



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

150Mbps Wireless N ADSL2+ Modem Router

Model: DL4311; DL4311D

Trade Name: netis

Issued to

**NETIS SYSTEMS CO., LTD
4F & 5F, R&D Building, Oriental Cyberport, High-Tech Industrial Park,
Nanshan, Shenzhen, China**

Issued by

**Compliance Certification Services Inc.
No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township,
Taoyuan County 33841, Taiwan, R.O.C.**

TEL: 886-3-324-0332

FAX: 886-3-324-5235

<http://www.ccsrf.com>

service@ccsrf.com



Note: This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, A2LA, NIST or any government agencies. The test results in the report only apply to the tested sample.



Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	March 13, 2014	Initial Issue	All	Iren Wang



TABLE OF CONTENTS

1	TEST RESULT CERTIFICATION	4
2	EUT DESCRIPTION	5
3	TEST METHODOLOGY	6
3.1	EUT CONFIGURATION	6
3.2	EUT EXERCISE	6
3.3	GENERAL TEST PROCEDURES	6
3.4	FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS	7
3.5	DESCRIPTION OF TEST MODES.....	8
4	INSTRUMENT CALIBRATION	9
4.1	MEASURING INSTRUMENT CALIBRATION.....	9
4.2	MEASUREMENT EQUIPMENT USED	9
4.3	MEASUREMENT UNCERTAINTY	10
5	FACILITIES AND ACCREDITATIONS	11
5.1	FACILITIES.....	11
5.2	LABORATORY ACCREDITATIONS AND LISTING	11
5.3	TABLE OF ACCREDITATIONS AND LISTINGS.....	12
6	SETUP OF EQUIPMENT UNDER TEST	13
6.1	SETUP CONFIGURATION OF EUT.....	13
6.2	SUPPORT EQUIPMENT	13
7	FCC PART 15 REQUIREMENTS	14
7.1	6DB BANDWIDTH.....	14
7.2	PEAK POWER	22
7.3	AVERAGE POWER.....	24
7.4	BAND EDGES MEASUREMENT	26
7.5	PEAK POWER SPECTRAL DENSITY	48
7.6	SPURIOUS EMISSIONS.....	56
7.7	POWERLINE CONDUCTED EMISSIONS	80
8	APPENDIX I PHOTOGRAPHS OF TEST SETUP	83
9	APPENDIX II: PHOTOGRAPHS OF EUT	87



1 TEST RESULT CERTIFICATION

Applicant: **NETIS SYSTEMS CO., LTD**
 4F & 5F, R&D Building, Oriental Cyberport, High-Tech Industrial Park,
 Nanshan, Shenzhen, China

Manufacturer: **Shenzhen Netcore Industrial Ltd.**
 4F & 5F, R&D Building, Oriental Cyberport, High-Tech Industrial Park,
 Nanshan, Shenzhen, China

Equipment Under Test: 150Mbps Wireless N ADSL2+ Modem Router

Trade Name: netis

Model: DL4311; DL4311D

Date of Test: February 17 ~ 18, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Stan Lin
 Section Manager

Reviewed by:

Angel Hu
 Section Manager



2 EUT DESCRIPTION

Product	150Mbps Wireless N ADSL2+ Modem Router		
Trade Name	netis		
Model Number	DL4311; DL4311D		
Model Discrepancy	All the model numbers (list on this report) are identical, just for marketing purpose only except Antenna.		
	Model Number	Antenna	
	DL4311	Fixed	
	DL4311D	Detachable	
EUT Power Rating	12VDC, 0.5A		
Power Adapter	Tenpao	Model	NT120050UL
Power Adapter Power Rating	I/P: 100-240VAC, 50/60HZ, 0.2A O/P: 12VDC, 0.5A		
RF Module Manufacturer	Realtek	Model	RTL8188ER-CG
Frequency Range	IEEE 802.11b/g/ IEEE 802.11n HT20 mode: 2412~2462MHz IEEE 802.11n HT40 mode: 2422~2452MHz		
Transmit Power	IEEE 802.11b mode: 21.29 dBm (0.1346W) IEEE 802.11g mode: 20.35 dBm (0.1084W) IEEE 802.11n HT20 mode: 20.48 dBm (0.1117W) IEEE 802.11n HT40 mode: 23.47 dBm (0.2223W)		
Modulation Technique & Transmit Data Rate	IEEE 802.11b mode: DSSS (11, 5.5, 2, 1 Mbps) IEEE 802.11g mode: OFDM (54, 48, 36, 24, 18, 12, 11, 9, 6 Mbps) IEEE 802.11n HT20 mode: OFDM (65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mbps) IEEE 802.11n HT40 mode: OFDM (135, 121.5, 108, 81, 54, 40.5, 27, 13.5 Mbps)		
Antenna Specification	Dipole Antenna / Gain: 5 dBi		

Remark:

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **T58DL4311R1** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. This report is compliance with the 558074 D01 DTS Meas Guidance v03r01 Requirement.



3 TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47 Part 15.207, 15.209, 15.247.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



3.5 DESCRIPTION OF TEST MODES

The EUT is a 1Tx1R SISO transmitter.

The EUT (model: DL4311D) had been tested under operating condition and had been reported as worst case on this test report.

Software used to control the EUT for staying in continuous transmitting and receiving mode was programmed.

The worst case data rate is determined as the data rate with highest output power.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode and receiving radiated spurious emission above 1GHz, which worst case was in CH Mid mode only.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis). The worst emission was found in lie-down position (Z axis) and the worst case was recorded.

IEEE 802.11b mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate was chosen for full testing.

IEEE 802.11g mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate was chosen for full testing.

IEEE 802.11n HT20 mode:

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

IEEE 802.11n HT40 mode:

Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.



4 INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	01/01/2015
Spectrum Analyzer	Agilent	N9010A	MY52220817	02/11/2015
Power meter	Anritsu	ML2495A	1033009	09/29/2014
Power Sensor	Anritsu	MA2411B	0917221	09/29/2014

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY48250064	01/01/2015
Pre-Amplifier	HP	8447D	2944A06530	04/23/2014
Pre-Amplifier	EMEC	EM01M26G	060570	07/25/2014
Pre-Amplifier	MITEQ	AMF-6F-26040 0-40-8P	985646	08/08/2014
Pre-Amplifier	Agilent	8449B	3008A01738	04/23/2014
EMI Test Receiver	SCHAFFNER	SCR 3501	430	04/07/2014
Loop Antenna	EMCO	6502	2356	06/12/2014
Bilog Antenna	TESEQ	CBL 6112D	35378	09/11/2014
Horn Antenna	EMCO	3115	00022250	08/04/2014
Horn Antenna	EMCO	3116	00026370	12/29/2014
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Test S/W	EZ-EMC			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R = No Calibration Request.



Powerline Conducted Emissions Test Site #4				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	100782	06/14/2014
LISN	R&S	ENV216	100066	02/06/2015
LISN	R&S	ENV 4200	830326/016	05/30/2014
ISN	FCC	FCC-TLISN-T2-02	20587	08/01/2014
ISN	TESEQ	ISN-T8	30843	08/16/2014
Current Probe	FCC	F-35	506	07/19/2014
ISN	TESEQ	ISN ST08	27907	09/30/2014
Test S/W	EZ-EMC			

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. N.C.R = No Calibration Request.

4.3 MEASUREMENT UNCERTAINTY

Parameter	Uncertainty
Powerline Conducted Emission	±0.9898
3M Semi Anechoic Chamber / 30MHz ~ 200MHz	±3.5921
3M Semi Anechoic Chamber / 200MHz ~ 1GHz	±3.5657
3M Semi Anechoic Chamber / 1 ~ 8GHz	±2.5873
3M Semi Anechoic Chamber / 8 ~ 18GHz	±2.6646
3M Semi Anechoic Chamber / 18 ~ 26GHz	±2.9617
3M Semi Anechoic Chamber / 26 ~ 40GHz	±3.4250

Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

- No. 163-1, Jhongsheng Rd., Sindien District, Taipei City 23151, Taiwan
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029
- No 11, Wugong 6th Rd, Wugu District, New Taipei City 24891, Taiwan (R.O.C)
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.





All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.2 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, IC 2324G-2 for 3M Semi Anechoic Chamber B.



5.3 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	A2LA	CFR 47, FCC Part15/18, CISPR 22, EN 55022, ICES-003, AS/NZS CISPR 22, VCCI V-3, EN 55011, CISPR 11, IEC/EN 61000-4-2/3/4/5/6/8/11, EN 61000-6-1/2/3/4, EN 55024, CISPR 24, AS/NZS CISPR 24, AS/NZS 61000.6.2, EN 55014-1/-2, ETSI EN 300 386 v1.3.2/v1.3.3, IEC/EN 61000-3-2, AS/NZS 61000.3.2, IEC/EN 61000-3-3, AS/NZS 61000.3.3	
USA	FCC MRA	3 meter Open Area Test Sites to perform FCC Part 15/18 measurements	
Japan	VCCI	3/10 meter Open Area Test Sites and conducted test sites to perform radiated/conducted measurements	VCCI R-2882/2541/2798/725/1868 C-402/747/912 T-1930/1646
Taiwan	TAF	EN 55014-1, CISPR 14, CNS 13781-1, EN 55013, CISPR 13, CNS 13439, EN 55011, CISPR 11, CNS 13803, PLMN09, IS2045-0, LP0002 FCC Part 27/90, Part 15B/C/D/E, RSS-192/193/210/310 ETSI EN 300 328/ 300 220-1/ 300 220-2/ 301 893/ 301 489-01/ 301 489-03/ 301 489-07 / 301 489-17/ 300 440-1/ 300 440-2 AS/NZS 4268, AS/NZS 4771 CISPR 22, EN 55022, CNS 13438, AS/NZS CISPR 22, VCCI, IEC/EN 61000-4-2/3/4/5/6/8/11, CNS 14676-2/3/4/5/6/8, CNS 14934-2/3, CNS 13783-1, CNS 13439, CNS 13803	
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	SL2-IS-E-0014 / IN-E-0014 /A1-E-0014 /R1-E-0014 /R2-E-0014 /L1-E-0014
Canada	Industry Canada	RSS-Gen Issue 3	

* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.



