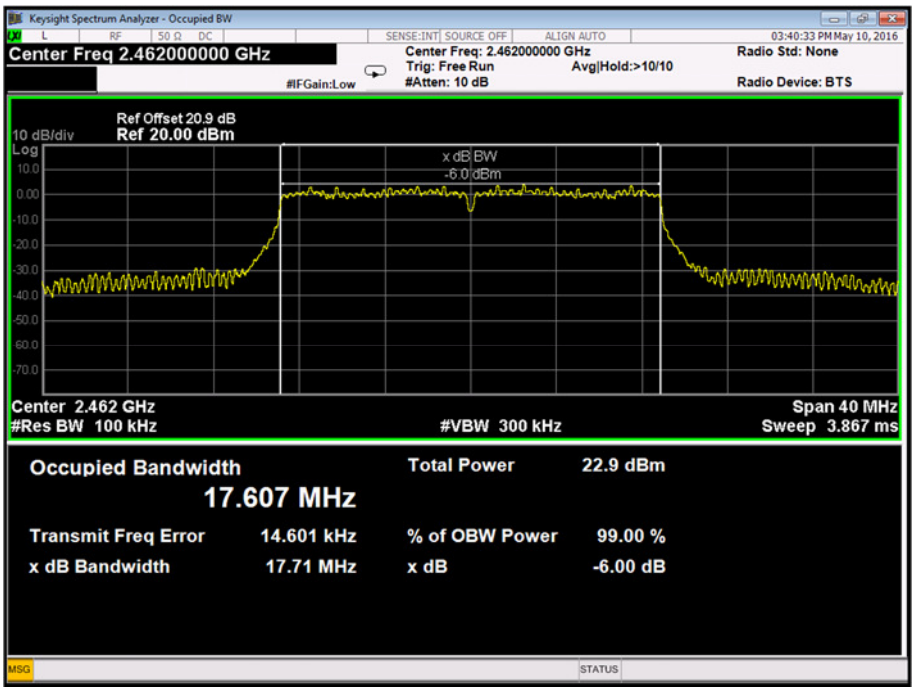


Product Service

802.11n 20 MHz Bandwidth, 2437 MHz, OFDM, MCS7, 6 dB Bandwidth Plot



802.11n 20 MHz Bandwidth, 2462 MHz, OFDM, MCS7, 6 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(2)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

Industry Canada RSS-247, Limit Clause, 5.2(1)

The minimum 6 dB bandwidth shall be 500 kHz.

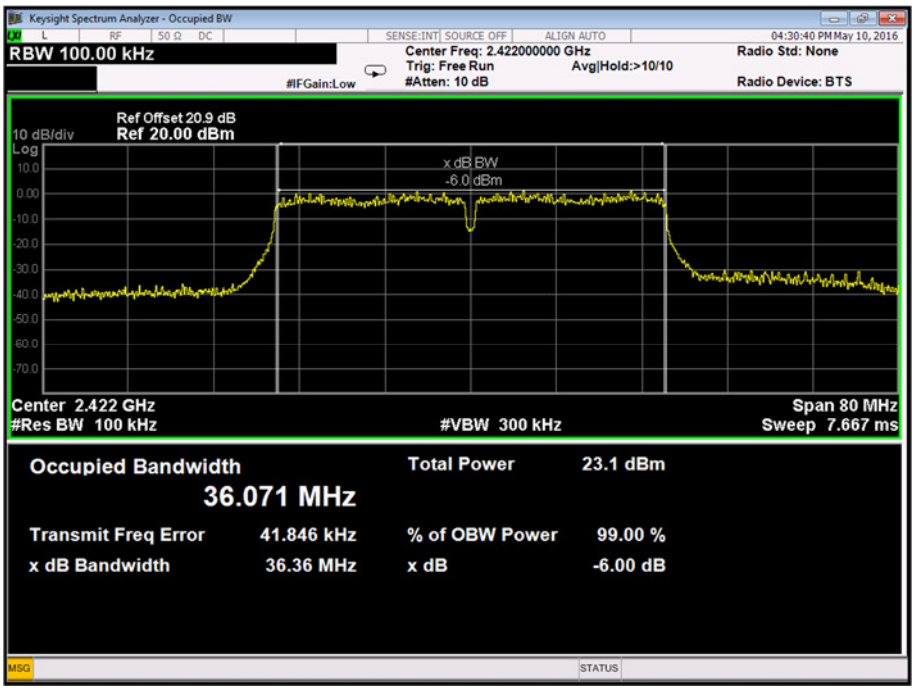
Product Service

5.00 V DC Supply

802.11n 40 MHz Bandwidth, OFDM, MCS5, 6 dB Bandwidth Results

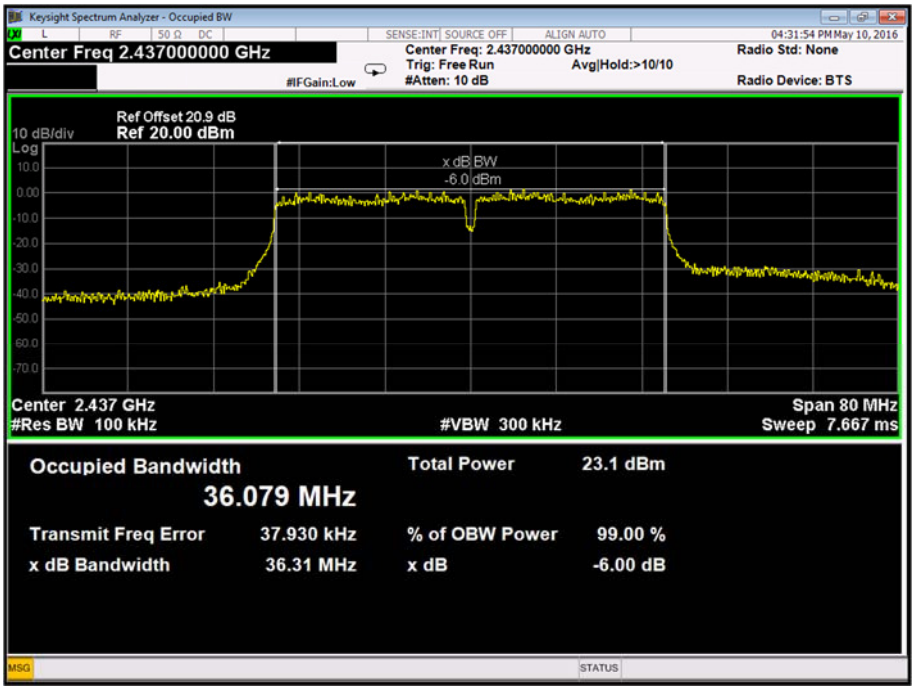
2422 MHz	2437 MHz	2452 MHz
kHz	kHz	kHz
36360	36310	36380

802.11n 40 MHz Bandwidth, 2422 MHz, OFDM, MCS5, 6 dB Bandwidth Plot

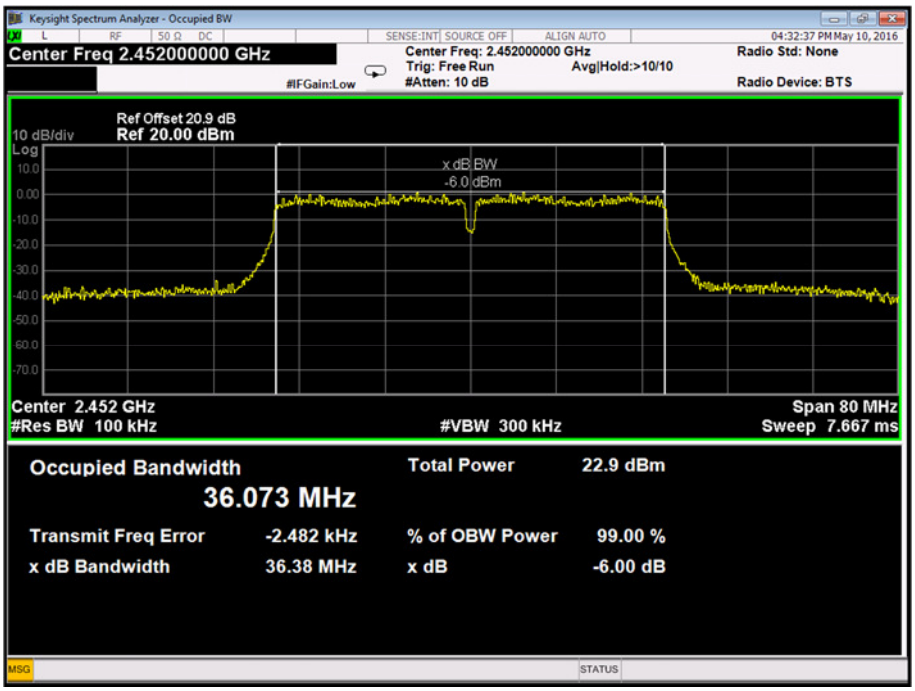


Product Service

802.11n 40 MHz Bandwidth, 2437 MHz, OFDM, MCS5, 6 dB Bandwidth Plot



802.11n 40 MHz Bandwidth, 2452 MHz, OFDM, MCS5, 6 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(2)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

Industry Canada RSS-247, Limit Clause, 5.2(1)

The minimum 6 dB bandwidth shall be 500 kHz.

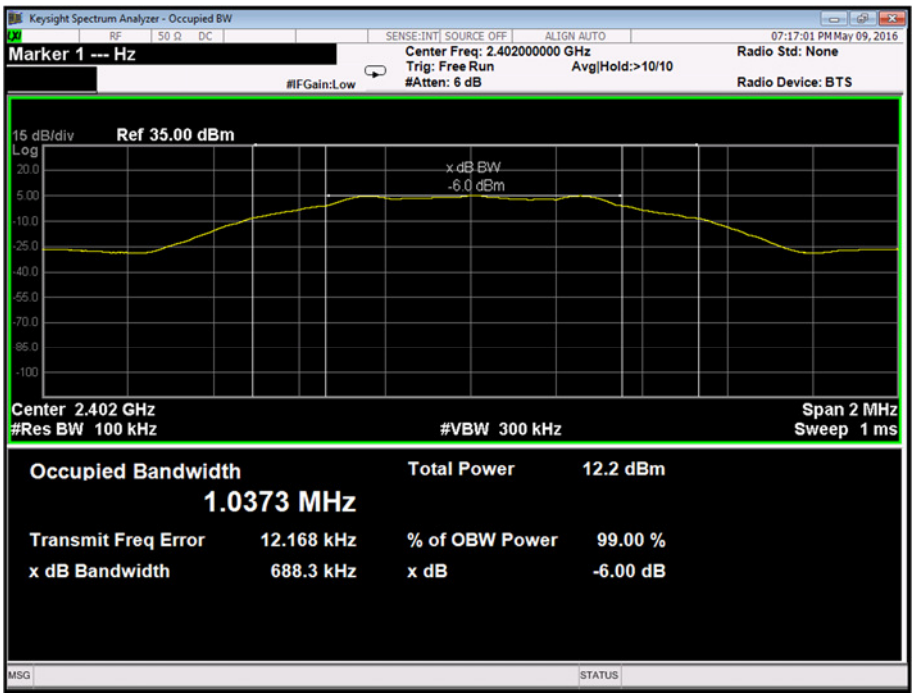
Product Service

5.00 V DC Supply

Bluetooth Low Energy, GFSK, 6 dB Bandwidth Results

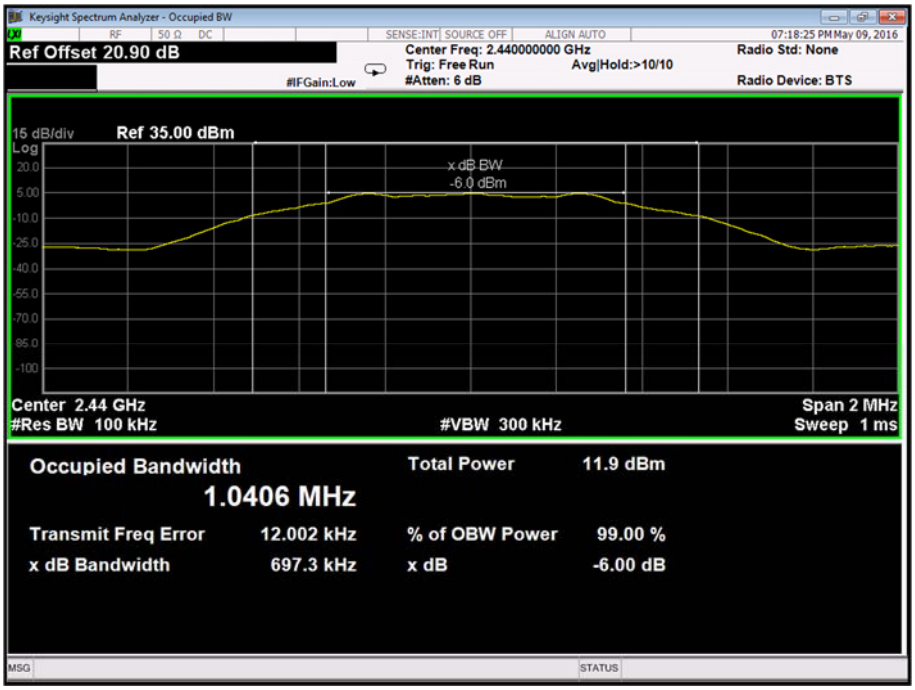
2402 MHz	2440 MHz	2480 MHz
kHz	kHz	kHz
688.3	697.3	690.1

Bluetooth Low Energy, 2402 MHz, GFSK, 6 dB Bandwidth Plot

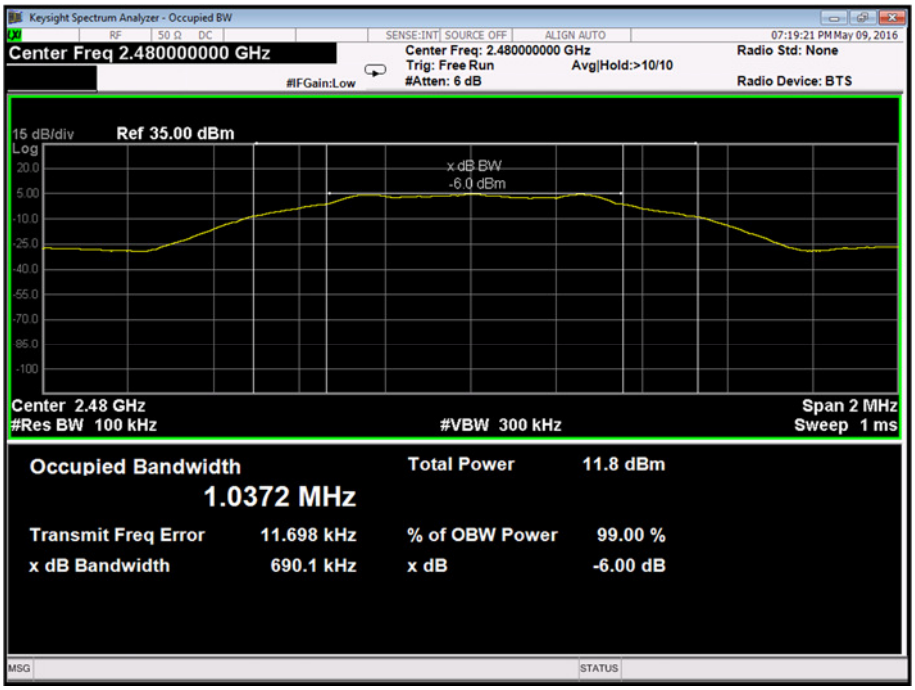


Product Service

Bluetooth Low Energy, 2440 MHz, GFSK, 6 dB Bandwidth Plot



Bluetooth Low Energy, 2480 MHz, GFSK, 6 dB Bandwidth Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (a)(2)

The minimum 6 dB Bandwidth shall be at least 500 kHz.

Industry Canada RSS-247, Limit Clause, 5.2(1)

The minimum 6 dB bandwidth shall be 500 kHz.