6 SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

For Radiated Emissions(Below 1GHz) and Powerline Conducted Emission							
No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook PC (Remote)	ThinkPad T430u	PB-VZLGG 12/09	FCC DoC	LENOVO	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2	Notebook PC (Remote)	1706-A78	LV-L1870 06/09	FCC DOC	IBM	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
3	Notebook PC (Remote)	D400	0932RY	E2K24GBRL	DELL	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
4	Multi Services Access Node	IES-1000	N/A	N/A	Zyxel	RJ-11 Cable: Unshielded, 10m	Unshielded, 1.8m

For Radiated Emissions(Above 1GHz)							
No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook PC (Remote)	ThinkPad T430u	PB-VZLGG 12/09	FCC DoC	LENOVO	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

For Conducted Emission							
No.	Device Type	Model	Series No.	FCC ID	Brand	Data Cable	Power Cord
1	Notebook PC	ThinkPad T430u	PB-VZLGG 12/09	FCC DoC	LENOVO	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

Remark: Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



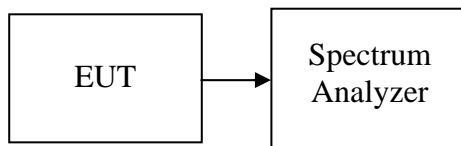
7 FCC PART 15 REQUIREMENTS

7.1 6DB BANDWIDTH

LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100kHz, VBW = 300kHz, Sweep = auto, Span = 30MHz (IEEE 802.11b, IEEE 802.11g, IEEE 802.11n HT20) or Span = 50MHz (IEEE 802.11n HT40).
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	10.10	>500	PASS
Mid	2437	10.10		PASS
High	2462	10.10		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.45	>500	PASS
Mid	2437	16.45		PASS
High	2462	16.45		PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.70	>500	PASS
Mid	2437	17.70		PASS
High	2462	17.70		PASS

Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.17	>500	PASS
Mid	2437	36.08		PASS
High	2452	35.50		PASS



Test Plot

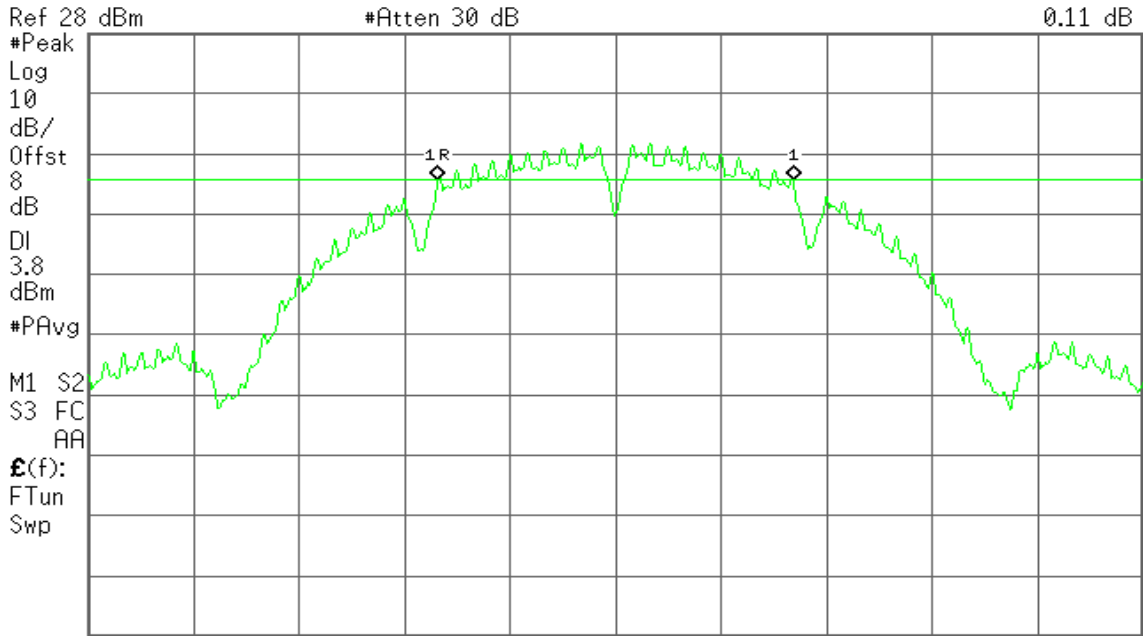
IEEE 802.11b mode

6dB Bandwidth (CH Low)

Agilent

R L

Mkr1 10.10 MHz
0.11 dB



Center 2.412 00 GHz

Span 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

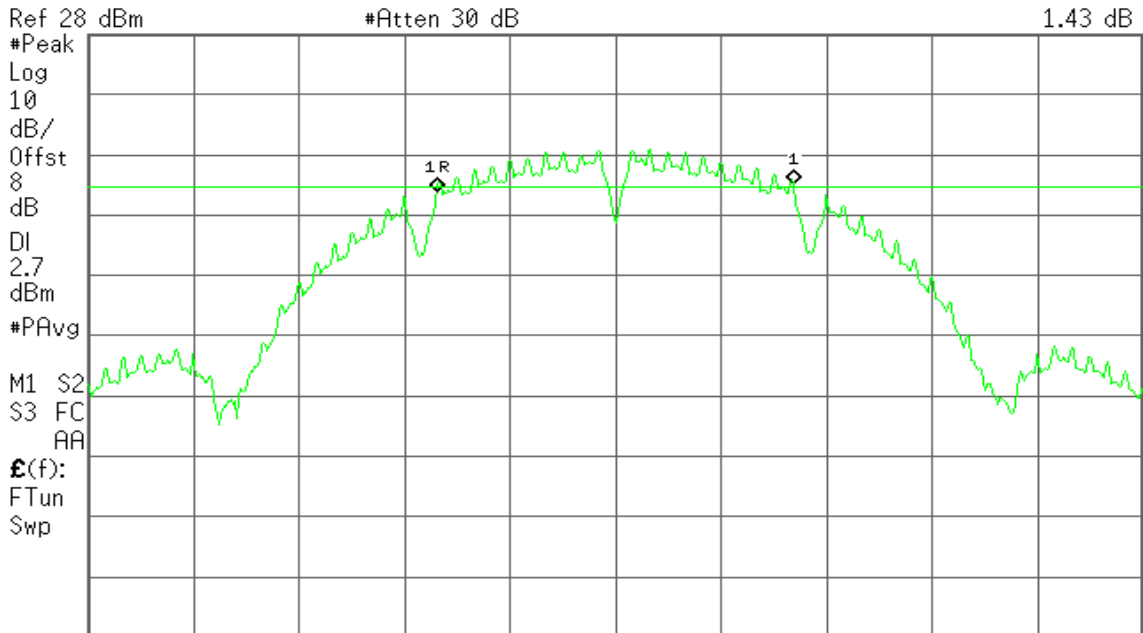
Sweep 3.64 ms (601 pts)

6dB Bandwidth (CH Mid)

Agilent

R T

Mkr1 10.10 MHz
1.43 dB



Center 2.437 00 GHz

Span 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 3.64 ms (601 pts)

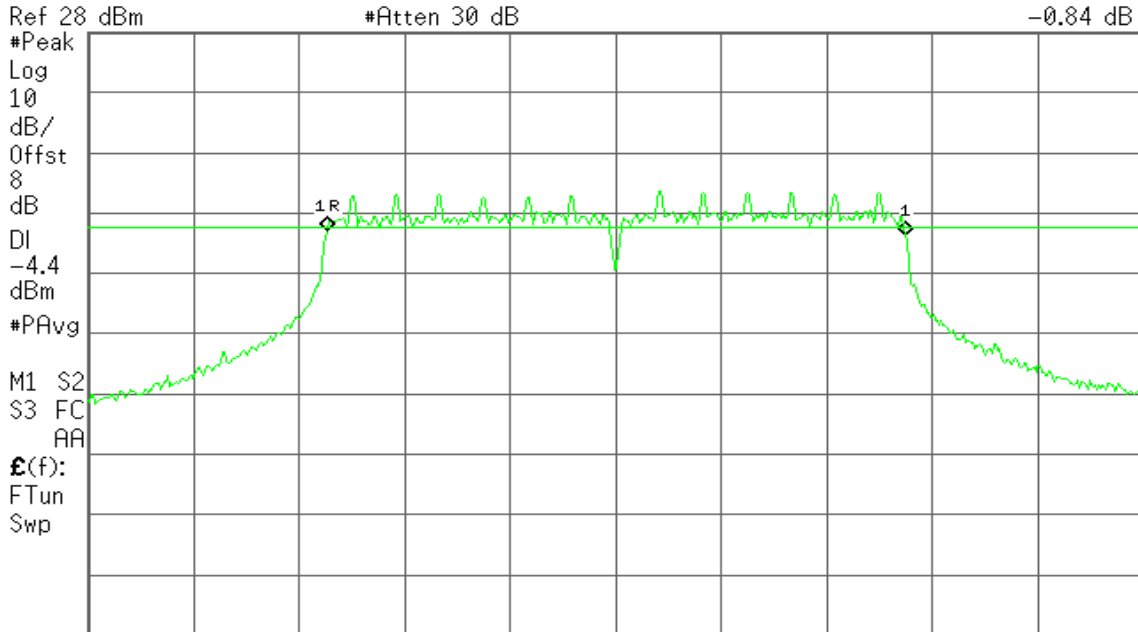


6dB Bandwidth (CH Mid)

Agilent

R T

Mkr1 16.45 MHz
-0.84 dB



Center 2.437 00 GHz

Span 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

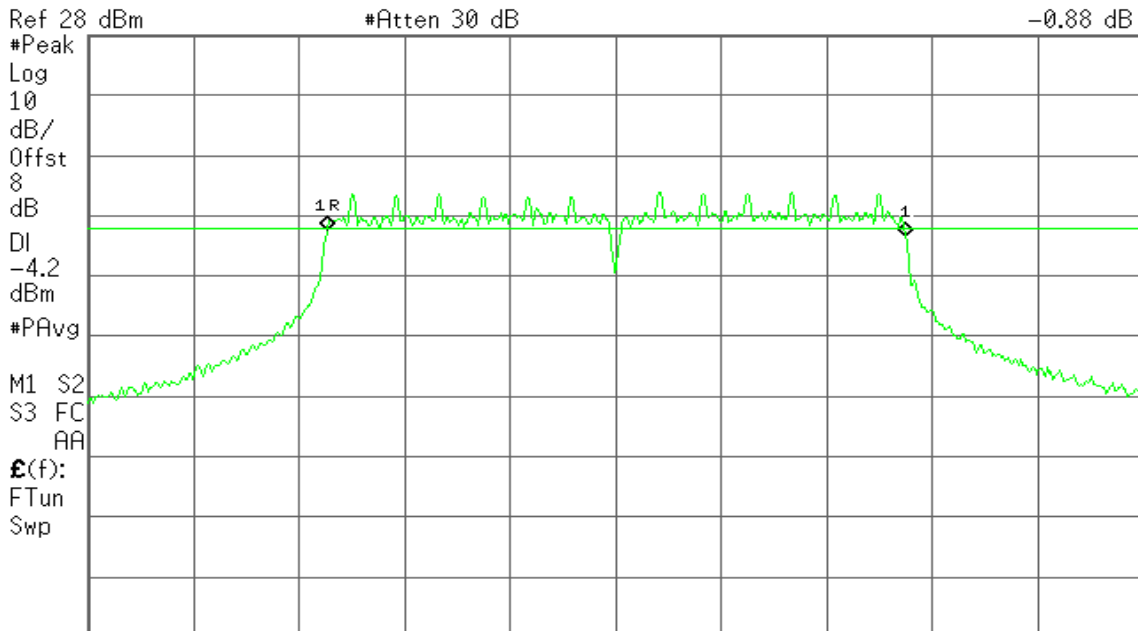
Sweep 3.64 ms (601 pts)