2.4 MAXIMUM CONDUCTED OUTPUT POWER

2.4.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (b)(3)
Industry Canada RSS-247, Clause 5.4(4)

2.4.2 Equipment Under Test and Modification State

Minuet/FS5332 S/N: RAD108620 (Module) and RAD108704 (Platform) - Modification State 0

2.4.3 Date of Test

9 May 2016 & 10 May 2016

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Procedure

The test was performed in accordance with KDB 558074 D01 v03r05, clause 9.1.2.

2.4.6 Environmental Conditions

Ambient Temperature	22.4 - 24.1°C
Relative Humidity	46.9 - 63.3%

Product Service

2.4.7 Test Results

5.00 V DC Supply

802.11b, 1 Mbps, Maximum Conducted Output Power Results

2412 MHz		2437 MHz		2462 MHz	
dBm	mW	dBm	mW	dBm	mW
18.31	67.76	18.15	65.31	18.05	63.83

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

Industry Canada RSS-247, Limit Clause, 5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

5.00 V DC Supply

802.11g, 12 Mbps, Maximum Conducted Output Power Results

2412 MHz		2437 MHz		2462 MHz	
dBm	mW	dBm	mW	dBm	mW
24.44	277.97	24.27	267.30	24.94	311.89

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

Industry Canada RSS-247, Limit Clause, 5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

5.00 V DC Supply

802.11n 20 MHz Bandwidth, MCS7, Maximum Conducted Output Power Results

2412 MHz		2437 MHz		2462 MHz	
dBm	mW	dBm	mW	dBm	mW
24.56	285.76	24.60	288.40	24.80	302.00

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

Industry Canada RSS-247, Limit Clause, 5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

5.00 V DC Supply

802.11n 40 MHz Bandwidth, MCS0, Maximum Conducted Output Power Results

2422 MHz		2437 MHz		2452 MHz	
dBm	mW	dBm	mW	dBm	mW
24.59	287.74	24.74	297.85	24.60	288.40

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

Industry Canada RSS-247, Limit Clause, 5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

5.00 V DC Supply

Bluetooth Low Energy, Maximum Conducted Output Power Results

2402 MHz		2440 MHz		2480 MHz	
dBm	mW	dBm	mW	dBm	mW
5.769	3.775	5.442	3.501	5.277	3.370

FCC 47 CFR Part 15, Limit Clause 15.247 (b)

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

Industry Canada RSS-247, Limit Clause, 5.4(4)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. Except as provided in Section 5.4(5), the e.i.r.p. shall not exceed 4 W.

2.5 SPURIOUS RADIATED EMISSIONS

2.5.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.247 (d), 15.205 and 15.209
Industry Canada RSS-247, Clause 5.5

2.5.2 Equipment Under Test and Modification State

Minuet/FS5332 S/N: RAD108624 (Module) and RAD108700 (Platform) - Modification State 0 – 1st Diversity Antenna Part Number N12-2128-ROA
Minuet/FS5332 S/N: RAD108624 (Module) and RAD108703 (Platform) - Modification State 0 – 2nd Diversity Antenna Part Number RFPCA431223IMLB301

2.5.3 Date of Test

23 May 2016, 25 May 2016, 26 May 2016, 27 May 2016, 20 June 2016, 22 June 2016, 29 June 2016, 1 July 2016, 3 July 2016, 4 July 2016, 6 July 2016 & 10 July 2016

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Procedure

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.5 and 6.6.

2.5.6 Environmental Conditions

Ambient Temperature	16.0 - 22.6°C
Relative Humidity	36.0 - 67.0%

Product Service

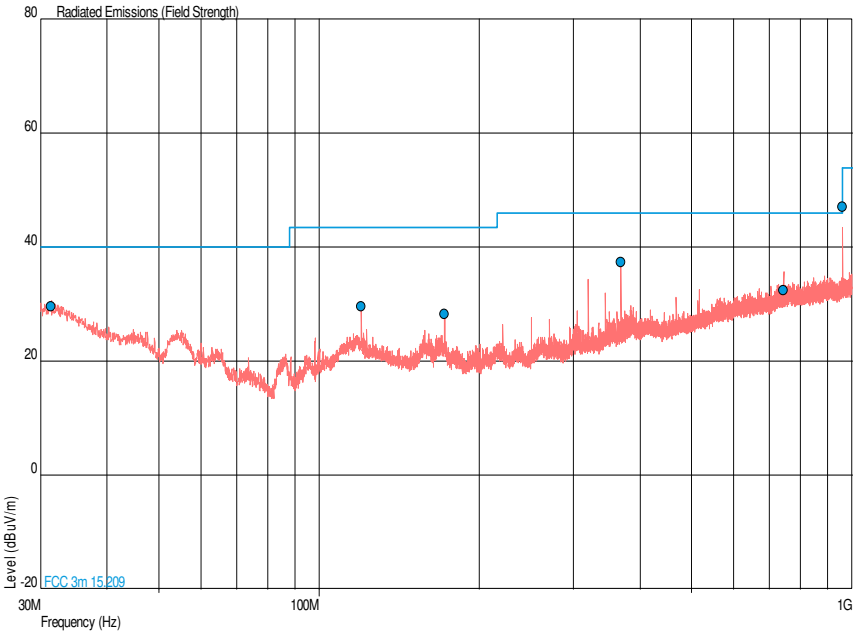
2.5.7 Test Results

5.00 V DC Supply

802.11b, 2412 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
31.434	29.6	-10.4	30.2	-69.8	176	1.00	Vertical
120.017	29.6	-13.9	30.2	-119.8	295	1.37	Vertical
172.036	28.3	-15.2	26.0	-124.0	123	1.00	Vertical
368.645	37.4	-8.6	74.1	-125.9	360	1.00	Horizontal
744.066	32.5	-13.5	42.2	-157.8	269	2.69	Horizontal
960.003	47.0	-7.0	223.9	-277.1	269	1.90	Horizontal

802.11b, 2412 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



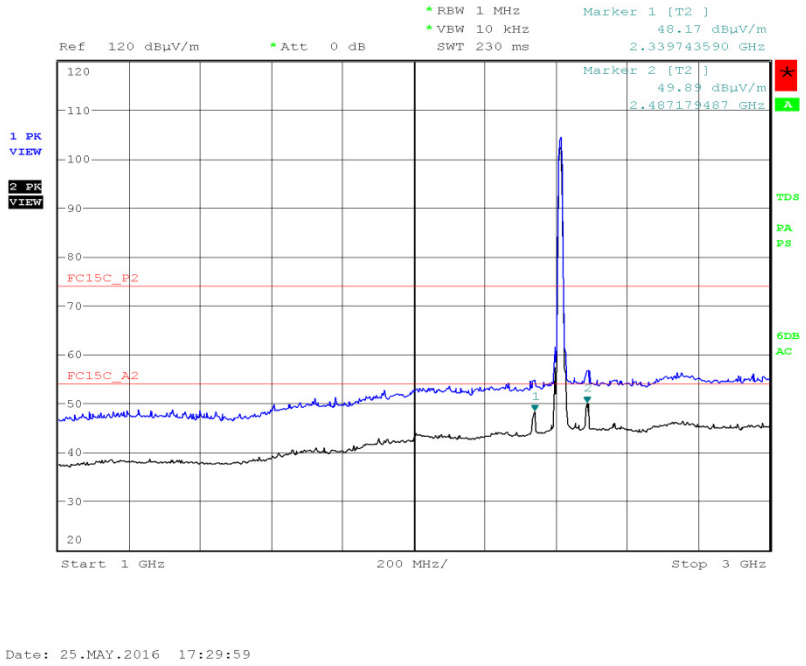
Product Service

802.11b, 2412 MHz, 1 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
2339.74	57.88	45.60	783.43	199.55	57.7	110	Vertical
2487.70	59.73	48.82	969.39	276.06	155.9	145	Vertical

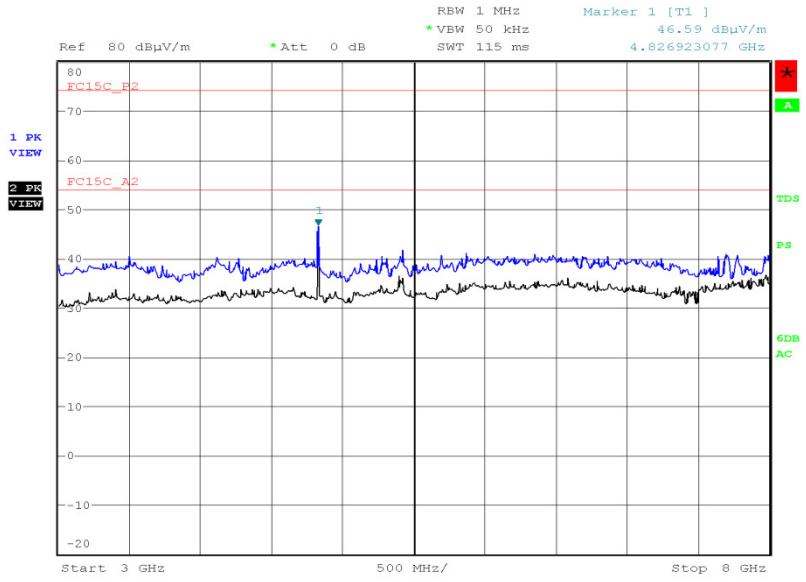
No other emissions were detected within 6 dB of the limit.

802.11b, 2412 MHz, 1 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



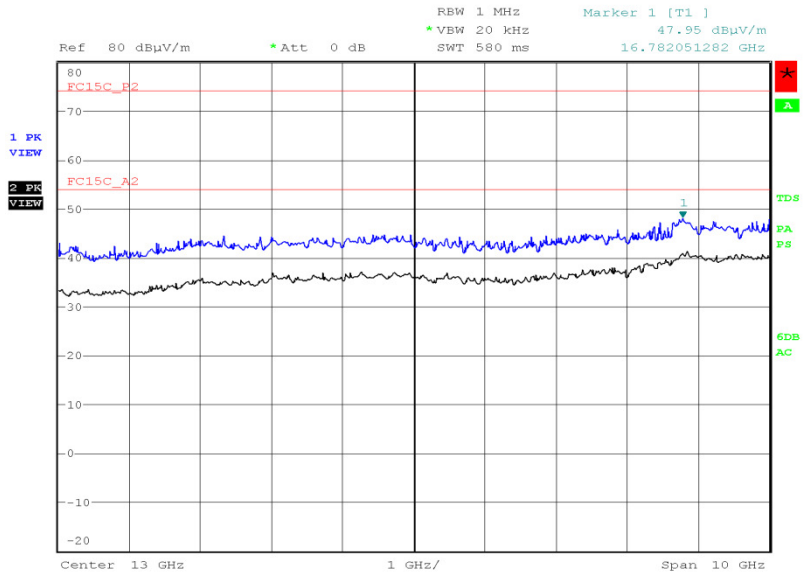
Product Service

802.11b, 2412 MHz,1 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 09:49:31

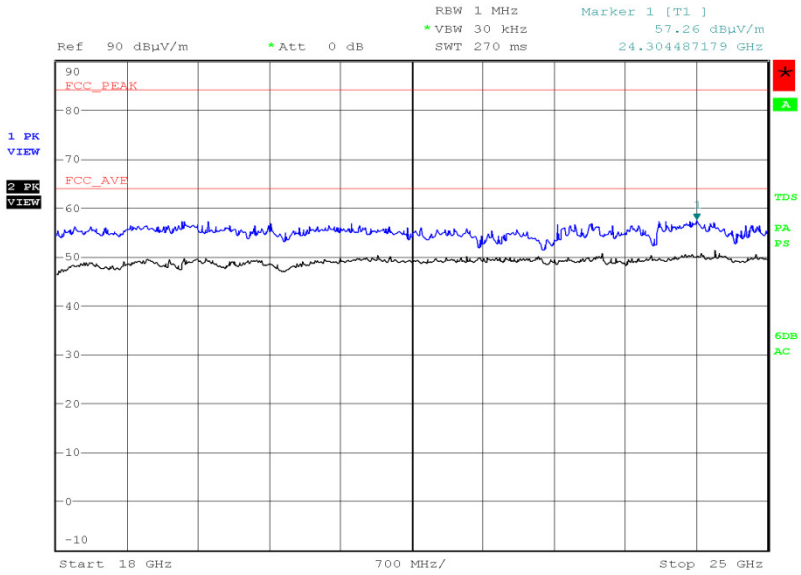
802.11b, 2412 MHz,1 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 07:33:44

Product Service

802.11b, 2412 MHz, 1 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



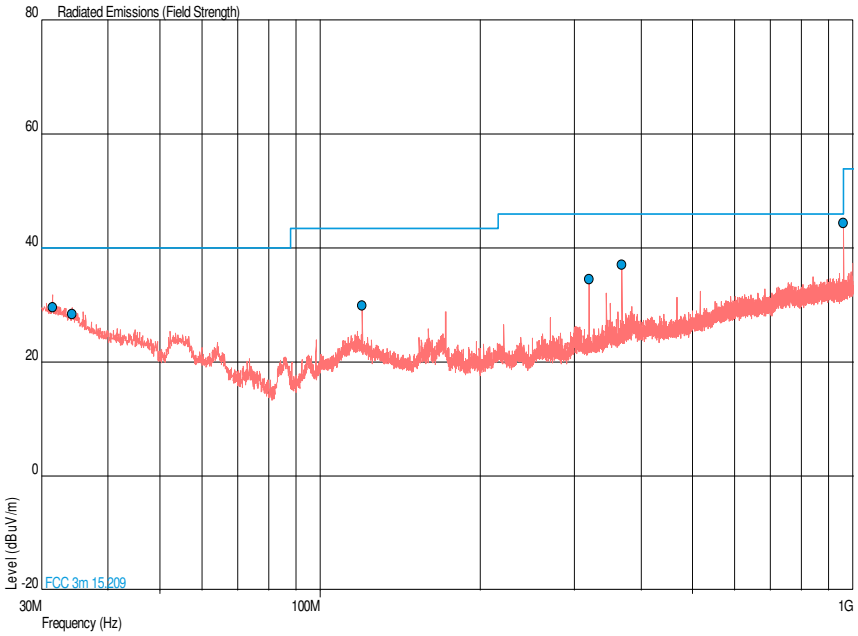
Date: 24.MAY.2016 07:46:15

Product Service

802.11b, 2437 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
31.454	29.6	-10.4	30.2	-69.8	84	2.92	Horizontal
34.228	28.4	-11.6	26.3	-73.7	360	1.00	Vertical
120.008	29.9	-13.6	31.3	-118.7	317	1.00	Vertical
319.479	34.6	-11.4	53.7	-146.3	66	1.00	Vertical
368.645	37.2	-8.8	72.4	-127.6	360	1.00	Horizontal
960.021	44.4	-9.6	166.0	-335.0	233	2.00	Horizontal

802.11b, 2437 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



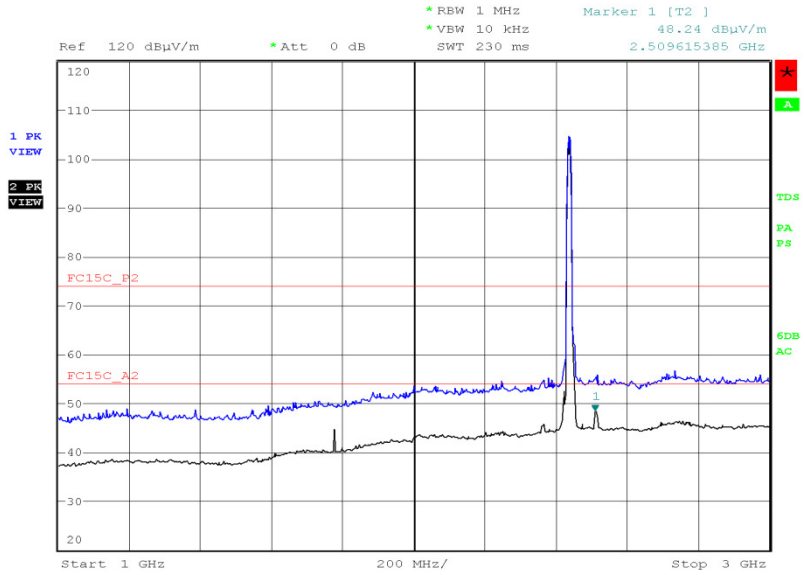
Product Service

802.11b, 2437 MHz, 1 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

*No emissions were detected within 6 dB of the limit.