6dB 6dB Bandwidth (CH High)

Agilent

R L

Mkr1 16.45 MHz
-0.88 dB



Center 2.462 00 GHz

Span 30 MHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 3.64 ms (601 pts)



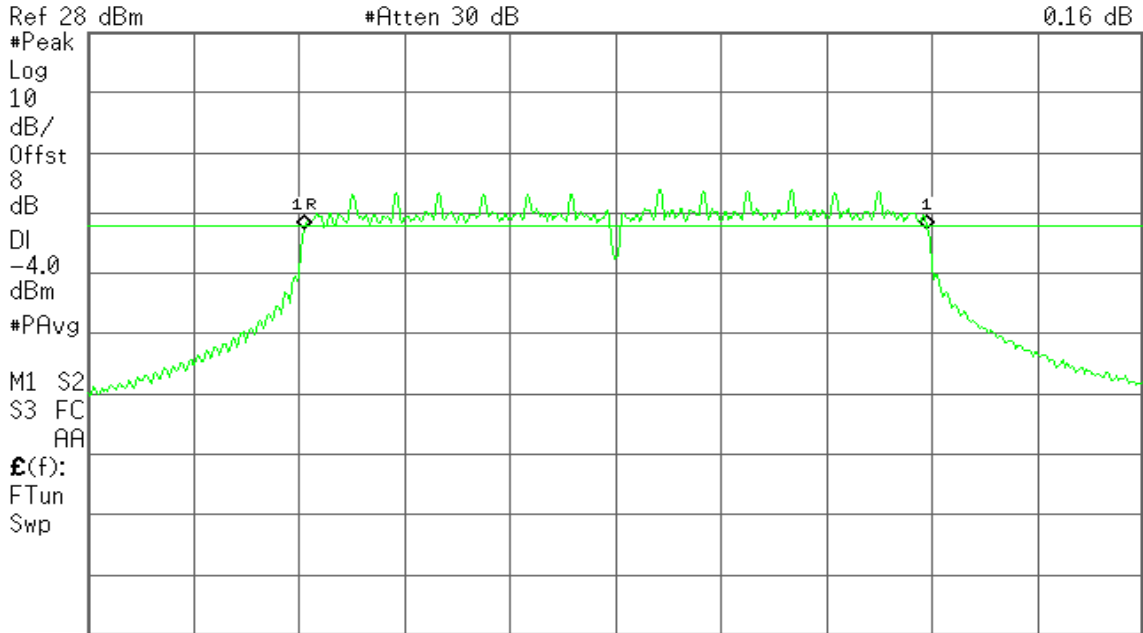
IEEE 802.11n HT20 mode

6dB Bandwidth (CH Low)

Agilent

R L

Mkr1 17.70 MHz
0.16 dB

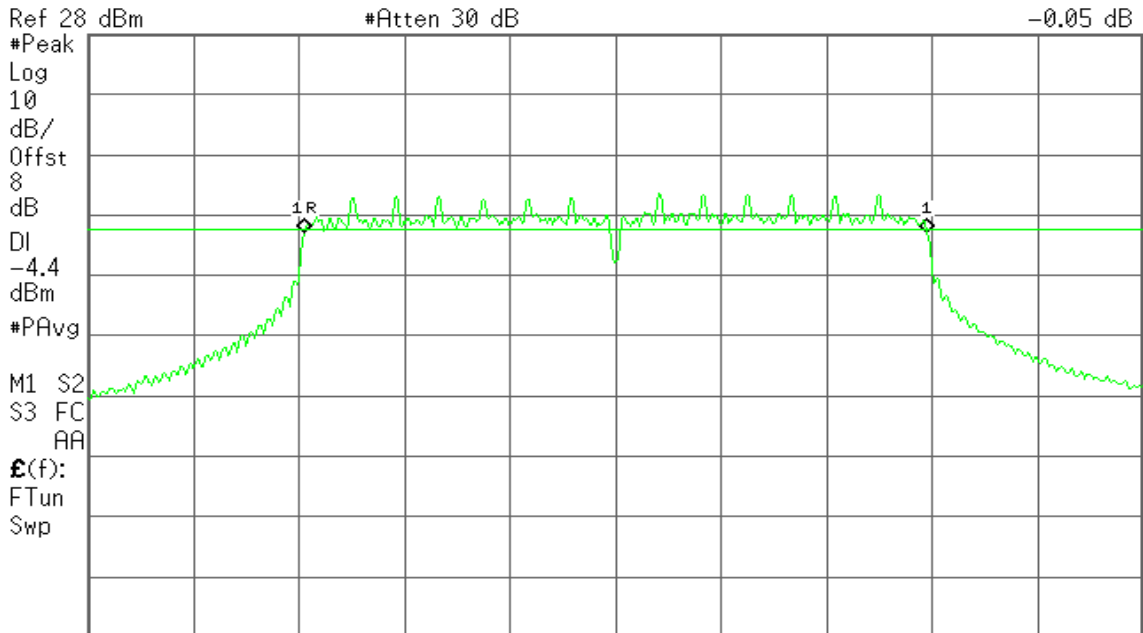


6dB Bandwidth (CH Mid)

Agilent

R L

Mkr1 17.70 MHz
-0.05 dB



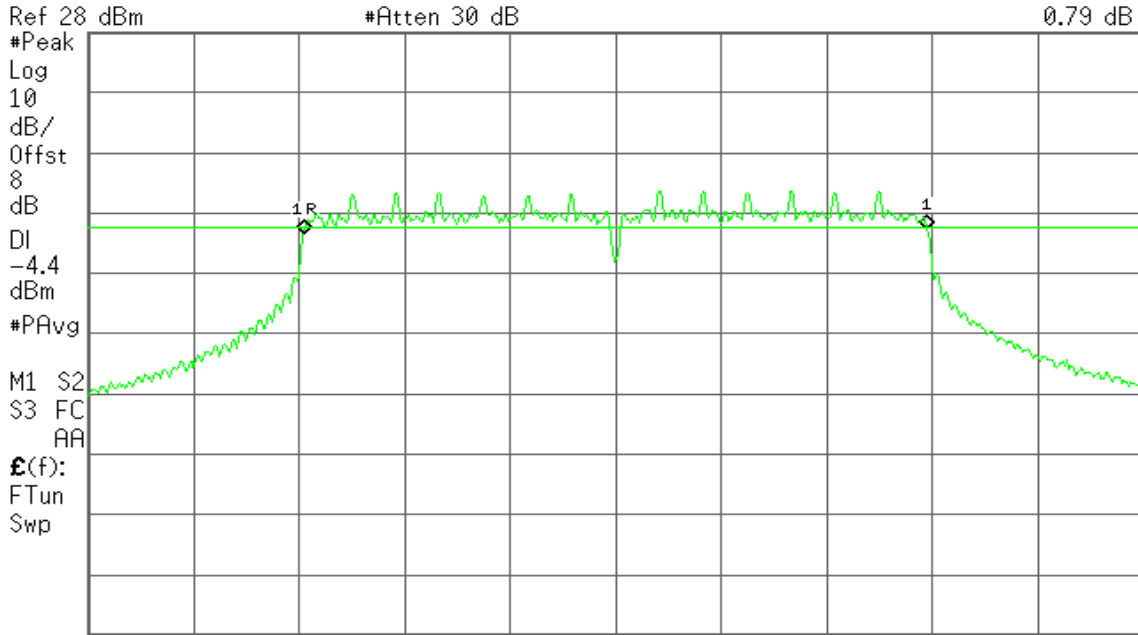


6dB Bandwidth (CH High)

Agilent

R T

Mkr1 17.70 MHz
0.79 dB



Center 2.462 00 GHz Span 30 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 3.64 ms (601 pts)

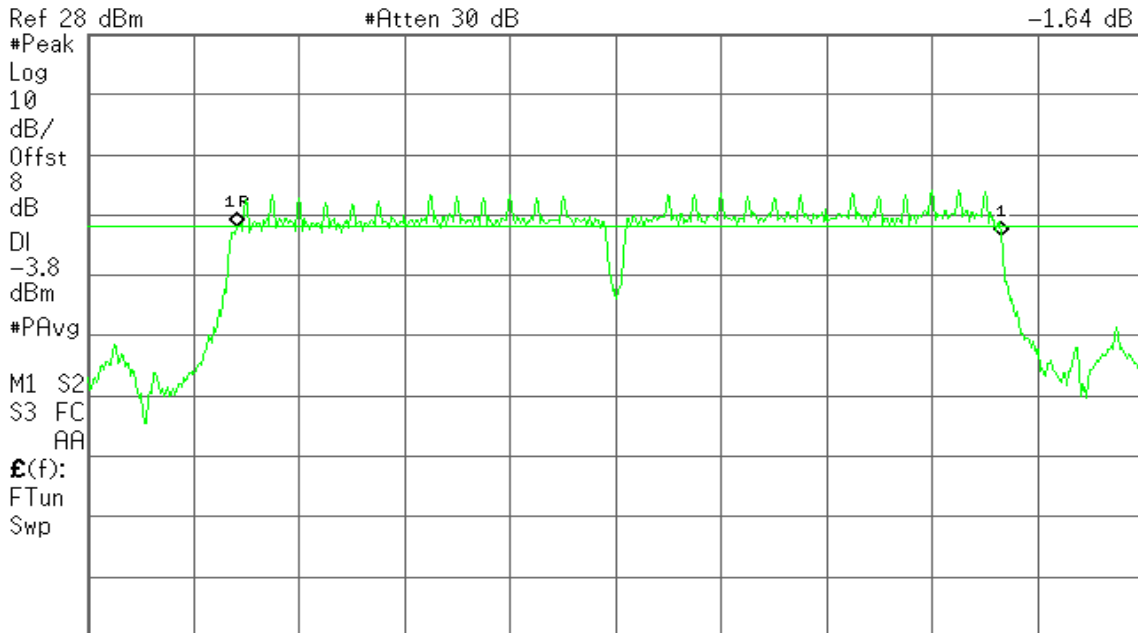
IEEE 802.11n HT40 mode

6dB Bandwidth (CH Low)