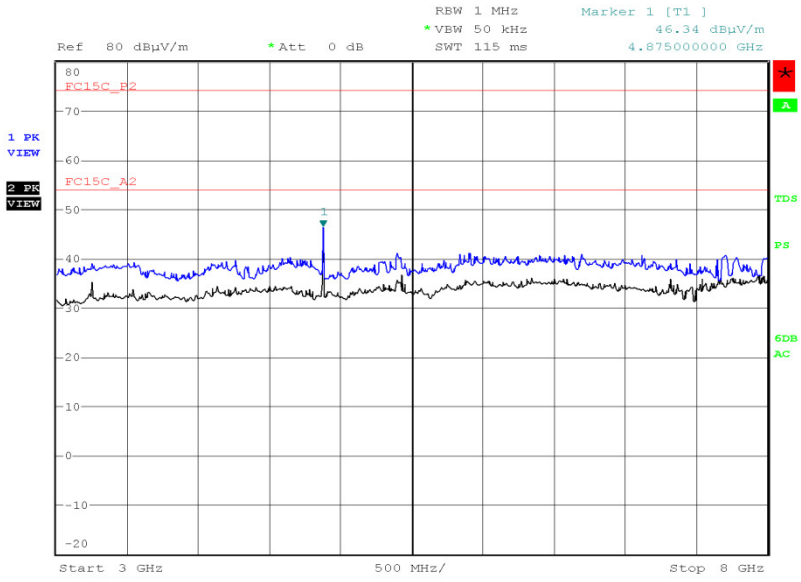
802.11b, 2437 MHz, 1 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 25.MAY.2016 18:19:06

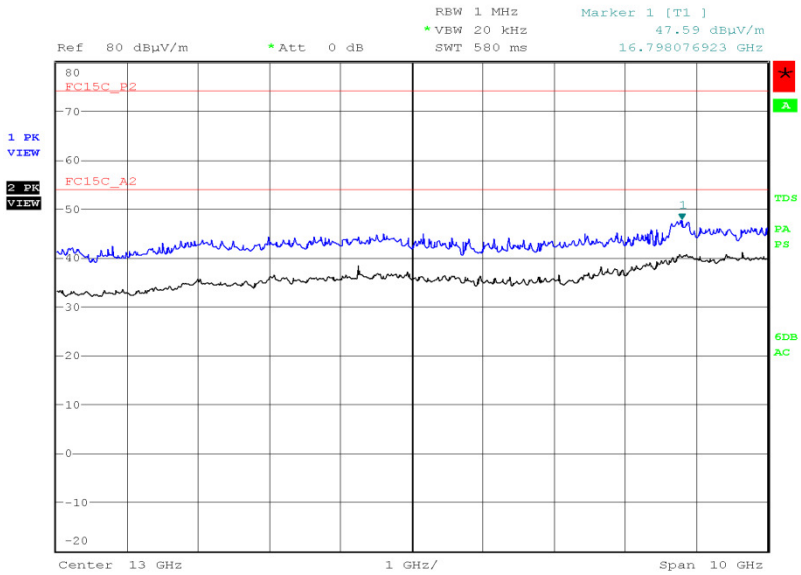
Product Service

802.11b, 2437 MHz, 1 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 09:59:35

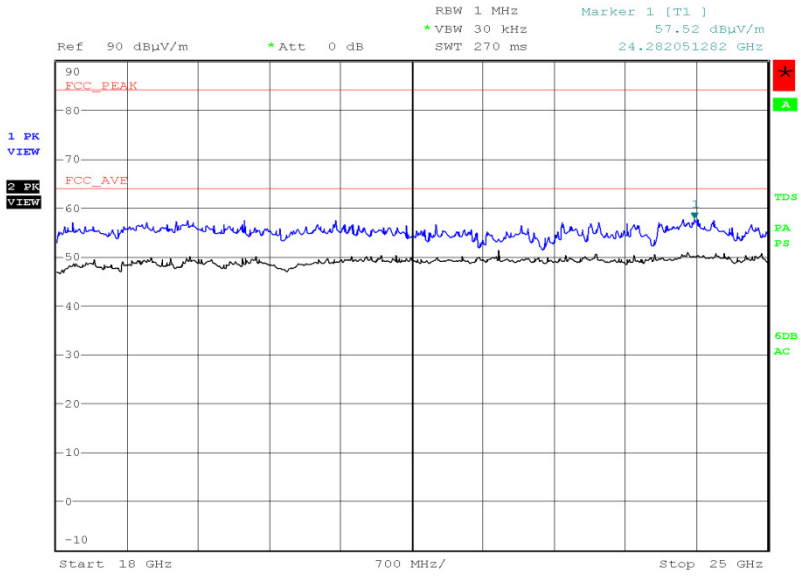
802.11b, 2437 MHz, 1 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 07:39:31

Product Service

802.11b, 2437 MHz, 1 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



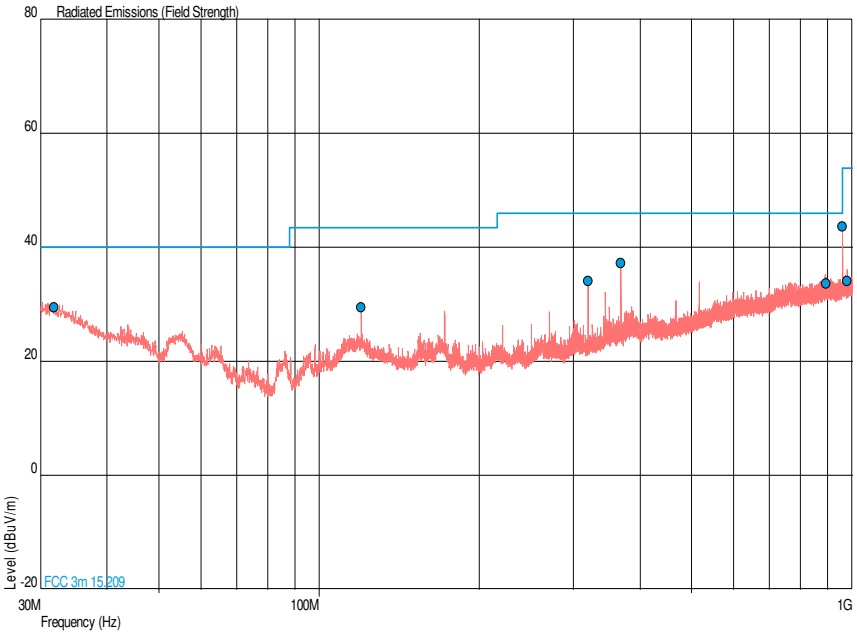
Date: 24.MAY.2016 07:52:26

Product Service

802.11b, 2462 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
31.849	29.5	-10.5	29.9	-70.1	102	1.00	Horizontal
119.995	29.5	-14.0	29.9	-120.1	360	1.00	Vertical
319.474	34.1	-11.9	50.7	-149.3	48	1.00	Vertical
368.638	37.2	-8.8	72.4	-127.6	360	1.00	Horizontal
894.491	33.6	-12.4	47.9	-152.1	125	1.00	Horizontal
960.003	43.6	-10.4	151.4	-349.6	295	1.00	Horizontal
979.417	34.2	-19.8	51.3	-449.7	5	1.00	Horizontal

802.11b, 2462 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



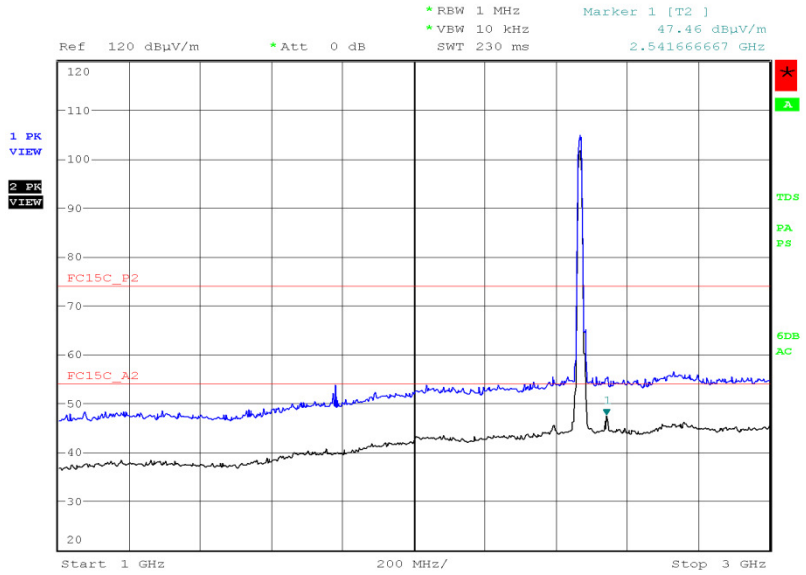
Product Service

802.11b, 2462 MHz, 1 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

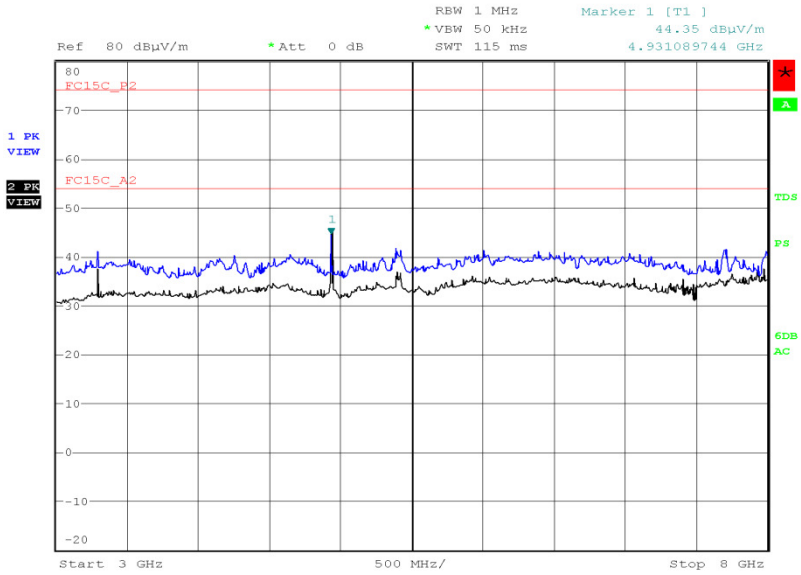
*No emissions were detected within 6 dB of the limit.

802.11b, 2462 MHz, 1 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



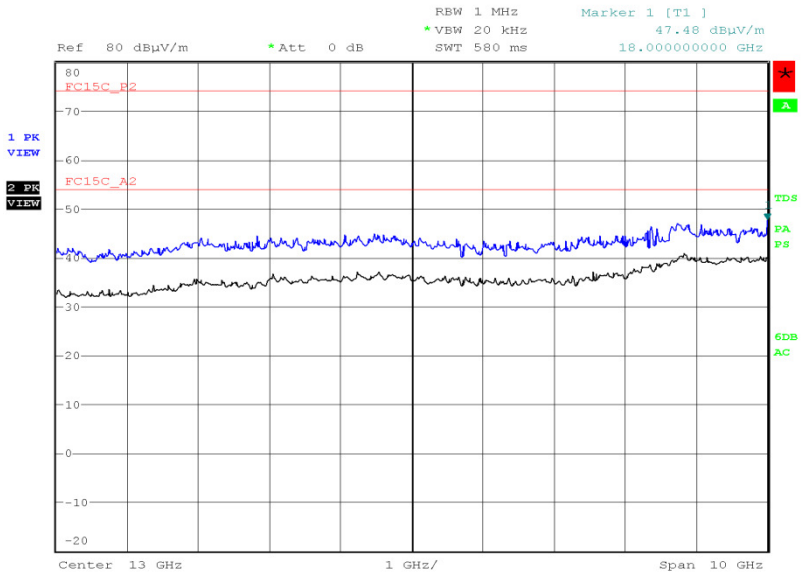
Product Service

802.11b, 2462 MHz, 1 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 10:09:55

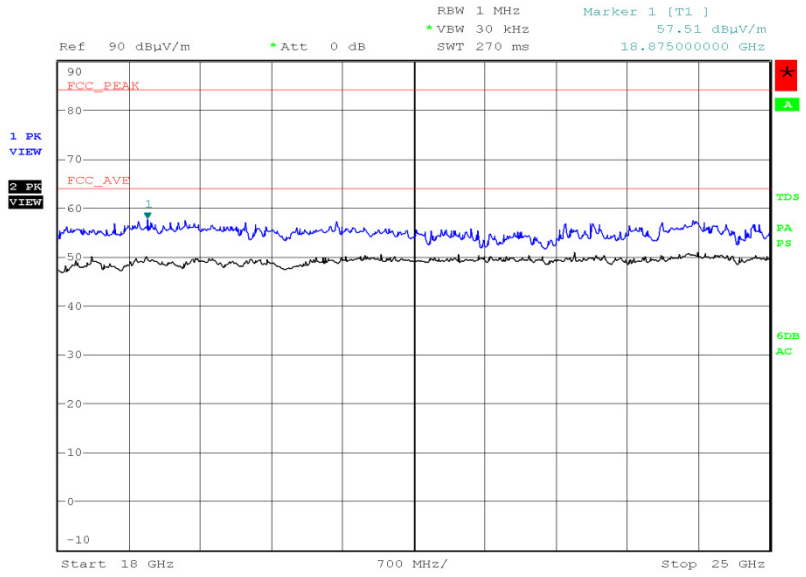
802.11b, 2462 MHz, 1 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 07:48:51

Product Service

802.11b, 2462 MHz, 1 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (d)

Emissions outside the restricted bands shall be at least 20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	As per 15.209	As per 15.209

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength			Measurement Distance (m)
	(µV/m)	Average (dBµV/m)	Peak (dBµV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3

Industry Canada RSS-247, Limit Clause, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

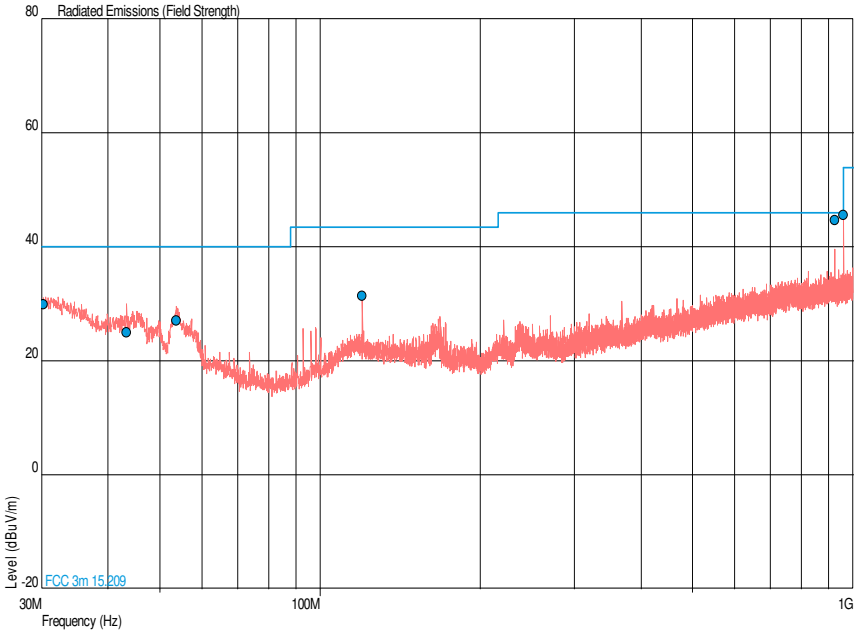
Product Service

5.00 V DC Supply

802.11b (2nd Diversity Antenna), 2412 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.240	29.9	-10.1	31.3	-68.7	53	2.48	Horizontal
43.380	25.0	-15.0	17.8	-82.2	358	1.00	Vertical
53.654	27.1	-12.9	22.6	-77.4	213	1.00	Vertical
119.998	31.3	-12.2	36.7	-113.3	0	2.70	Vertical
923.455	44.7	-1.3	171.8	-28.2	74	2.42	Horizontal
960.005	45.5	-8.5	188.4	-312.6	318	1.00	Horizontal