Agilent

R T

Mkr1 36.17 MHz
-1.64 dB



Center 2.422 00 GHz Span 50 MHz
#Res BW 100 kHz #VBW 300 kHz Sweep 6.04 ms (601 pts)

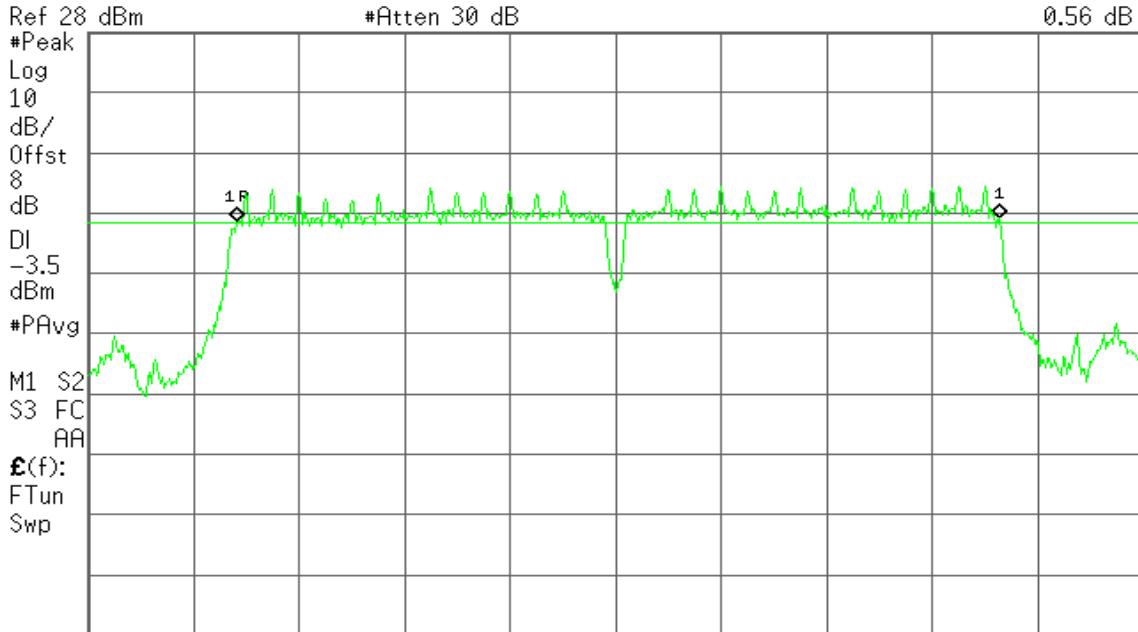


6dB Bandwidth (CH Mid)

Agilent

R T

Mkr1 36.08 MHz
0.56 dB



Center 2.437 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 300 kHz

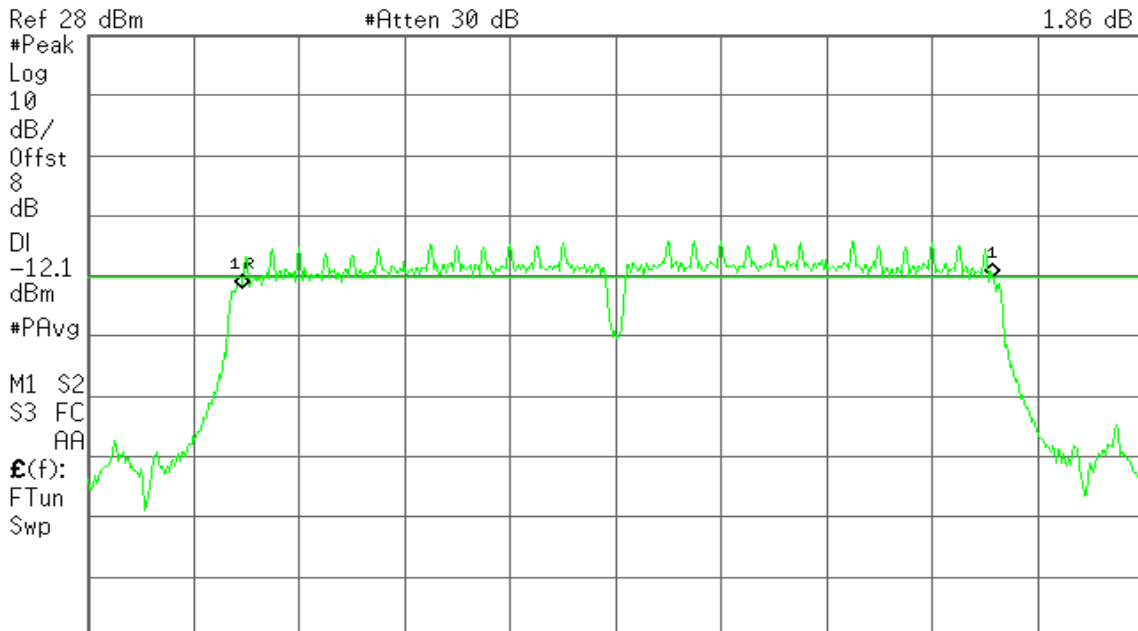
Sweep 6.04 ms (601 pts)

6dB Bandwidth (CH High)

Agilent

R L

Mkr1 35.50 MHz
1.86 dB



Center 2.452 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 6.04 ms (601 pts)



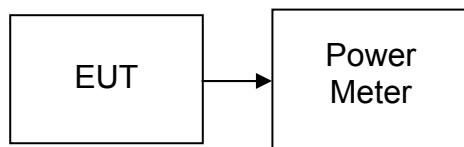
7.2 PEAK POWER

LIMIT

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

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Configuration



TEST PROCEDURE

Per KDB 558074 v03r01

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	21.29	0.1346	1	PASS
Mid	2437	20.81	0.1205		PASS
High	2462	18.41	0.0693		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	20.28	0.1067	1	PASS
Mid	2437	20.20	0.1047		PASS
High	2462	20.35	0.1084		PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2412	20.31	0.1074	1	PASS
Mid	2437	20.13	0.1030		PASS
High	2462	20.48	0.1117		PASS

Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Test Result
Low	2422	22.11	0.1626	1	PASS
Mid	2437	23.47	0.2223		PASS
High	2452	15.33	0.0341		PASS

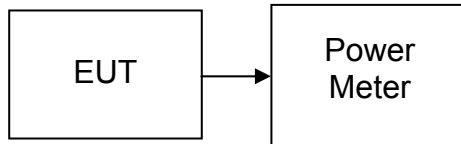


7.3 AVERAGE POWER

LIMIT

None; for reporting purposes only.

Test Configuration



TEST PROCEDURE

Per KDB 558074 v03r01

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	18.29	0.0675
Mid	2437	17.73	0.0593
High	2462	15.36	0.0344

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	12.70	0.0186
Mid	2437	12.48	0.0177
High	2462	12.88	0.0194

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	12.60	0.0182
Mid	2437	12.60	0.0182
High	2462	12.75	0.0188

Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2422	15.35	0.0343
Mid	2437	15.56	0.0360
High	2452	6.99	0.0050



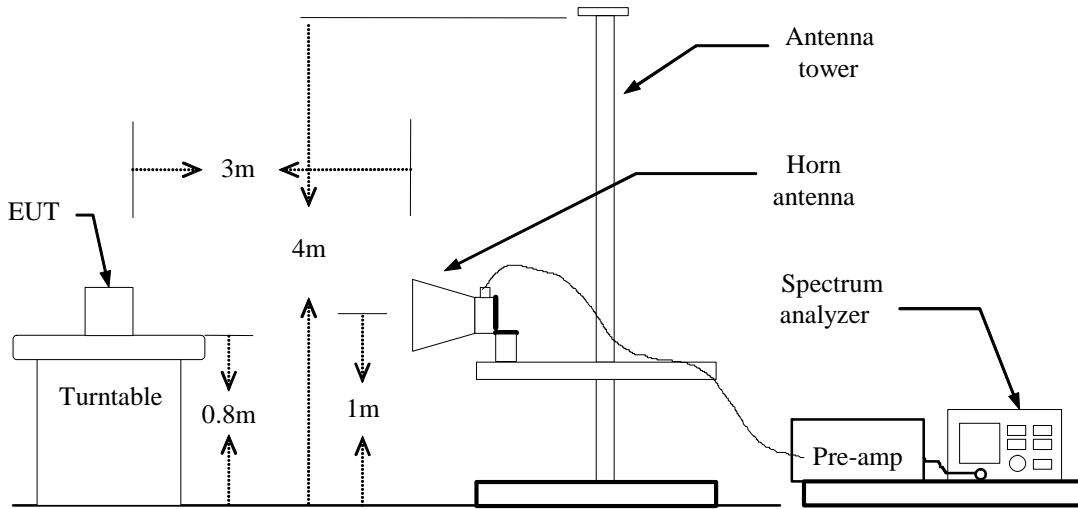
7.4 BAND EDGES MEASUREMENT

LIMIT

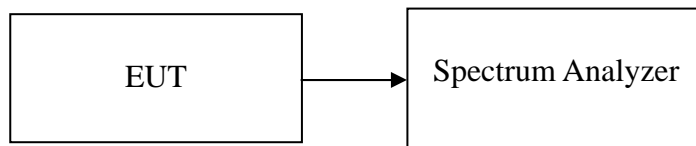
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Test Configuration

For Radiated



For Conducted





TEST PROCEDURE

For Radiated

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

For Conducted

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

TEST RESULTS

Refer to attach spectrum analyzer data chart.