802.11b (2nd Diversity Antenna), 2412 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



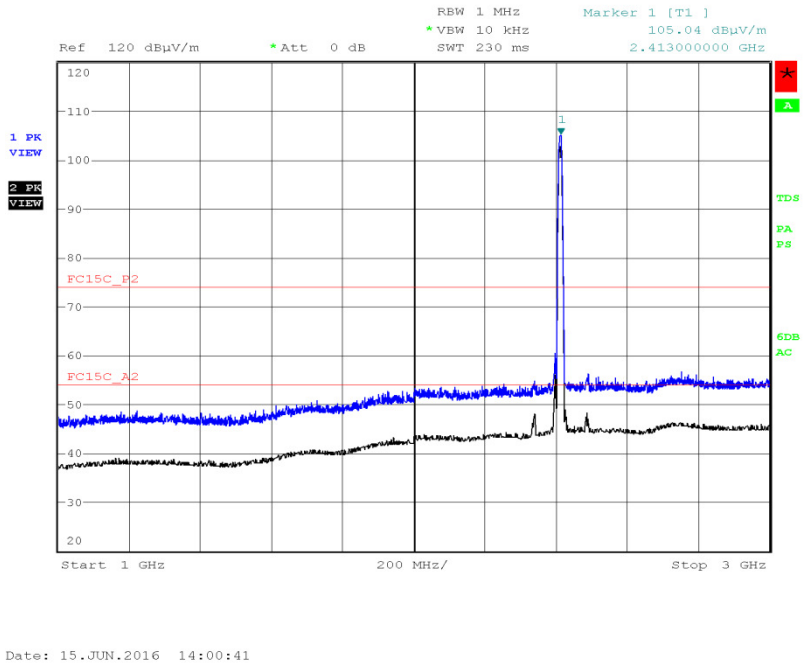
Product Service

802.11b (2nd Diversity Antenna), 2412 MHz, 1 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
4824.112	51.26	47.60	365.59	239.88	342	1.30	Horizontal

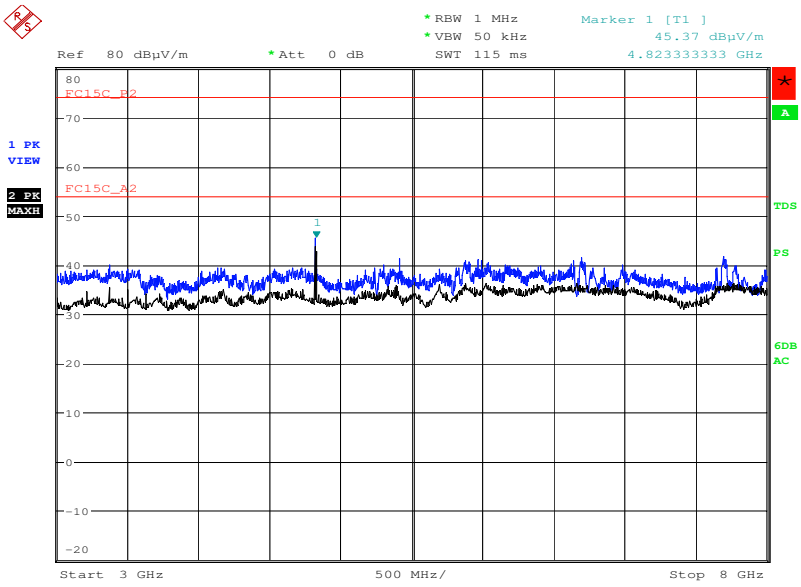
No other emissions were detected within 10 dB of the limit.

802.11b (2nd Diversity Antenna), 2412 MHz, 1 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



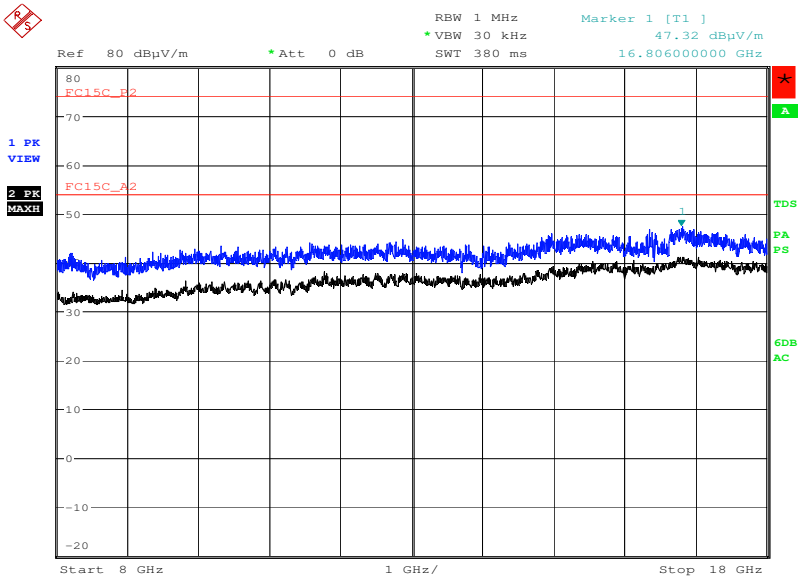
Product Service

802.11b (2nd Diversity Antenna), 2412 MHz,1 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 6.JUL.2016 19:14:28

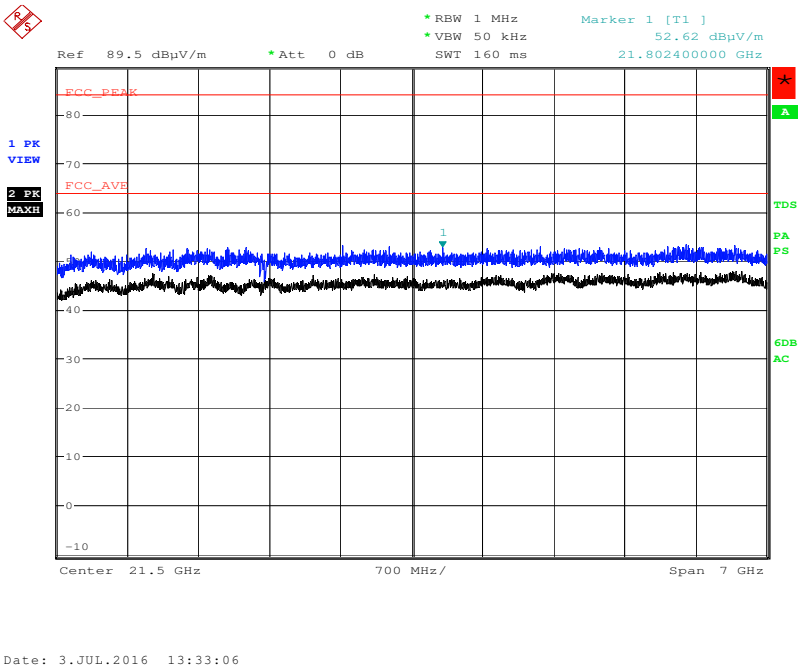
802.11b (2nd Diversity Antenna), 2412 MHz,1 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 29.JUN.2016 20:01:54

Product Service

802.11b (2nd Diversity Antenna), 2412 MHz, 1 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot

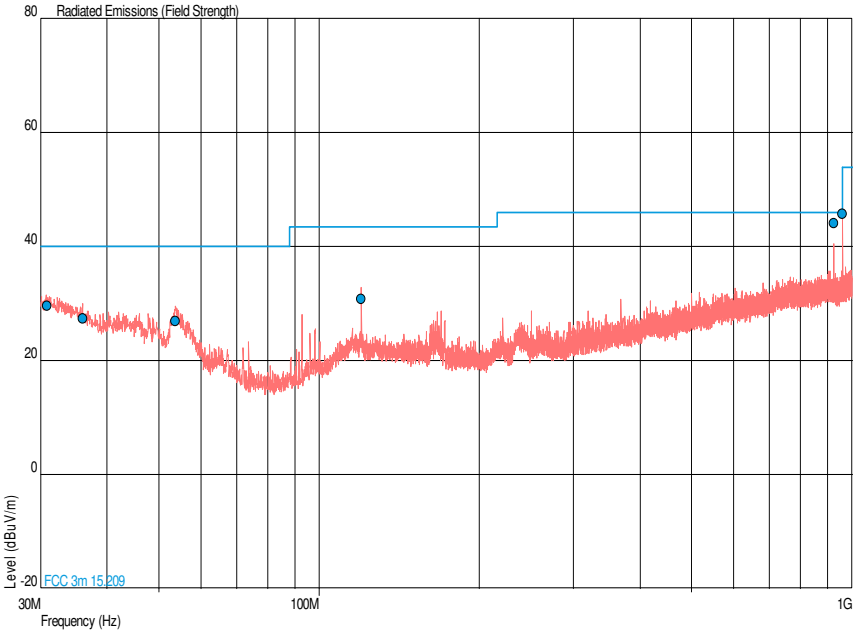


Product Service

802.11b (2nd Diversity Antenna), 2437 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.820	29.7	-10.3	30.5	-69.5	360	1.00	Horizontal
36.017	27.4	-12.6	23.4	-76.6	47	1.00	Vertical
53.718	27.0	-13.0	22.4	-77.6	360	1.00	Vertical
120.000	30.8	-12.7	34.7	-115.3	297	1.00	Vertical
923.419	44.1	-1.9	160.3	-39.7	188	2.41	Horizontal
960.003	45.7	-8.3	192.8	-308.2	37	1.00	Horizontal

802.11b (2nd Diversity Antenna), 2437 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



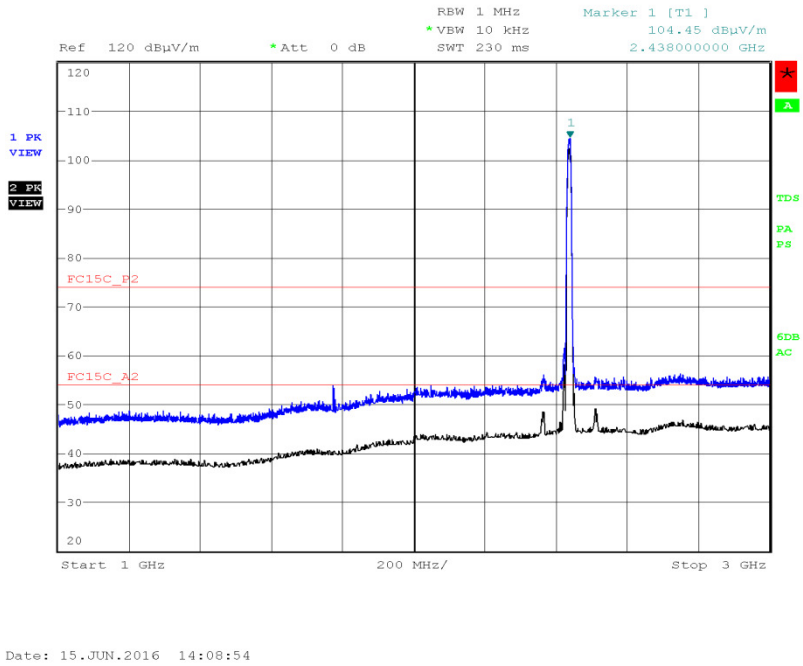
Product Service

802.11b (2nd Diversity Antenna), 2437 MHz, 1 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
4873.984	51.29	48.23	366.86	257.93	340	1.28	Horizontal

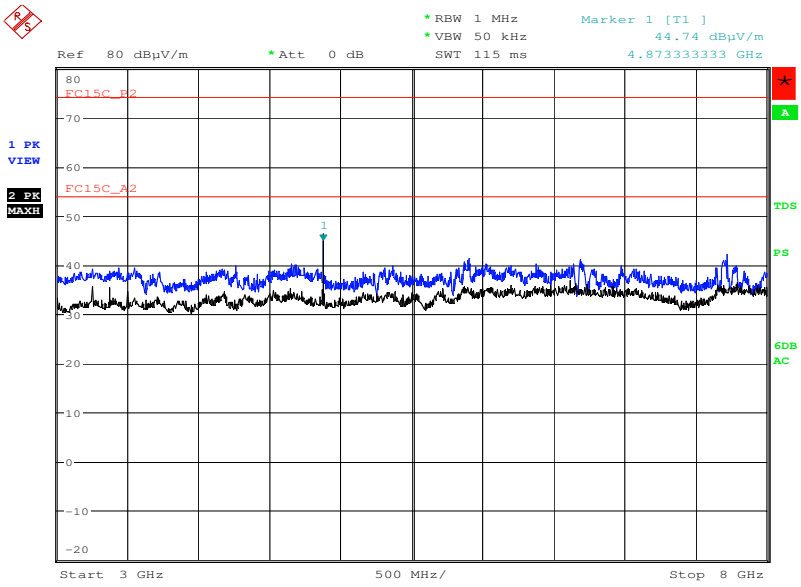
No other emissions were detected within 10 dB of the limit.

802.11b (2nd Diversity Antenna), 2437 MHz, 1 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



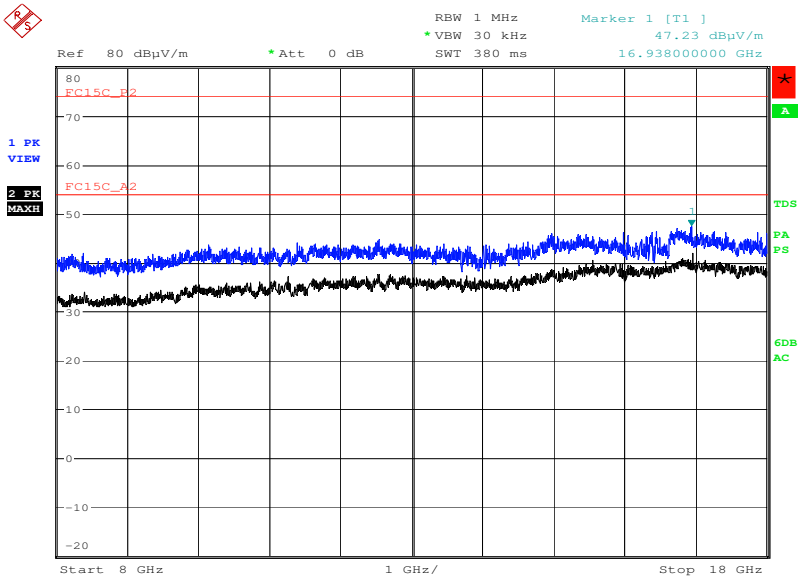
Product Service

802.11b (2nd Diversity Antenna), 2437 MHz, 1 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 6.JUL.2016 20:08:13

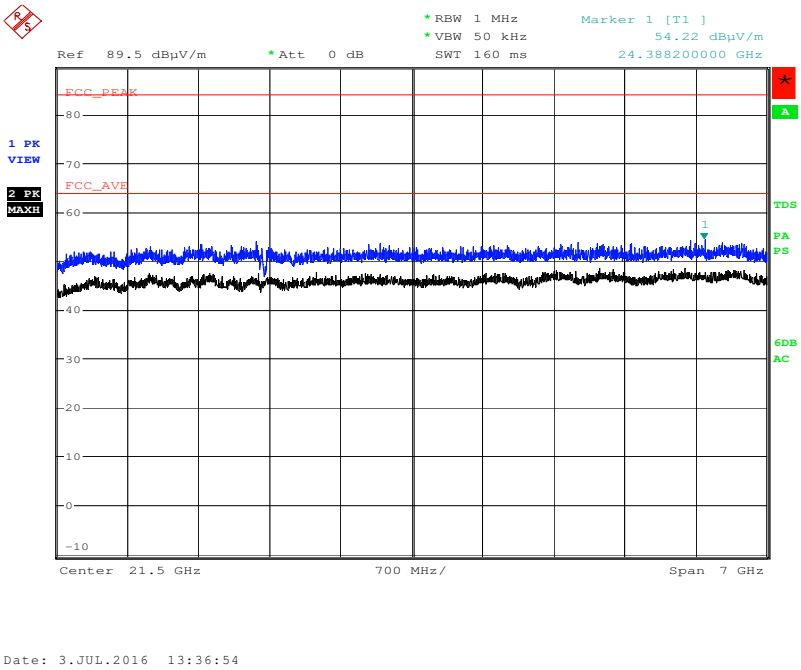
802.11b (2nd Diversity Antenna), 2437 MHz, 1 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 29.JUN.2016 20:10:56