TEST DATA

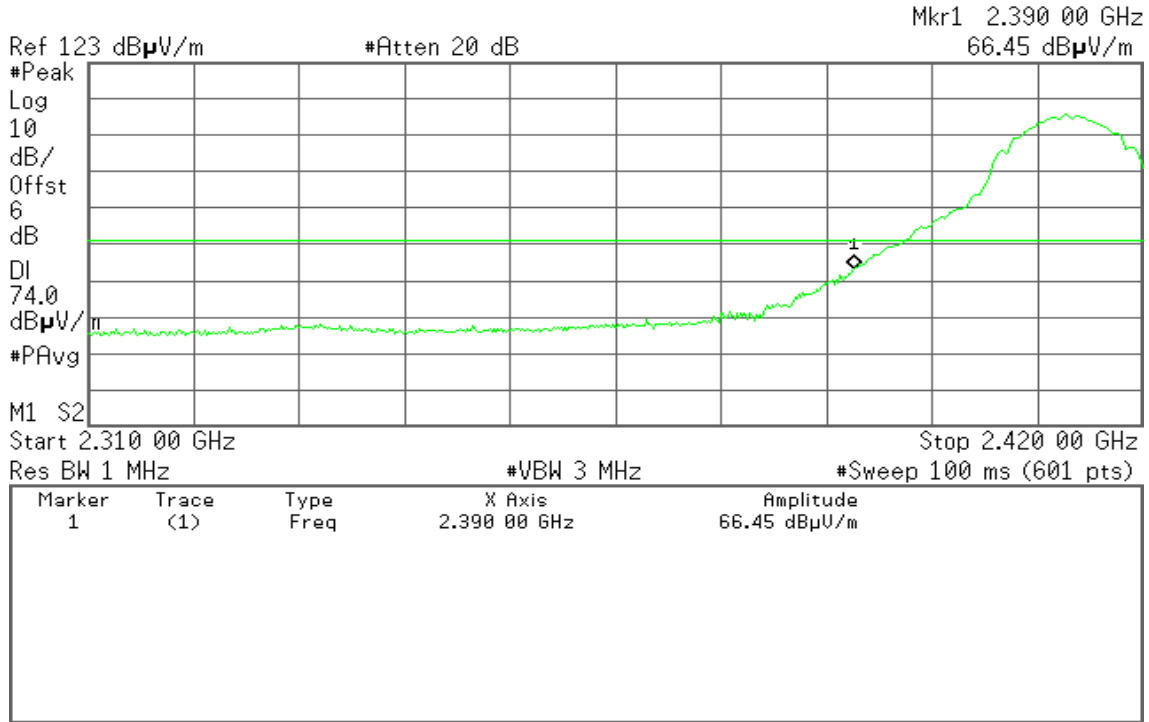
Band Edges (IEEE 802.11b mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent

R L

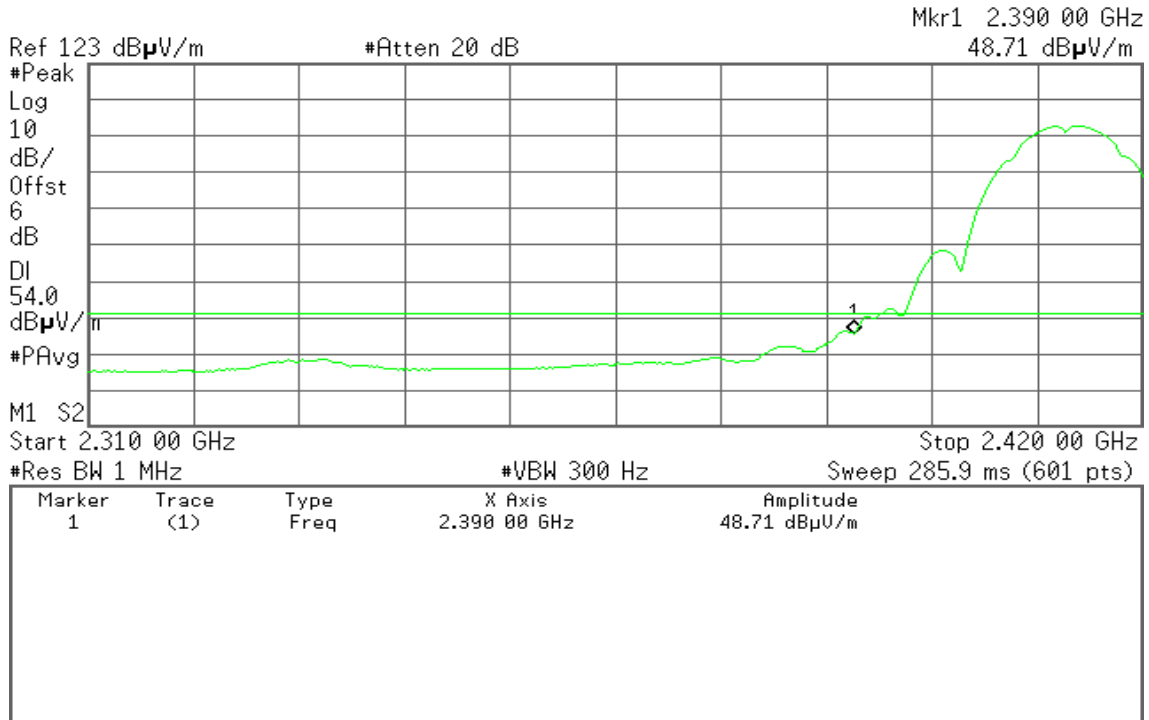


Detector mode: Average

Polarity: Vertical

Agilent

R L





Detector mode: Peak

Polarity: Horizontal

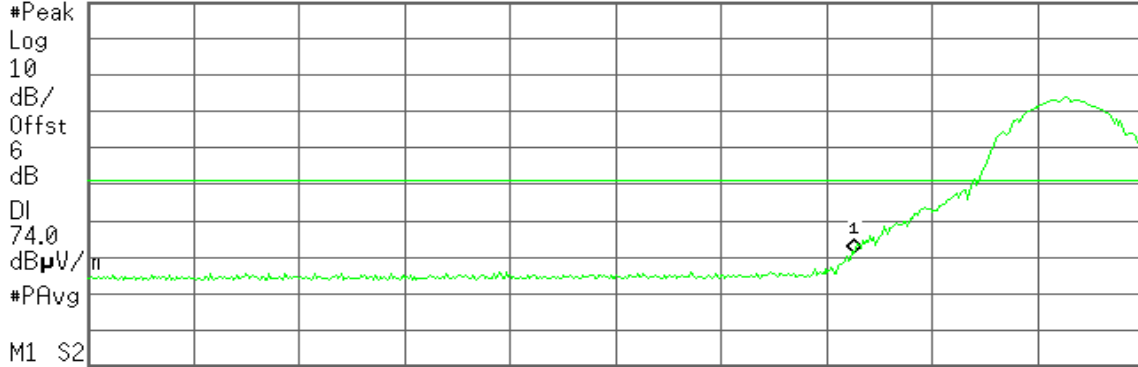
Agilent

R L

Mkr1 2.390 00 GHz
54.08 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	54.08 dBµV/m

Detector mode: Average

Polarity: Horizontal

Agilent

R L

Mkr1 2.390 00 GHz
39.46 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 300 Hz

Sweep 285.9 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	39.46 dBµV/m



Band Edges (IEEE 802.11b mode / CH High)

Detector mode: Peak

Polarity: Vertical

Agilent

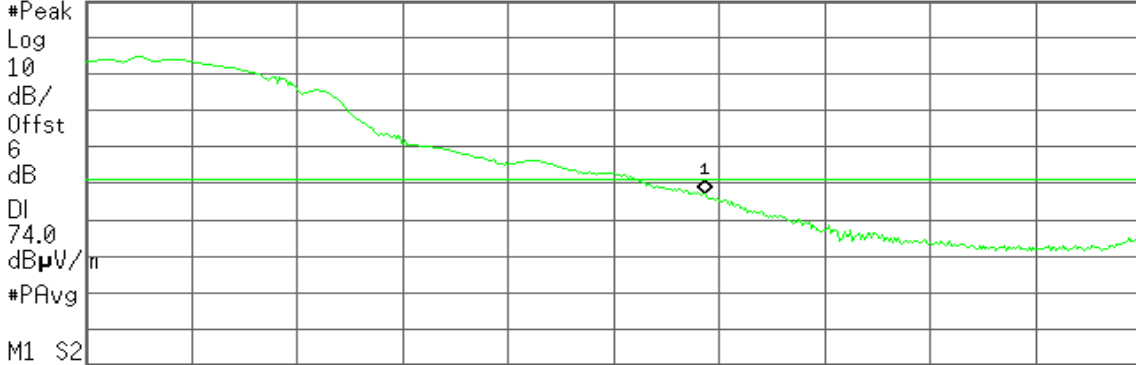
R T

Mkr1 2.483 50 GHz

70.05 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	70.05 dBµV/m

Detector mode: Average

Polarity: Vertical

Agilent

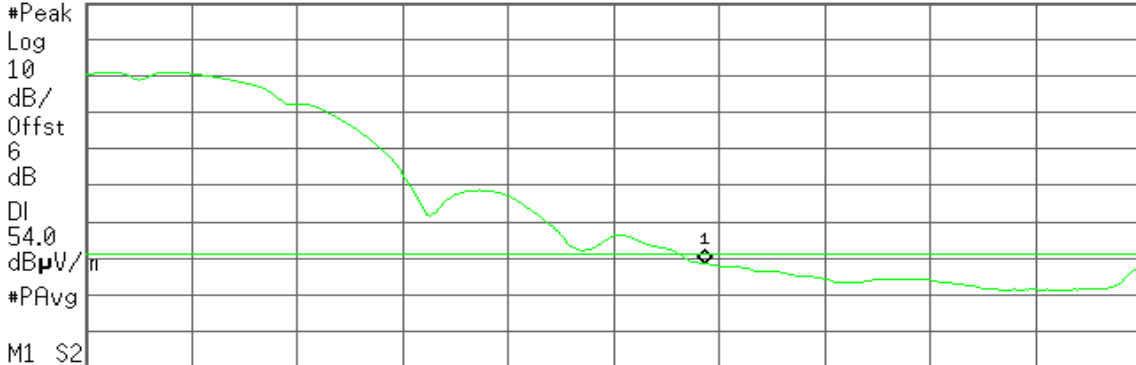
R T

Mkr1 2.483 50 GHz

51.65 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 300 Hz

Sweep 104 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	51.65 dBµV/m



Detector mode: Peak

Polarity: Horizontal

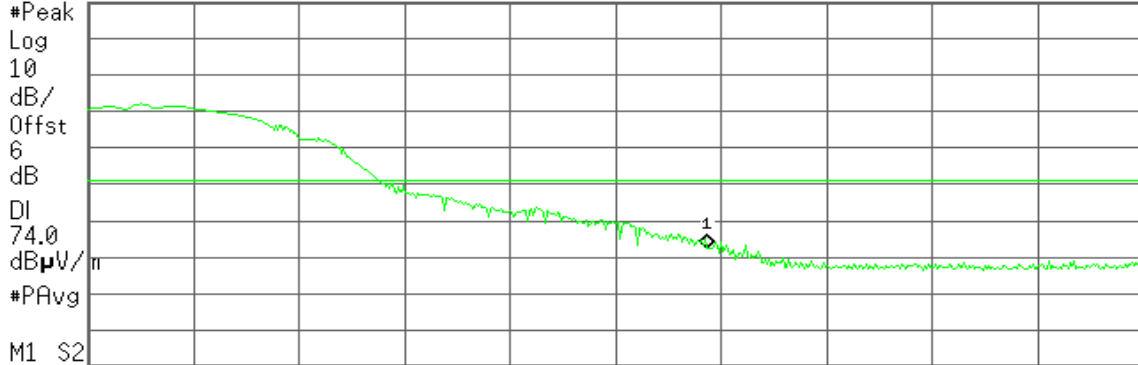
Agilent

R L

Mkr1 2.483 50 GHz
55.52 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	55.52 dBµV/m