Product Service

802.11b (2nd Diversity Antenna), 2437 MHz, 1 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot

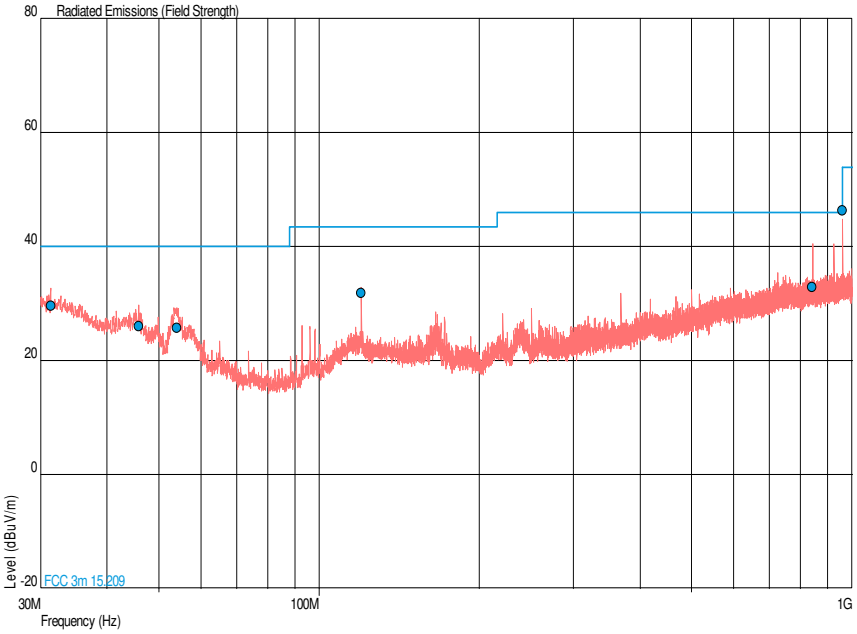


Product Service

802.11b (2nd Diversity Antenna), 2462 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
31.339	29.7	-10.3	30.5	-69.5	360	1.00	Horizontal
45.889	26.1	-13.9	20.2	-79.8	0	1.00	Vertical
54.104	25.8	-14.2	19.5	-80.5	140	1.00	Vertical
120.020	31.8	-11.7	38.9	-111.1	18	1.98	Vertical
841.818	32.9	-13.1	44.2	-155.8	121	1.67	Horizontal
960.005	46.3	-7.7	206.5	-294.5	360	1.99	Horizontal

802.11b (2nd Diversity Antenna), 2462 MHz, 1 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



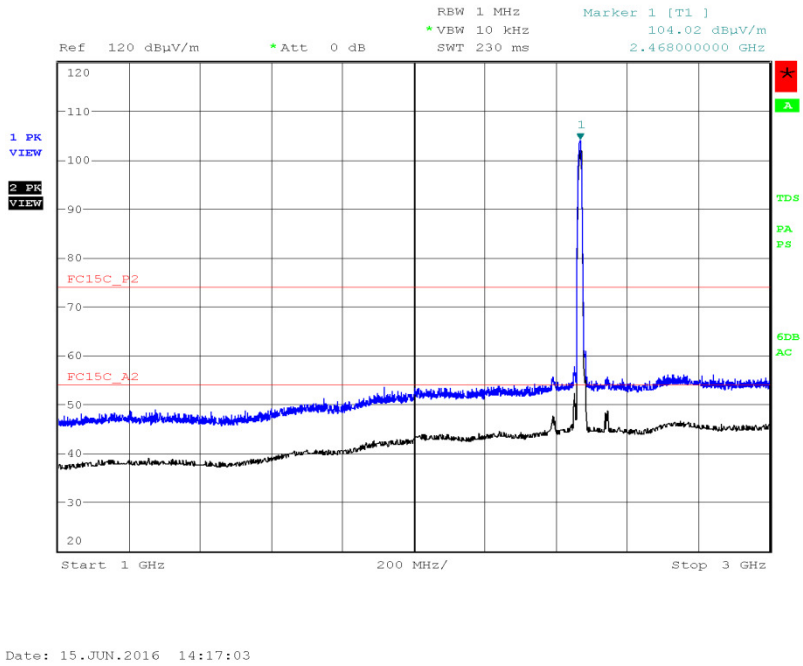
Product Service

802.11b (2nd Diversity Antenna), 2462 MHz, 1 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
4923.998	51.71	48.74	385.03	273.53	165	1.05	Horizontal

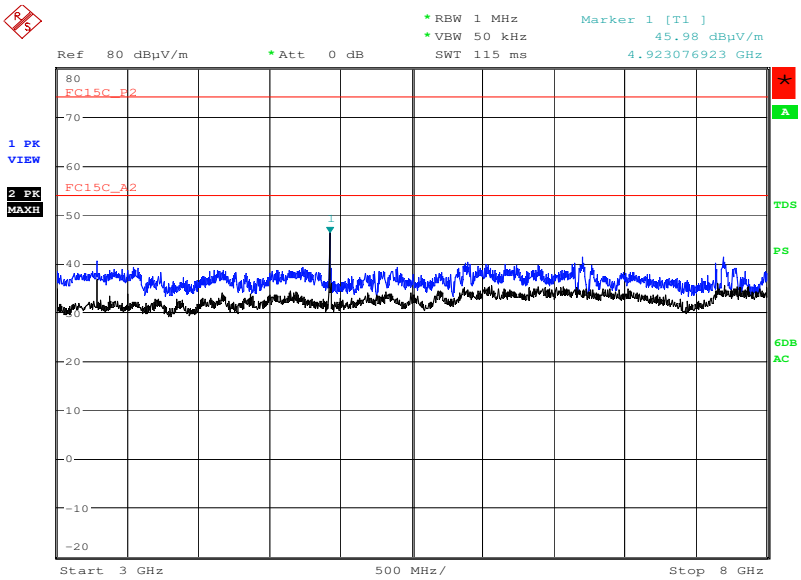
No other emissions were detected within 10 dB of the limit.

802.11b (2nd Diversity Antenna), 2462 MHz, 1 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



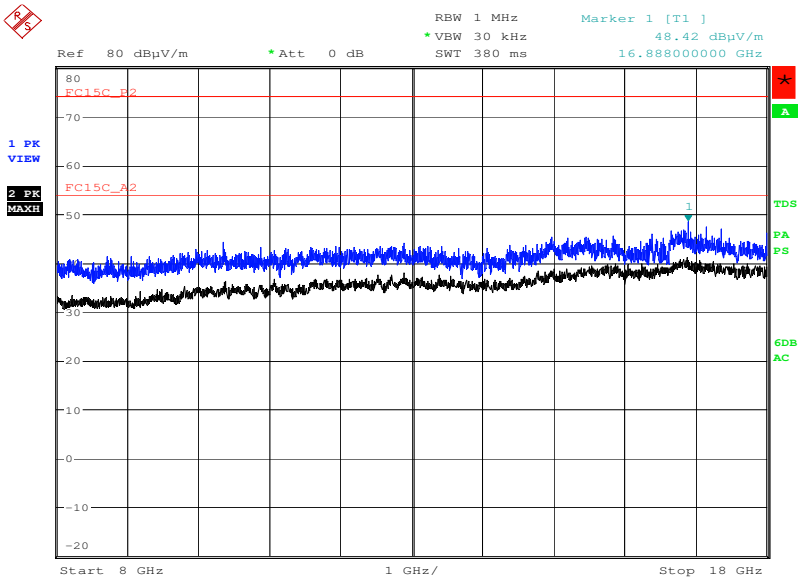
Product Service

802.11b (2nd Diversity Antenna), 2462 MHz, 1 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 6.JUL.2016 20:42:42

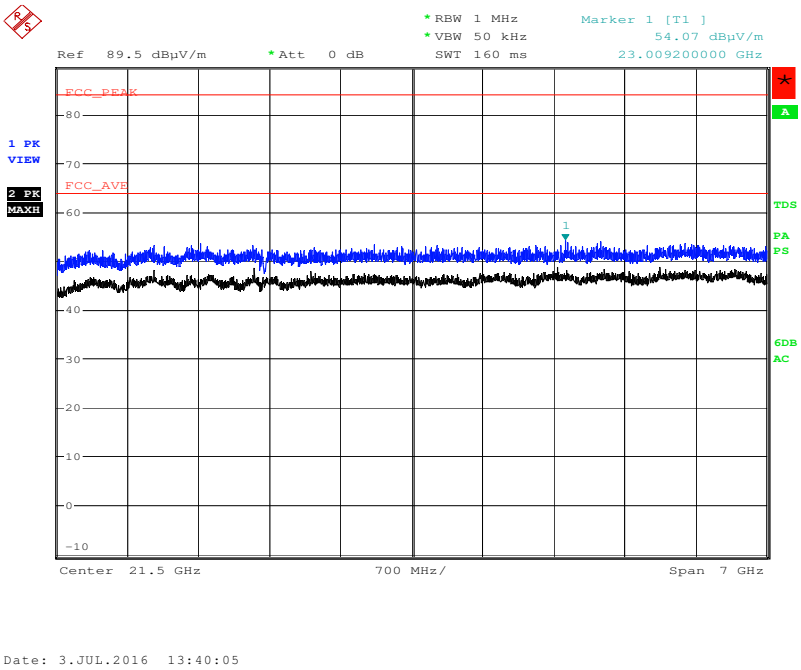
802.11b (2nd Diversity Antenna), 2462 MHz, 1 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 29.JUN.2016 20:19:08

Product Service

802.11b (2nd Diversity Antenna), 2462 MHz, 1 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (d)

Emissions outside the restricted bands shall be at least 20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	As per 15.209	As per 15.209

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength			Measurement Distance (m)
	(µV/m)	Average (dBµV/m)	Peak (dBµV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3

Industry Canada RSS-247, Limit Clause, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

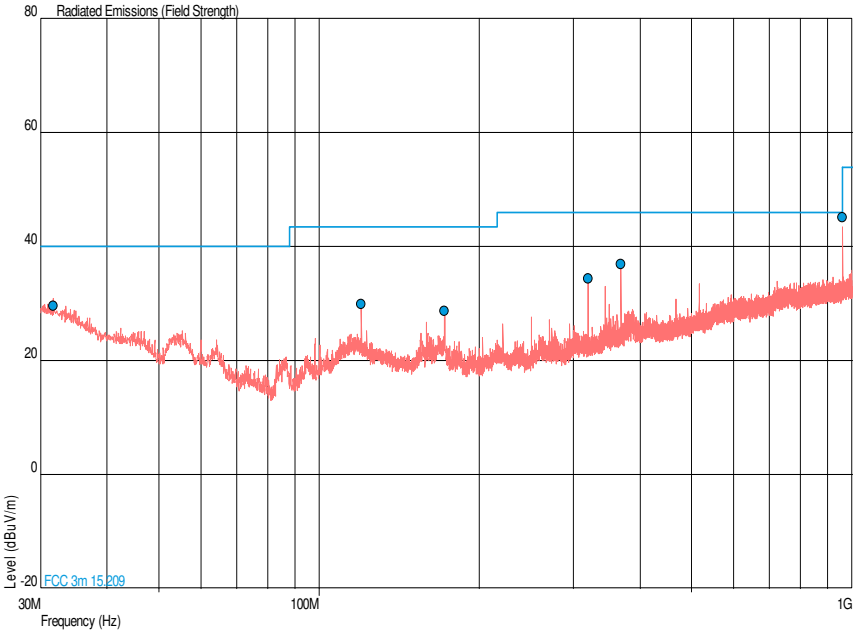
Product Service

5.00 V DC Supply

802.11g, 2412 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
31.693	29.6	-10.4	30.2	-69.8	147	1.00	Vertical
119.998	29.9	-13.6	31.3	-118.7	318	1.00	Vertical
172.015	28.7	-14.8	27.2	-122.8	131	1.00	Vertical
319.494	34.4	-11.6	52.5	-147.5	8	1.00	Horizontal
368.638	37.0	-9.0	70.8	-129.2	360	1.00	Horizontal
960.005	45.2	-8.8	182.0	-319.0	235	2.02	Horizontal

802.11g, 2412 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



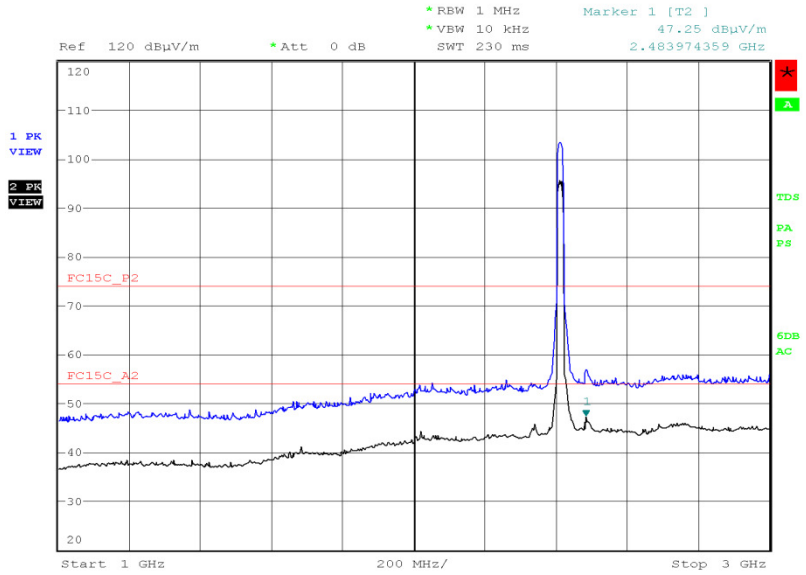
Product Service

802.11g, 2412 MHz, 12 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

*No emissions were detected within 6 dB of the limit.

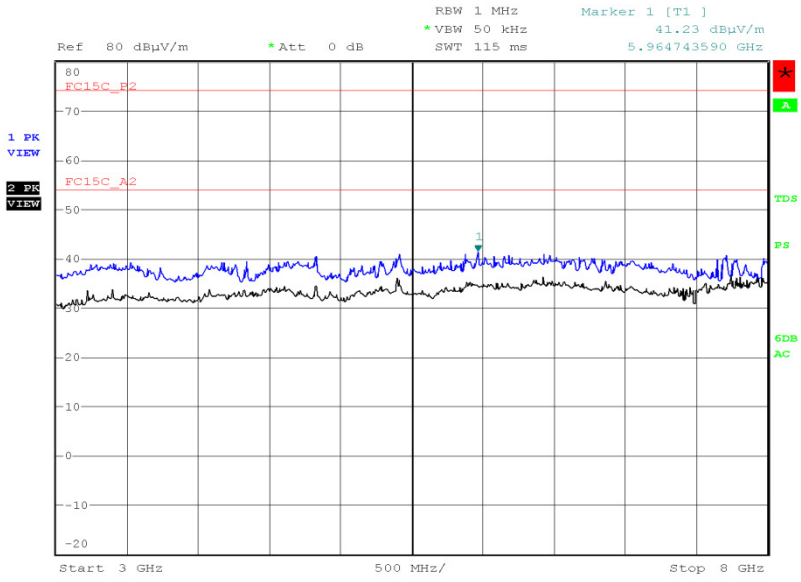
802.11g, 2412 MHz, 12 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Date: 25.MAY.2016 18:39:45

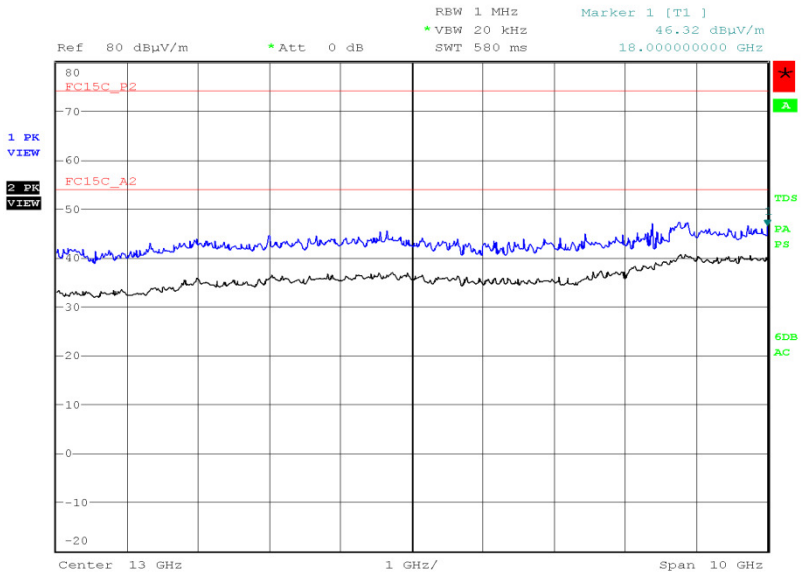
Product Service

802.11g, 2412 MHz,12 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 10:15:55

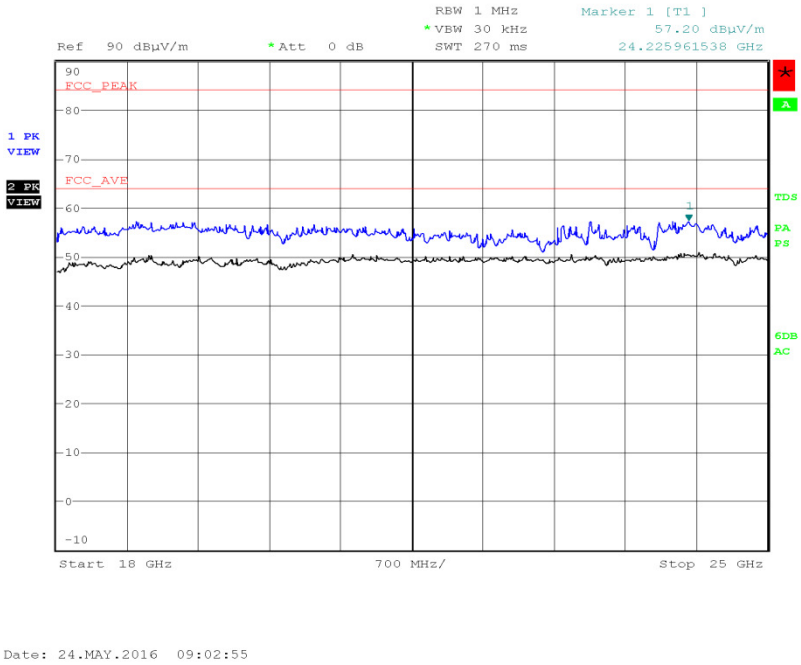
802.11g, 2412 MHz,12 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 07:53:46

Product Service

802.11g, 2412 MHz, 12 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot

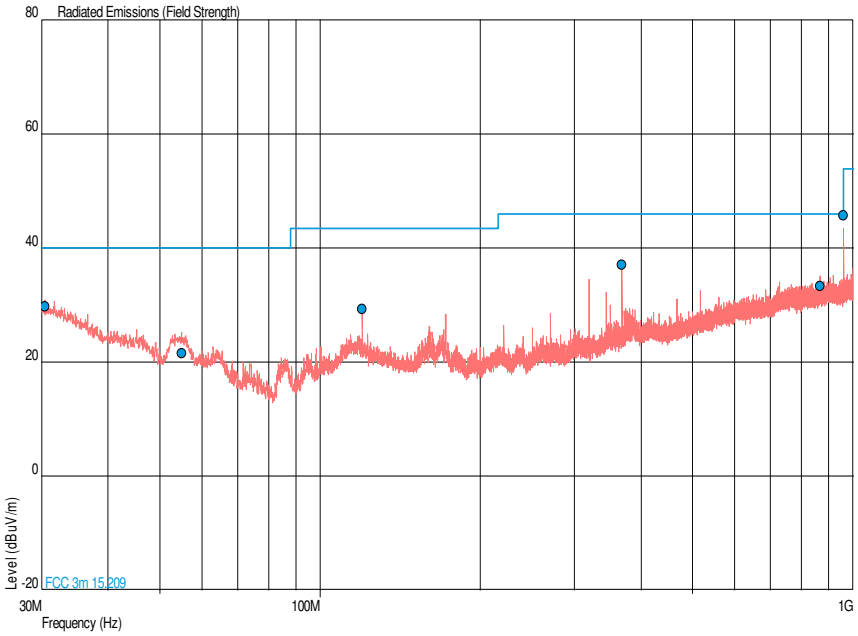


Product Service

802.11g, 2437 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.442	29.8	-10.2	30.9	-69.1	265	1.00	Horizontal
54.918	21.6	-18.4	12.0	-88.0	36	1.00	Vertical
120.006	29.3	-14.2	29.2	-120.8	13	1.00	Vertical
368.638	37.1	-8.9	71.6	-128.4	360	1.00	Horizontal
865.759	33.4	-12.6	46.8	-153.2	202	2.41	Horizontal
960.003	45.7	-8.3	192.8	-308.2	286	1.92	Horizontal

802.11g, 2437 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



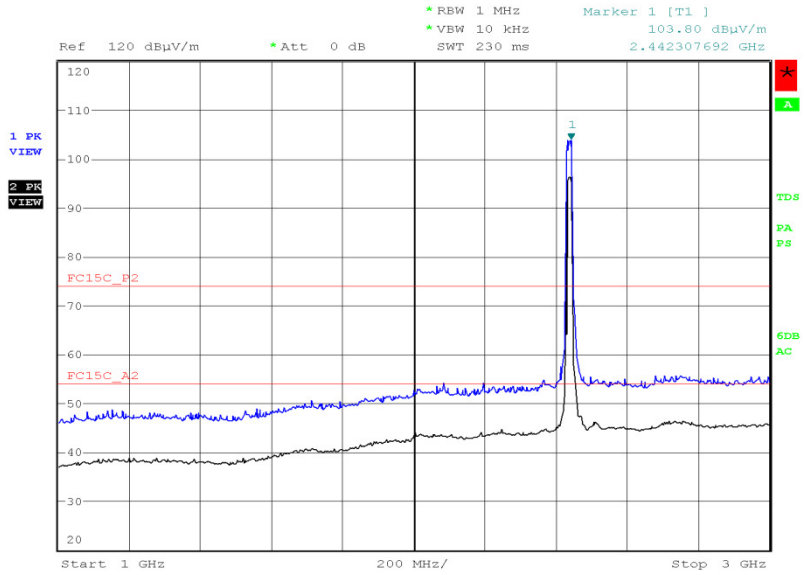
Product Service

802.11g, 2437 MHz, 12 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

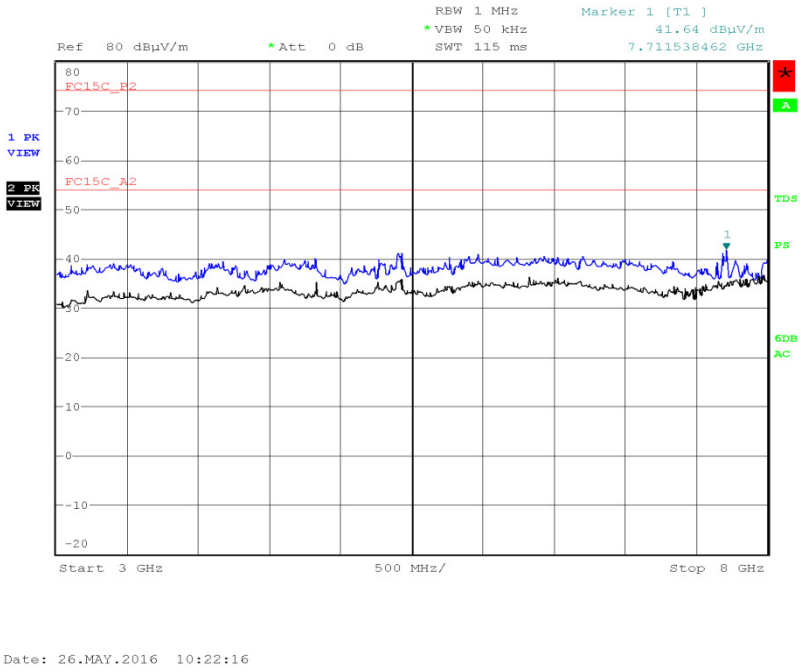
*No emissions were detected within 6 dB of the limit.

802.11g, 2437 MHz, 12 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot

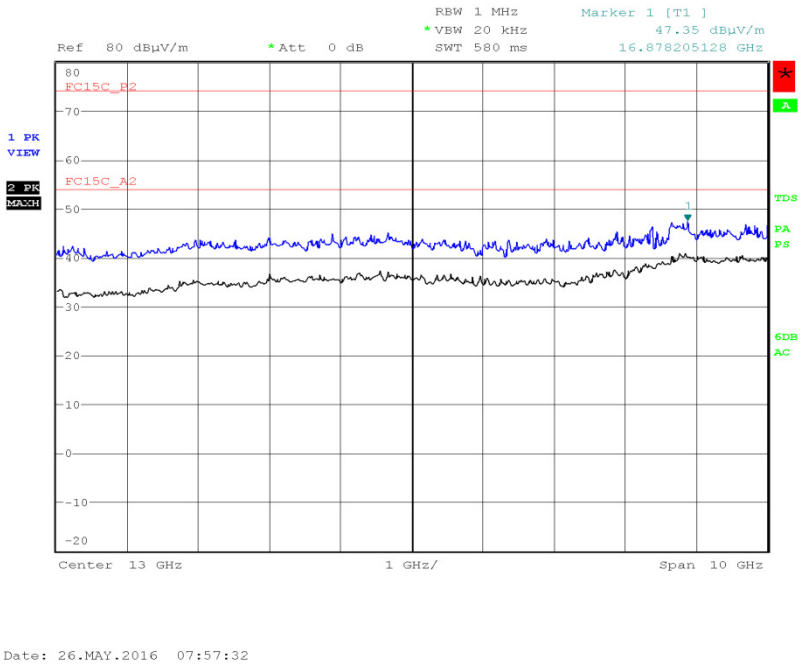


Product Service

802.11g, 2437 MHz, 12 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot

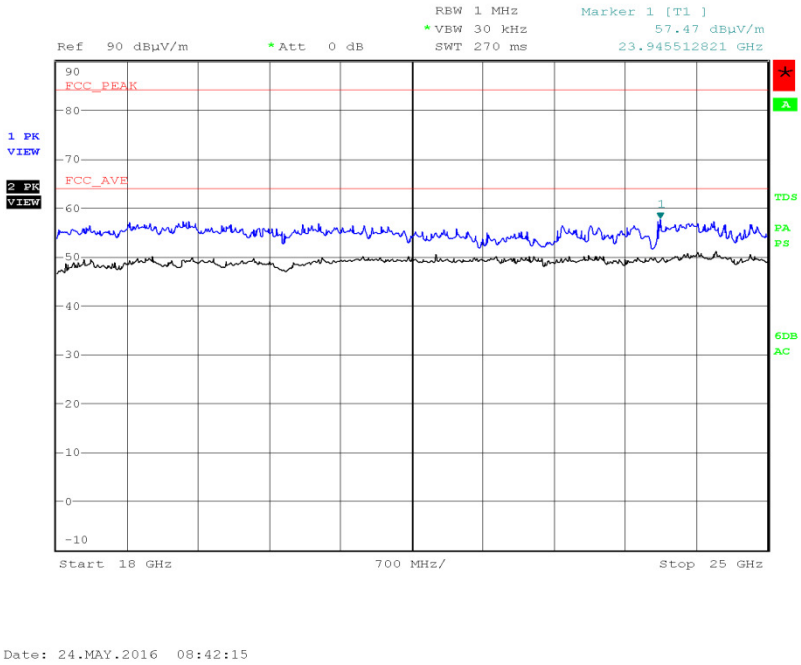


802.11g, 2437 MHz, 12 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Product Service

802.11g, 2437 MHz, 12 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot

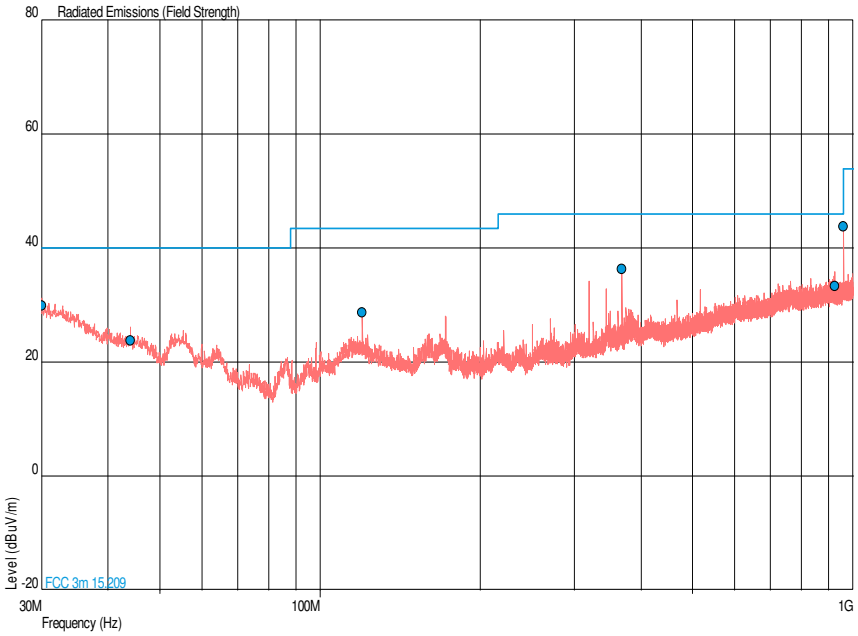


Product Service

802.11g, 2462 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.063	29.9	-10.1	31.3	-68.7	331	1.00	Horizontal
44.093	23.8	-16.2	15.5	-84.5	15	1.00	Vertical
119.991	28.7	-14.8	27.2	-122.8	315	2.00	Vertical
368.651	36.3	-9.7	65.3	-134.7	341	1.00	Horizontal
923.766	33.4	-12.6	46.8	-153.2	112	1.00	Vertical
960.005	43.8	-10.2	154.9	-346.1	295	1.98	Horizontal

802.11g, 2462 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



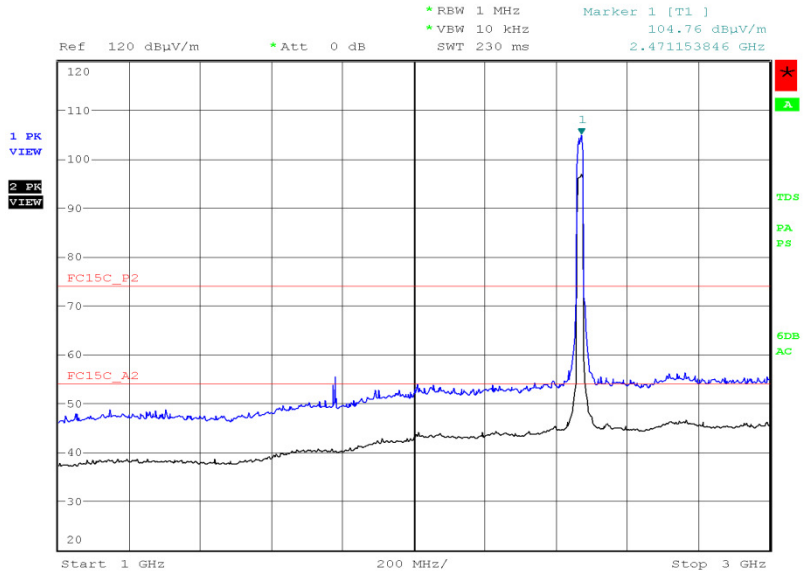
Product Service

802.11g, 2462 MHz, 12 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

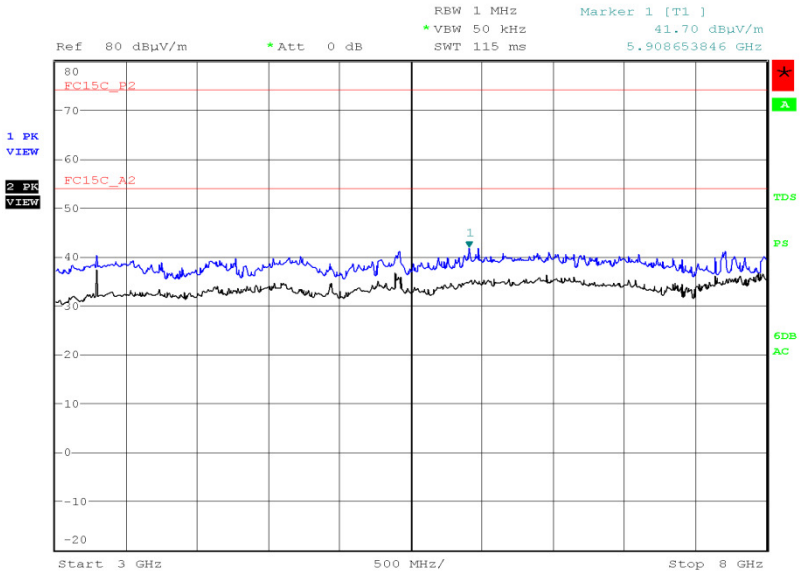
*No emissions were detected within 6 dB of the limit.