Detector mode: Average

Polarity: Horizontal

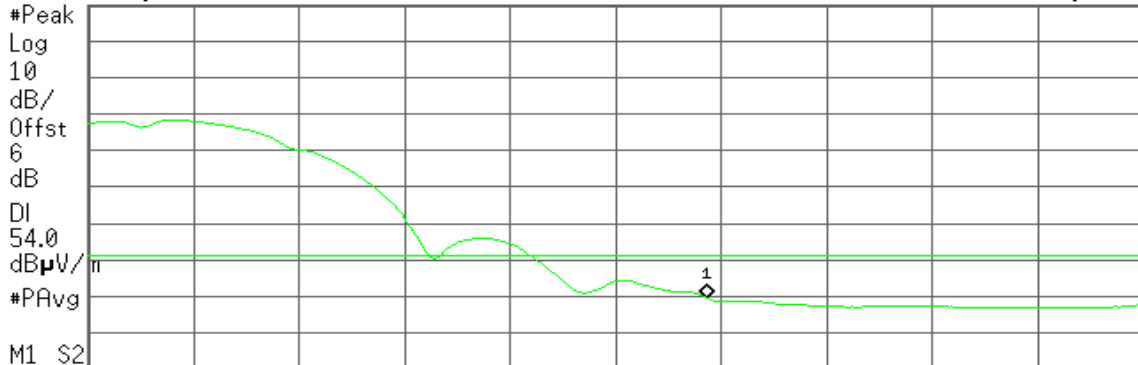
Agilent

R L

Mkr1 2.483 50 GHz
42.61 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 300 Hz

Sweep 104 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	42.61 dBµV/m



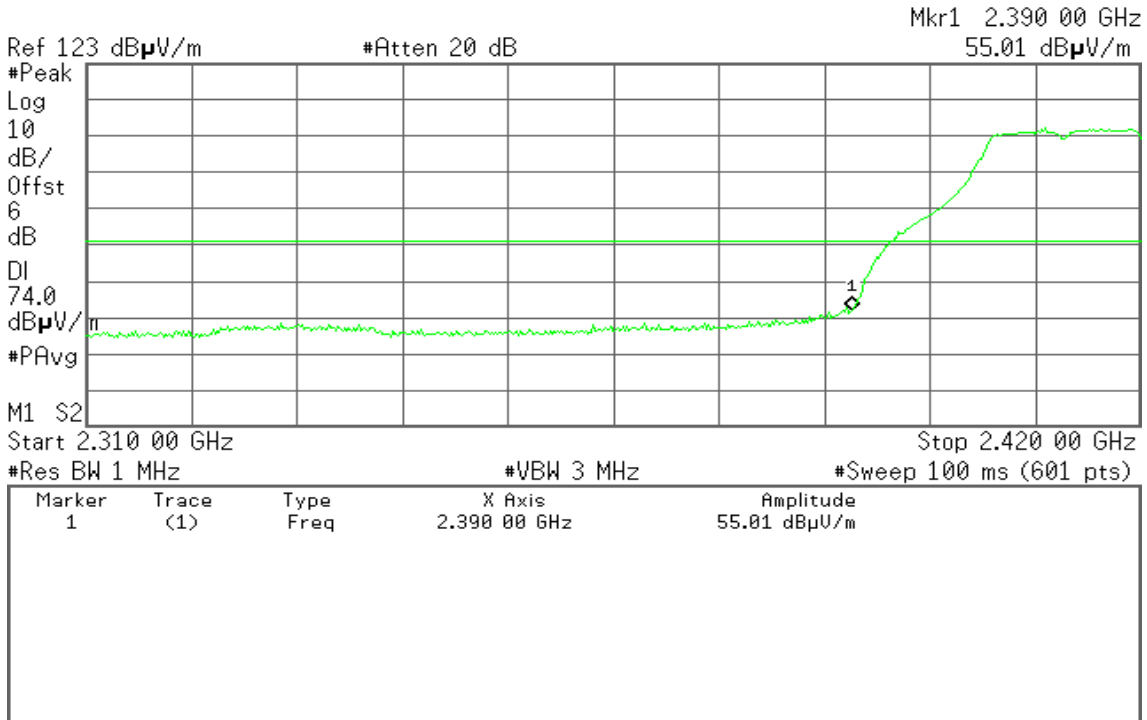
Band Edges (IEEE 802.11g mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent

R L

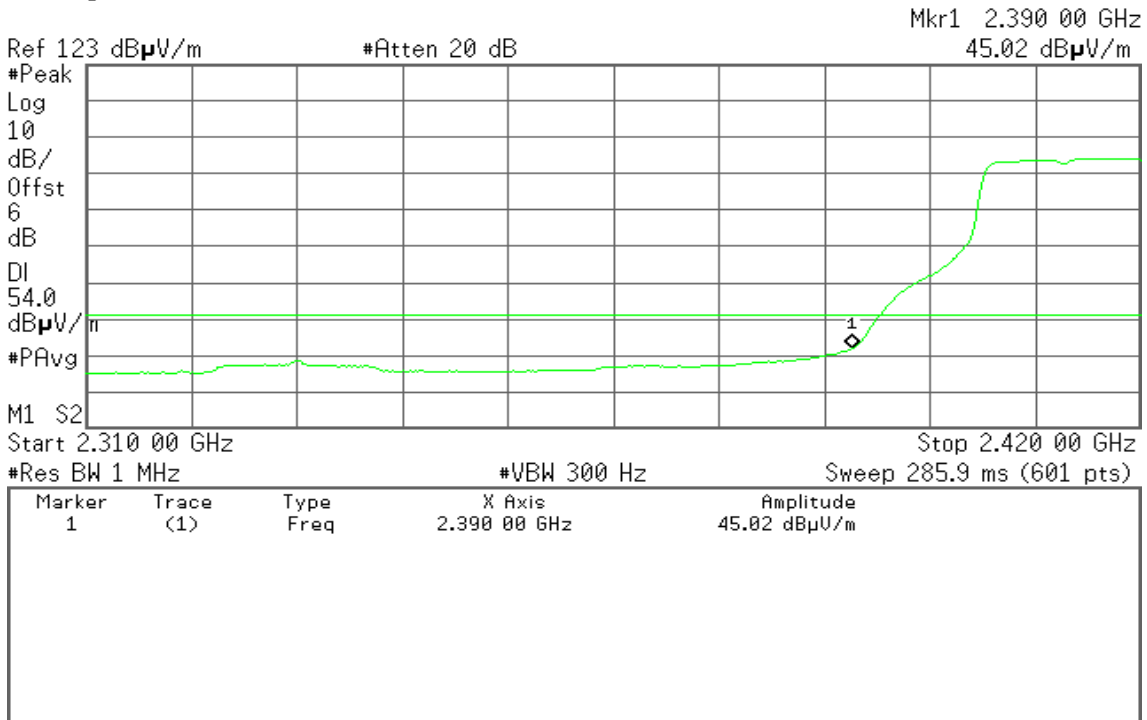


Detector mode: Average

Polarity: Vertical

Agilent

R L





Detector mode: Peak

Polarity: Horizontal

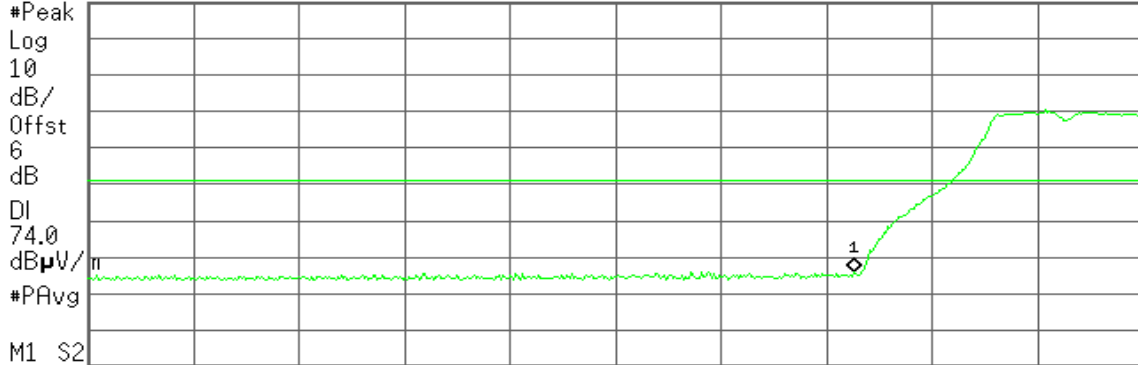
Agilent

R L

Mkr1 2.390 00 GHz
48.79 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	48.79 dBµV/m

Detector mode: Average

Polarity: Horizontal

Agilent

R L

Mkr1 2.390 00 GHz
38.40 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 300 Hz

Sweep 285.9 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	38.40 dBµV/m



Band Edges (IEEE 802.11g mode / CH High)