802.11g, 2462 MHz, 12 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



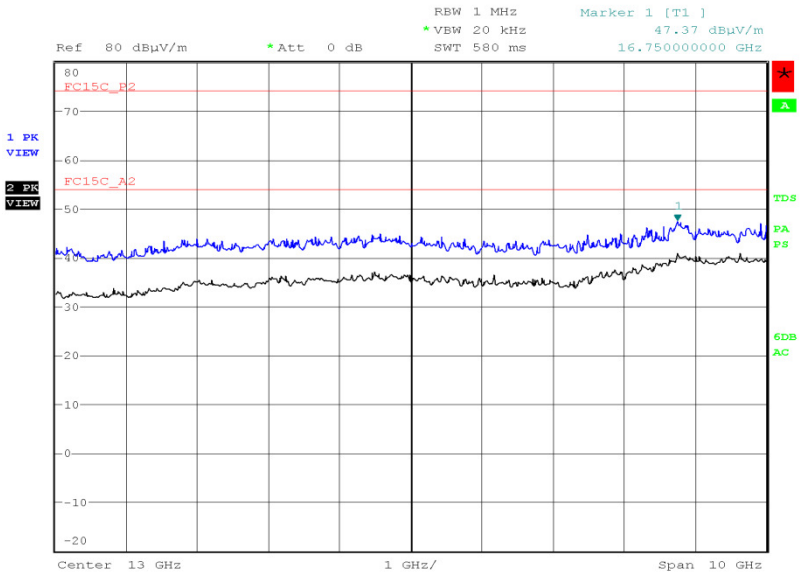
Product Service

802.11g, 2462 MHz, 12 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 10:35:26

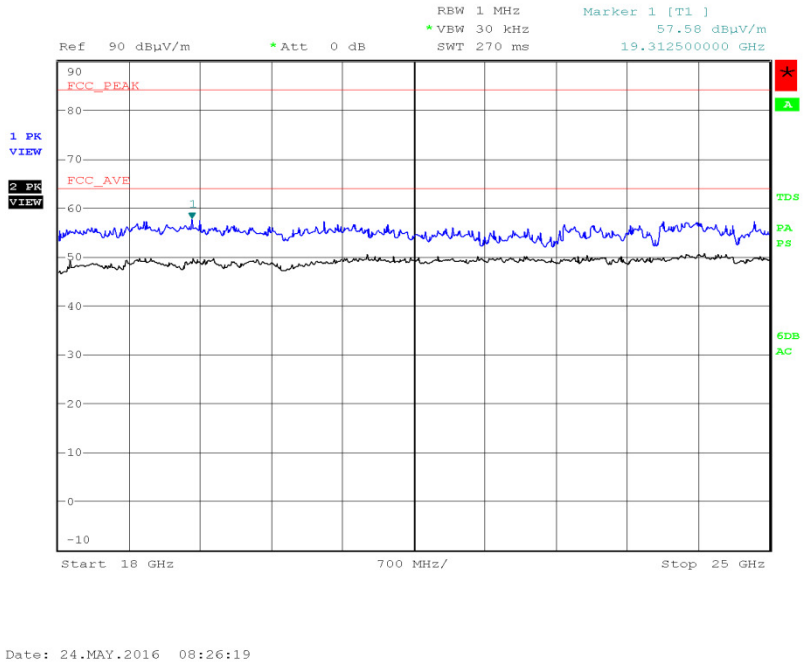
802.11g, 2462 MHz, 12 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 26.MAY.2016 08:00:59

Product Service

802.11g, 2462 MHz, 12 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



FCC 47 CFR Part 15, Limit Clause 15.247 (d)

Emissions outside the restricted bands shall be at least 20 dB below the fundamental measured in a 100 kHz bandwidth using a peak detector. If the transmitter complies with the conducted power limits, based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB below the fundamental instead of 20 dB.

FCC 47 CFR Part 15, Limit Clause 15.205

	Peak (dBµV/m)	Average (dBµV/m)
Restricted Bands of Operation	As per 15.209	As per 15.209

FCC 47 CFR Part 15, Limit Clause 15.209

Frequency (MHz)	Field Strength			Measurement Distance (m)
	(µV/m)	Average (dBµV/m)	Peak (dBµV/m)	
30-88	100	40.0	60.0	3
88-216	150	43.5	63.5	3
216-960	200	46.0	66.0	3
Above 960	500	54.0	74.0	3

Industry Canada RSS-247, Limit Clause, 5.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

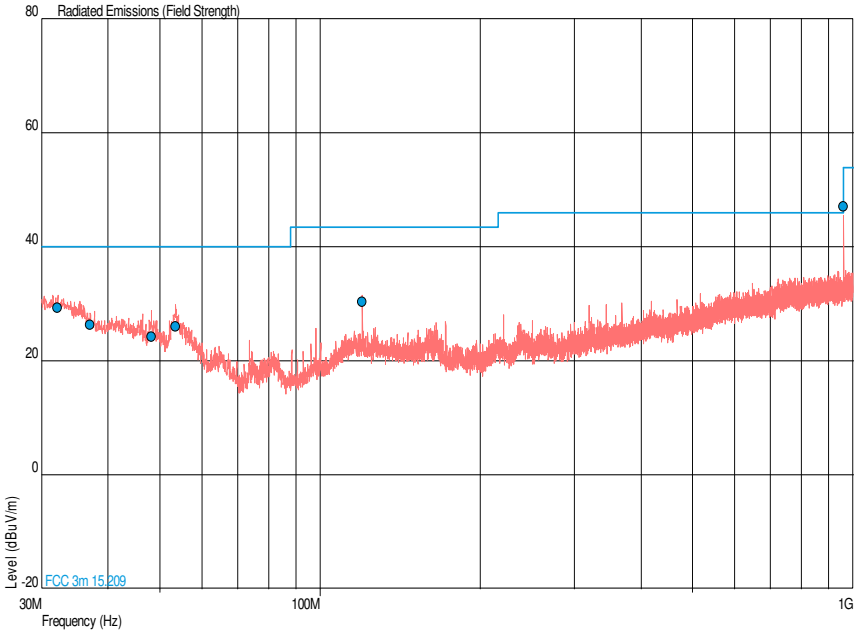
Product Service

5.00 V DC Supply

802.11g (2nd Diversity Antenna), 2412 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
32.186	29.4	-10.6	29.5	-70.5	318	1.00	Horizontal
37.026	26.3	-13.7	20.7	-79.3	0	1.00	Horizontal
48.242	24.3	-15.7	16.4	-83.6	223	1.00	Vertical
53.623	26.1	-13.9	20.2	-79.8	305	1.00	Vertical
119.998	30.4	-13.1	33.1	-116.9	272	1.00	Vertical
960.005	47.1	-6.9	226.5	-274.5	305	1.88	Horizontal

802.11g (2nd Diversity Antenna), 2412 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



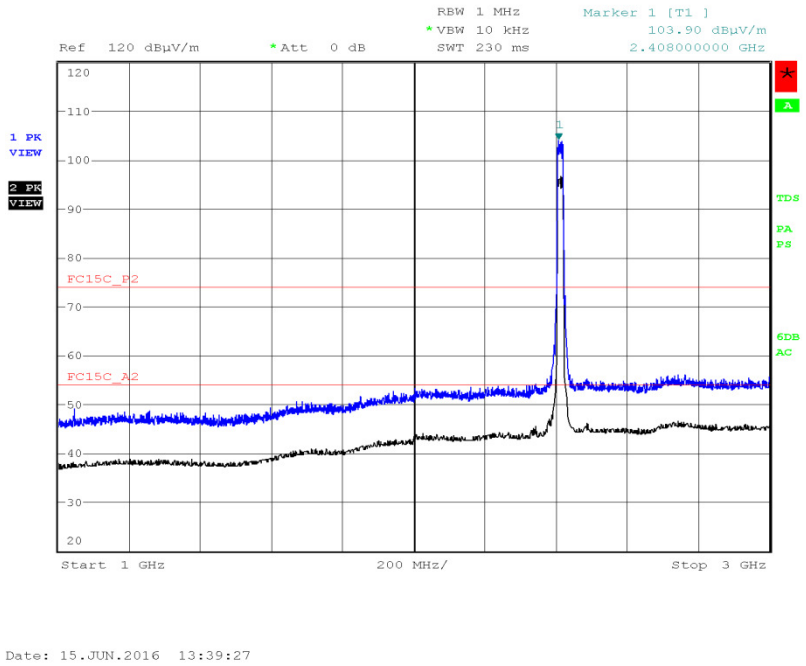
Product Service

802.11g (2nd Diversity Antenna), 2412 MHz, 12 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

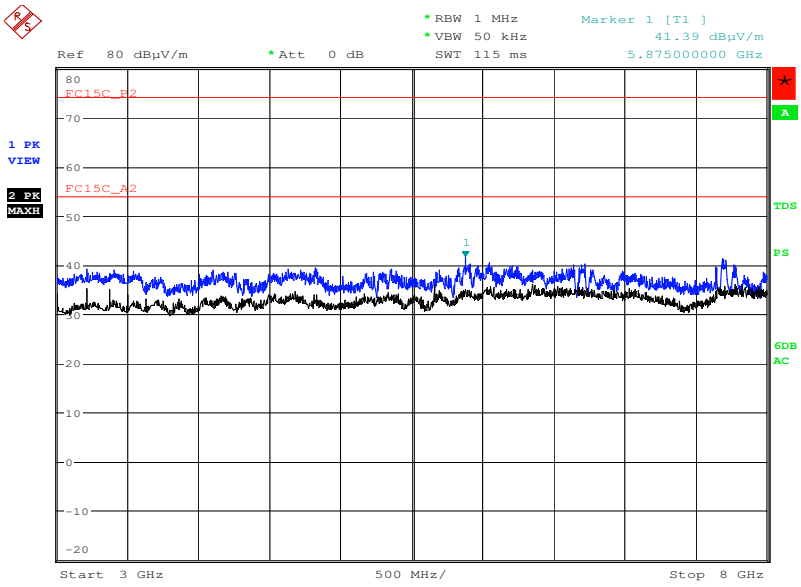
*No emissions were detected within 10 dB of the limit.

802.11g (2nd Diversity Antenna), 2412 MHz, 12 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



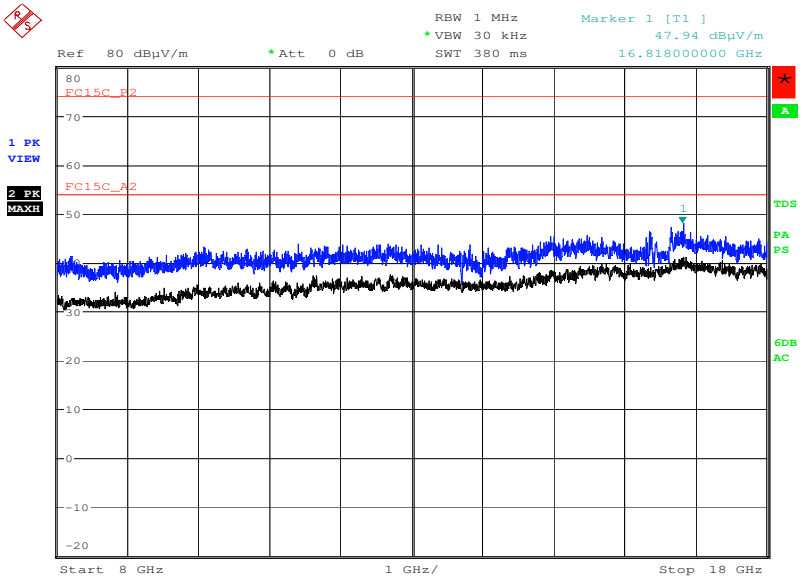
Product Service

802.11g (2nd Diversity Antenna), 2412 MHz,12 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 6.JUL.2016 21:22:08

802.11g (2nd Diversity Antenna), 2412 MHz,12 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



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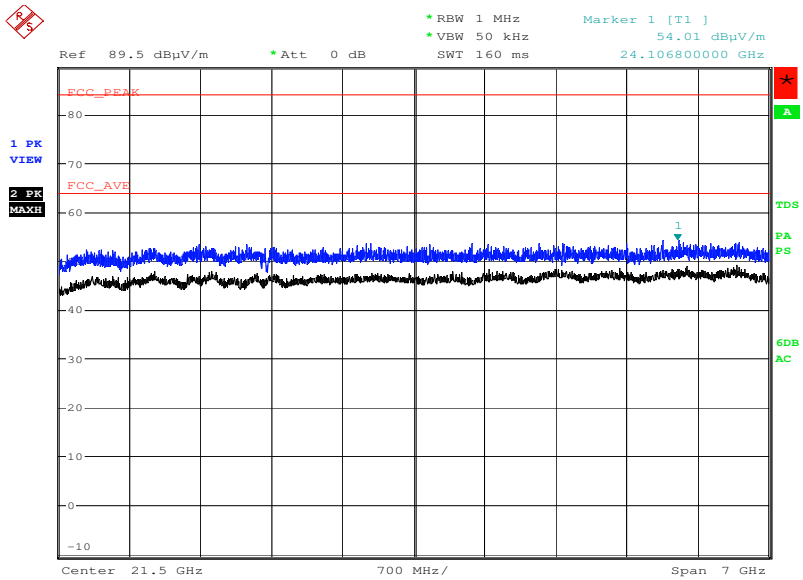
Product Service

802.11g (2nd Diversity Antenna), 2412 MHz, 12 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



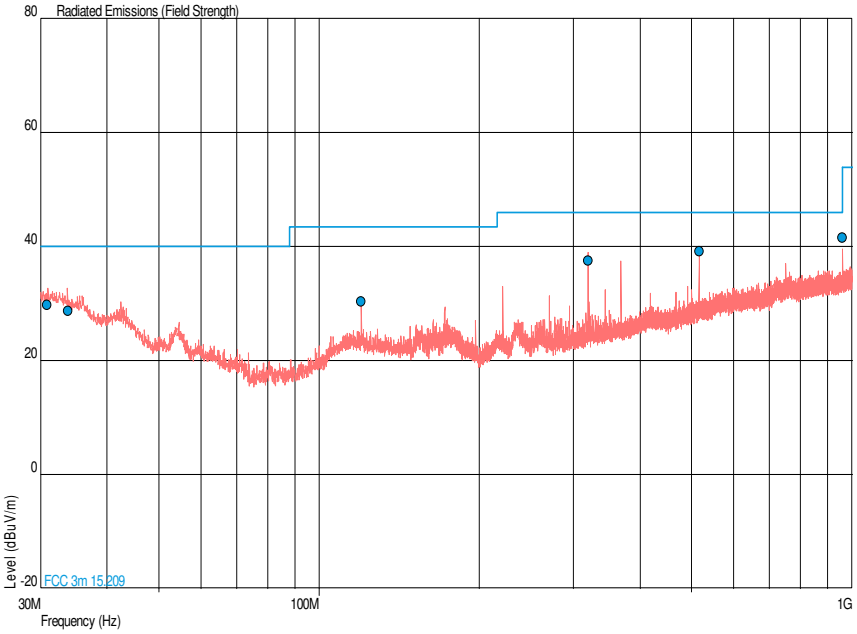
Date: 3.JUL.2016 13:49:08

Product Service

802.11g (2nd Diversity Antenna), 2437 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.832	29.8	-10.2	30.9	-69.1	65	3.00	Horizontal
33.808	28.8	-11.2	27.5	-72.5	56	1.00	Horizontal
119.996	30.3	-13.2	32.7	-117.3	348	1.00	Vertical
319.489	37.6	-8.4	75.9	-24.1	0	1.00	Horizontal
516.108	39.1	-6.9	90.2	-109.8	175	1.00	Vertical
960.000	41.5	-4.5	118.9	-81.1	333	1.39	Horizontal

802.11g (2nd Diversity Antenna), 2437 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



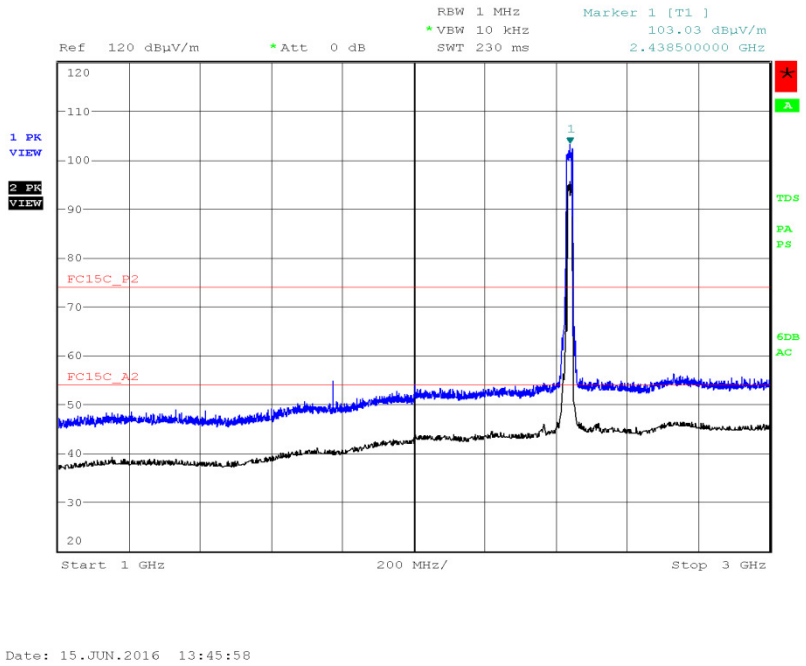
Product Service

802.11g (2nd Diversity Antenna), 2437 MHz, 12 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

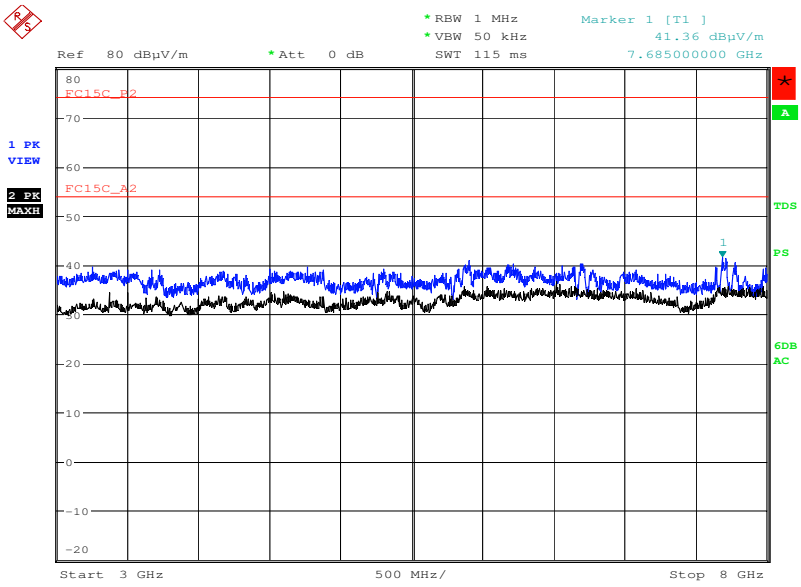
*No emissions were detected within 10 dB of the limit.

802.11g (2nd Diversity Antenna), 2437 MHz, 12 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



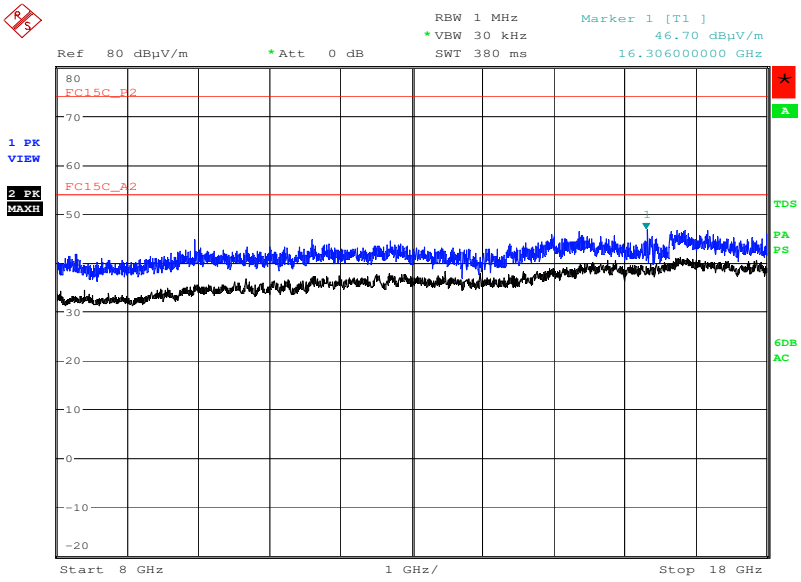
Product Service

802.11g (2nd Diversity Antenna), 2437 MHz, 12 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



Date: 6.JUL.2016 21:34:23

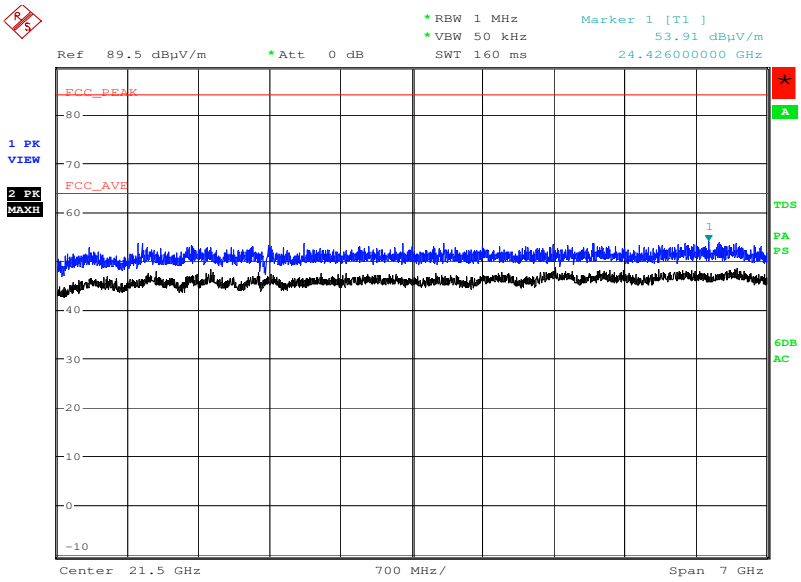
802.11g (2nd Diversity Antenna), 2437 MHz, 12 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



Date: 29.JUN.2016 20:37:51

Product Service

802.11g (2nd Diversity Antenna), 2437 MHz, 12 Mbps, 18 GHz to 25 GHz, Spurious Radiated Emissions Plot



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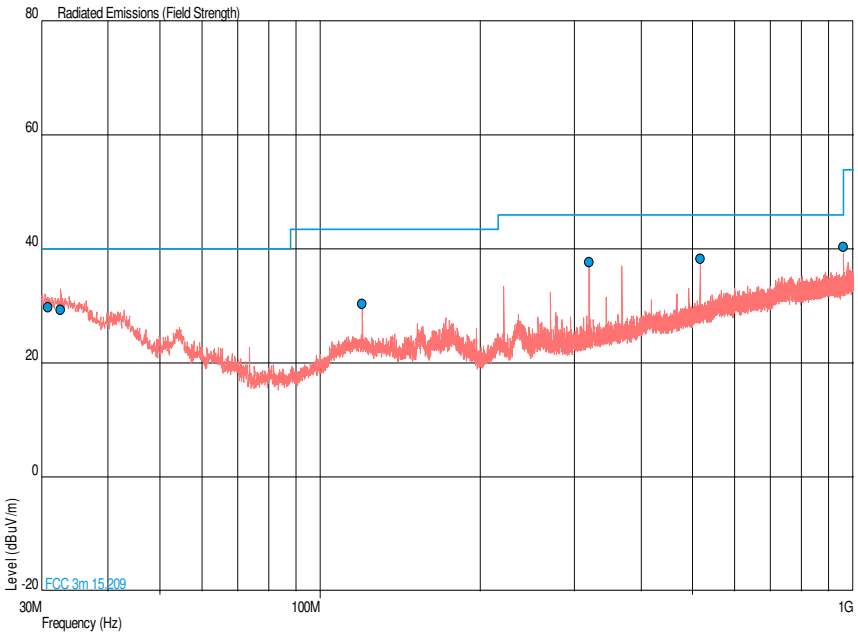
Product Service

802.11g (2nd Diversity Antenna), 2462 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	QP Level (dBµV/m)	QP Margin (dBµV/m)	QP Level (µV/m)	QP Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.897	29.8	-10.2	30.9	-69.1	229	1.00	Horizontal
32.594	29.4	-10.6	29.5	-70.5	342	1.28	Horizontal
119.994	30.4	-13.1	33.1	-116.9	294	1.00	Vertical
319.499	37.7	-8.3	76.7	-23.3	1	1.00	Horizontal
516.117	38.3	-7.7	82.2	-117.8	176	1.00	Vertical
960.000	40.4	-5.6	104.7	-95.3	344	1.38	Horizontal

802.11g (2nd Diversity Antenna), 2462 MHz, 12 Mbps, 30 MHz to 1 GHz, Spurious Radiated Emissions Plot



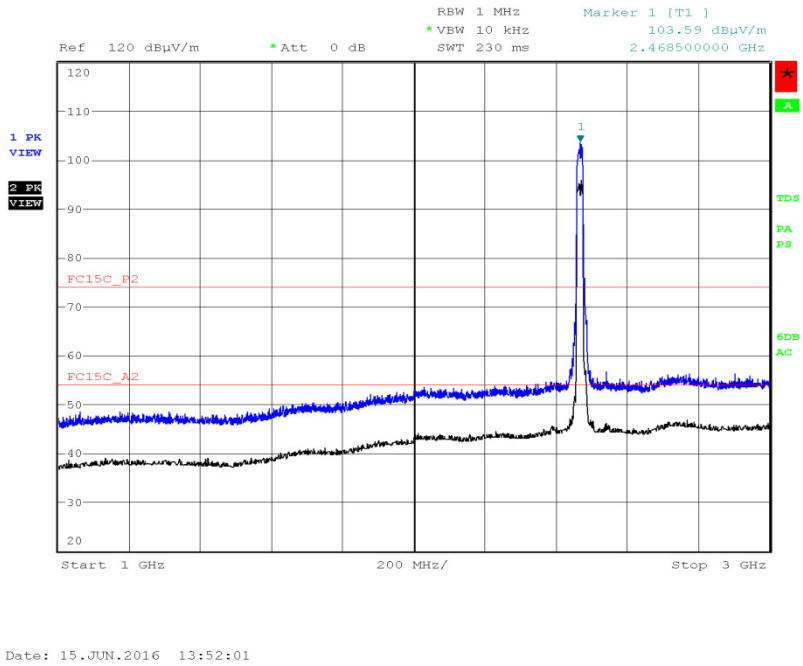
Product Service

802.11g (2nd Diversity Antenna), 2462 MHz, 12 Mbps, 1 GHz to 25 GHz, Spurious Radiated Emissions Results

Frequency (MHz)	Final Peak (dBµV/m)	Final Average (dBµV/m)	Final Peak (µV/m)	Final Average (µV/m)	Angle (°)	Height (m)	Polarisation
*							

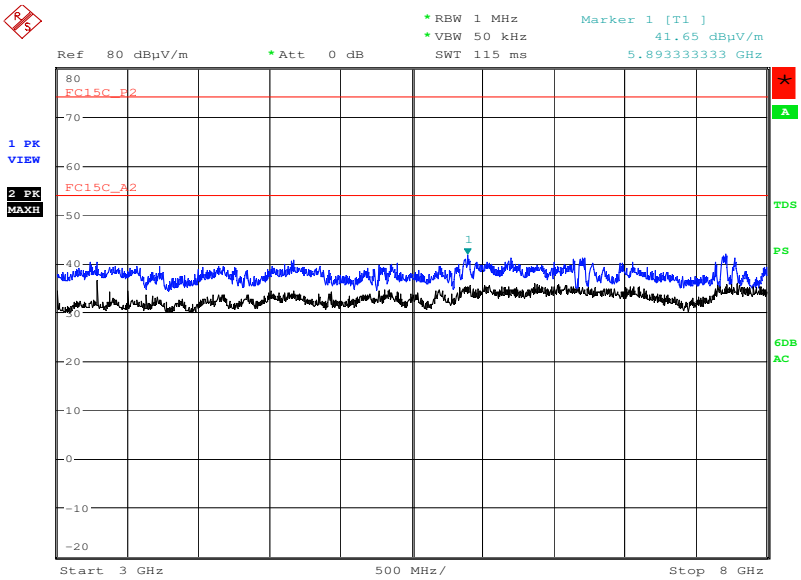
*No emissions were detected within 10 dB of the limit.

802.11g (2nd Diversity Antenna), 2462 MHz, 12 Mbps, 1 GHz to 3 GHz, Spurious Radiated Emissions Plot



Product Service

802.11g (2nd Diversity Antenna), 2462 MHz, 12 Mbps, 3 GHz to 8 GHz, Spurious Radiated Emissions Plot



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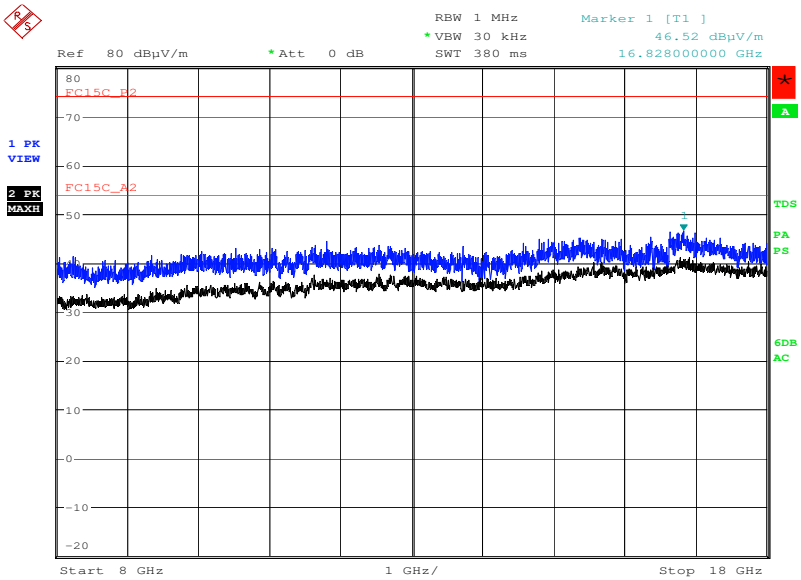
802.11g (2nd Diversity Antenna), 2462 MHz, 12 Mbps, 8 GHz to 18 GHz, Spurious Radiated Emissions Plot



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