Detector mode: Peak

Polarity: Vertical

Agilent

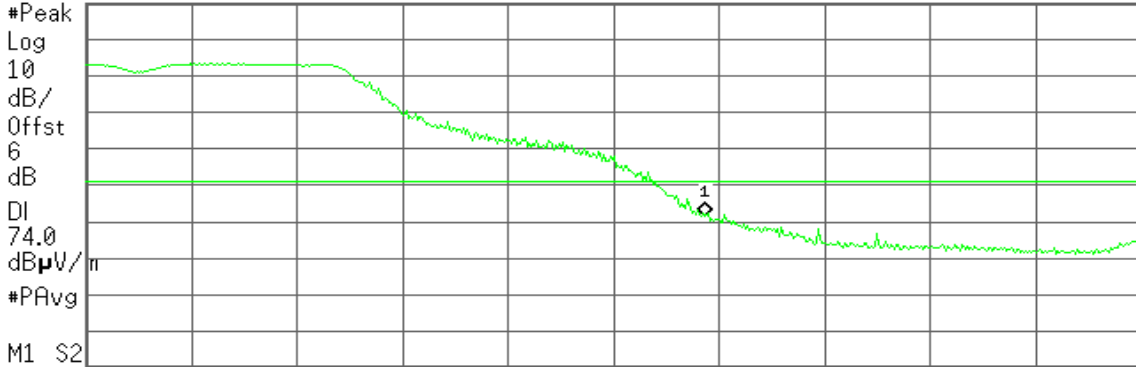
R T

Mkr1 2.483 50 GHz

64.39 dB μ V/m

Ref 123 dB μ V/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	64.39 dB μ V/m

Detector mode: Average

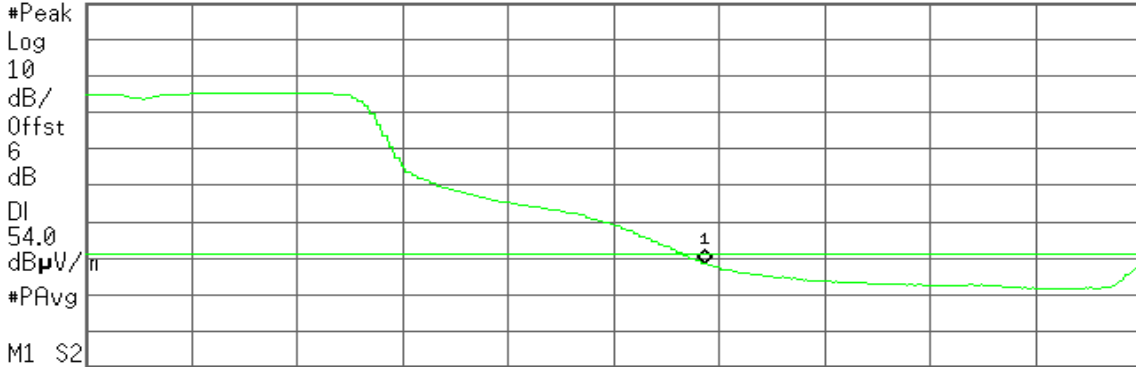
Polarity: Vertical

Agilent

R L

Ref 123 dB μ V/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 300 Hz

Sweep 104 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	51.47 dB μ V/m

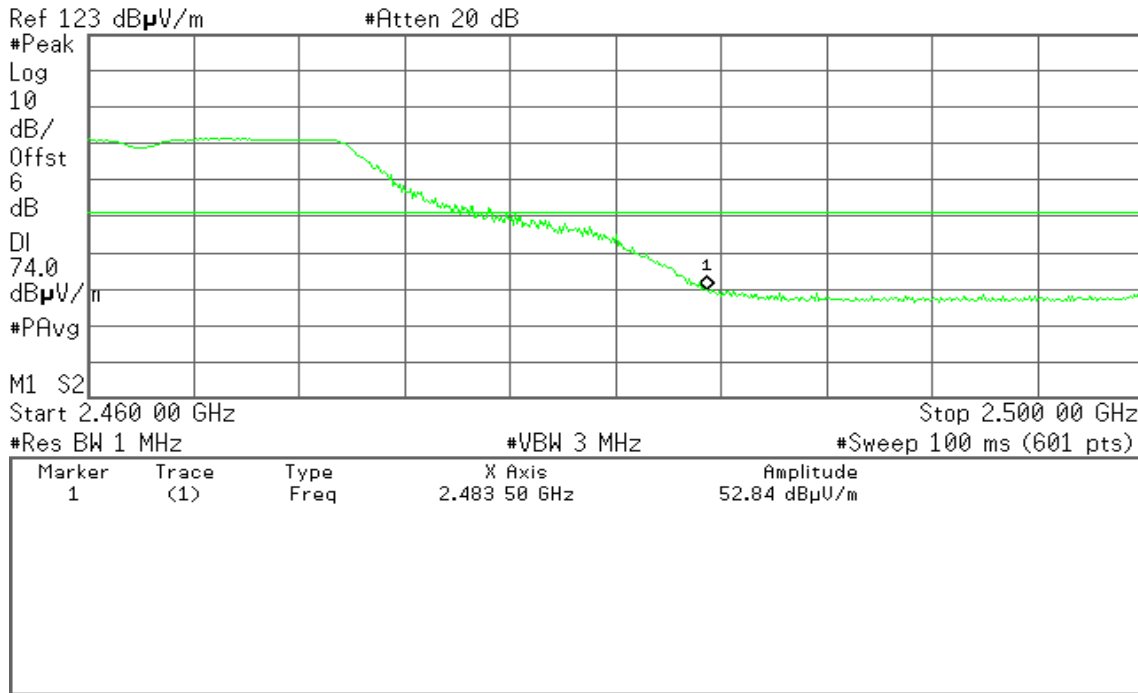


Detector mode: Peak

Polarity: Horizontal

Agilent

R L

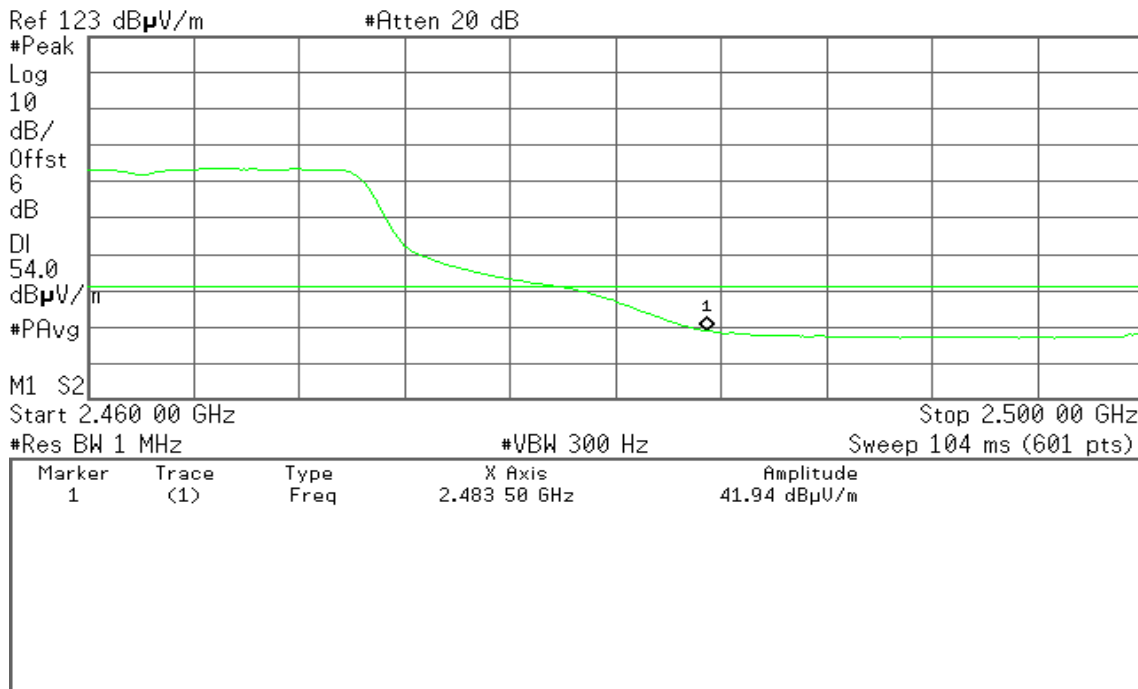


Detector mode: Average

Polarity: Horizontal

Agilent

R L





Band Edges (IEEE 802.11n HT20 mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent

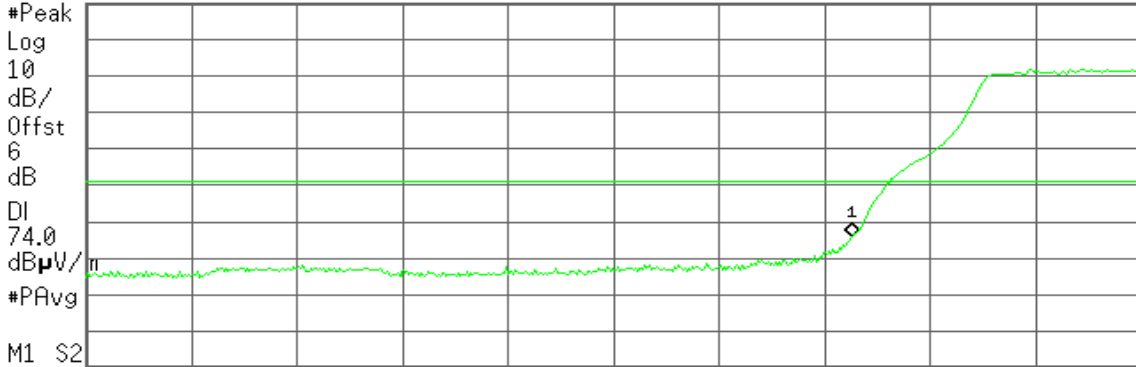
R T

Mkr1 2.390 00 GHz

58.79 dB μ V/m

Ref 123 dB μ V/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	58.79 dB μ V/m

Detector mode: Average

Polarity: Vertical

Agilent

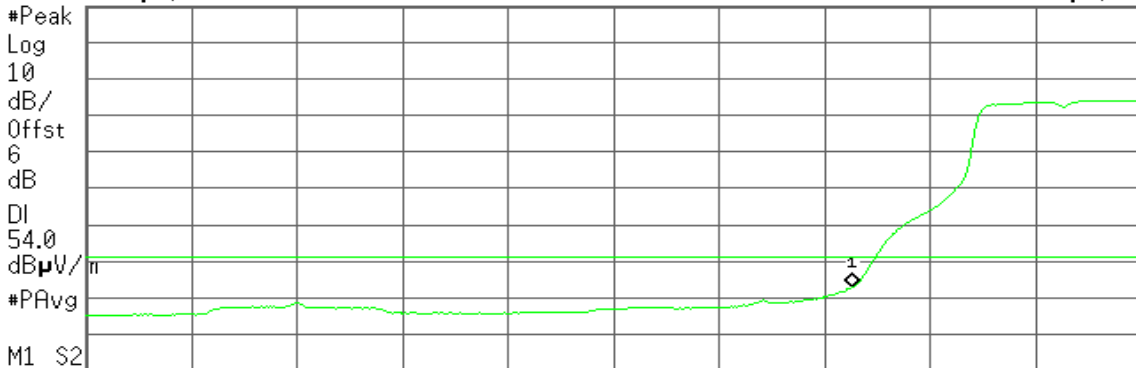
R L T

Mkr1 2.390 00 GHz

45.80 dB μ V/m

Ref 123 dB μ V/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 300 Hz

Sweep 285.9 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	45.80 dB μ V/m



Detector mode: Peak

Polarity: Horizontal

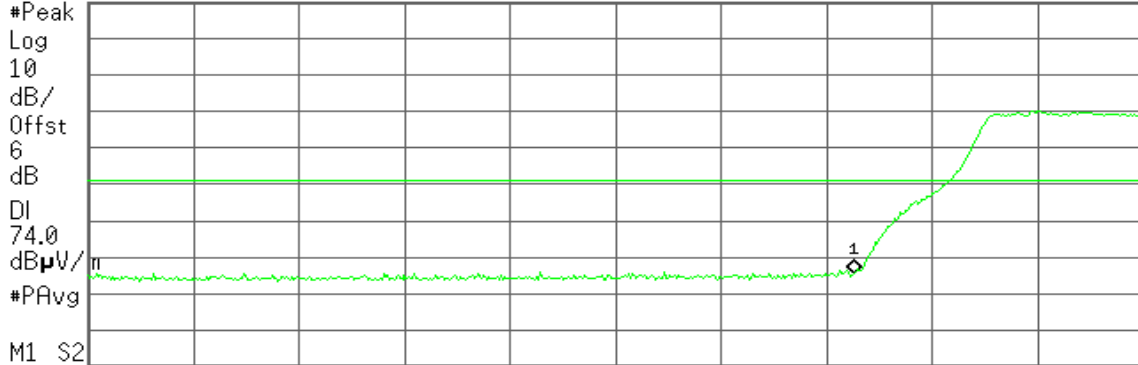
Agilent

R L

Mkr1 2.390 00 GHz
48.59 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	48.59 dBµV/m

Detector mode: Average

Polarity: Horizontal

Agilent

R L

Mkr1 2.390 00 GHz
38.51 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 300 Hz

Sweep 285.9 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.390 00 GHz	38.51 dBµV/m



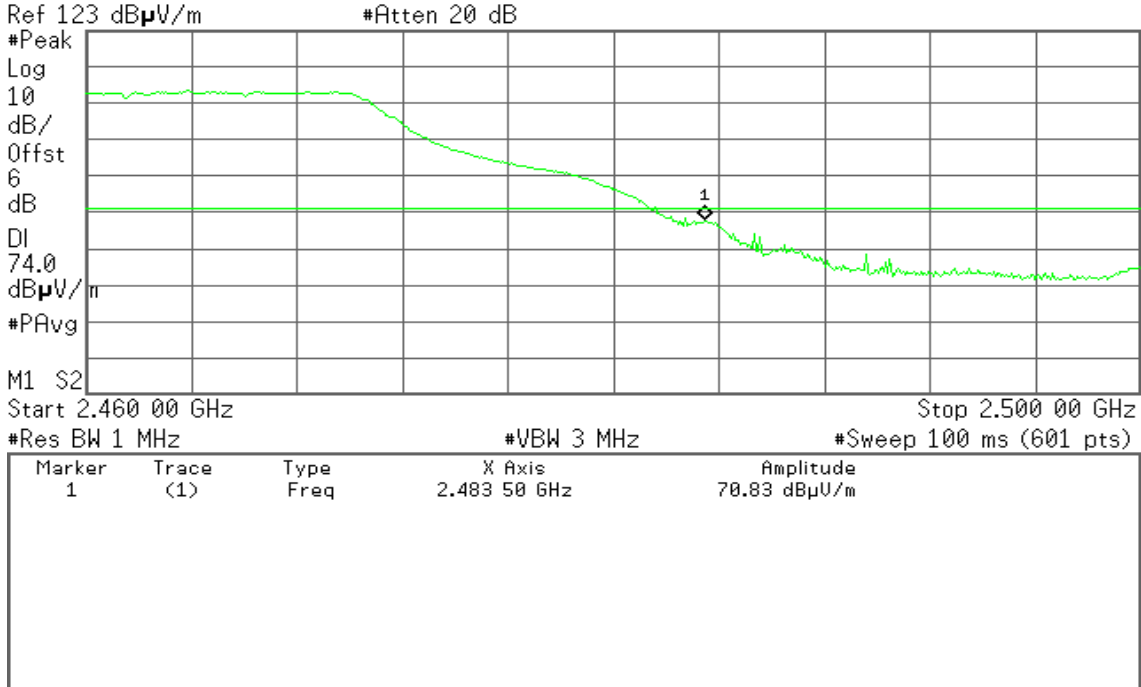
Band Edges (IEEE 802.11n HT20 mode / CH High)

Detector mode: Peak

Polarity: Vertical

Agilent

R L

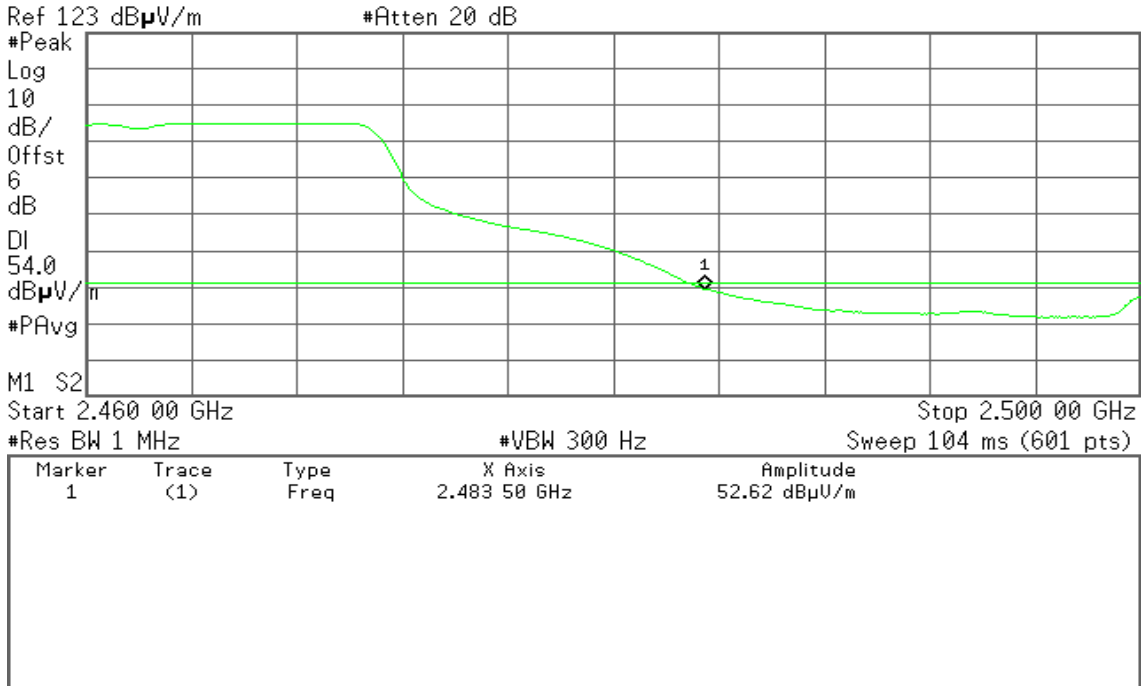


Detector mode: Average

Polarity: Vertical

Agilent

R L



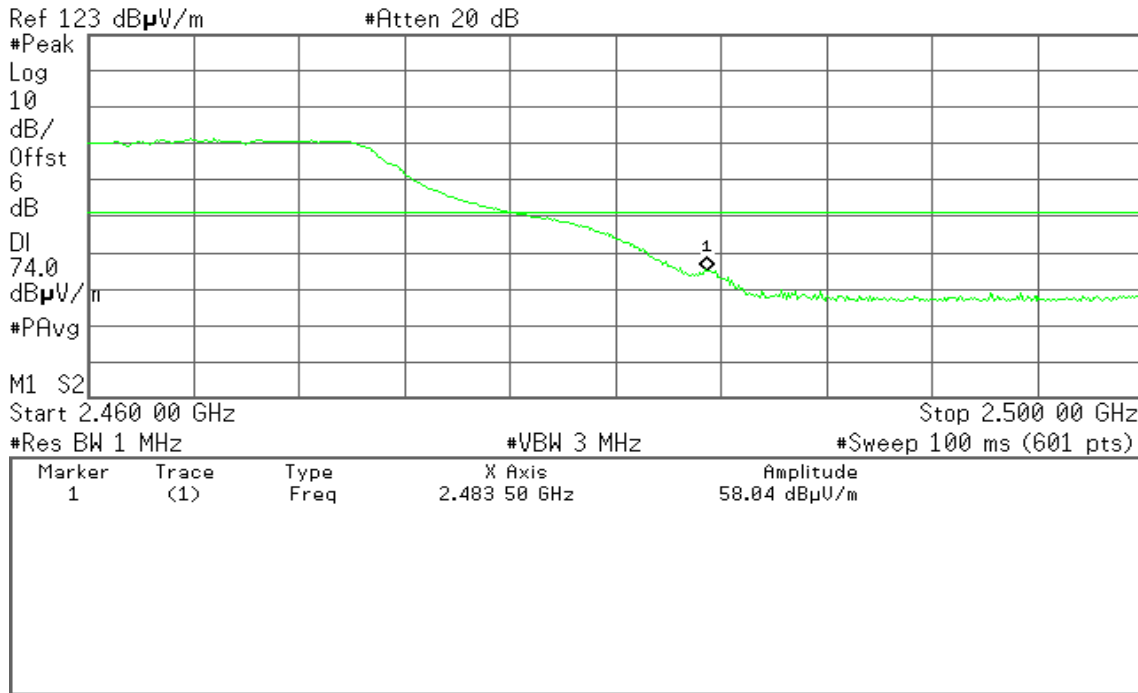


Detector mode: Peak

Polarity: Horizontal

Agilent

R T

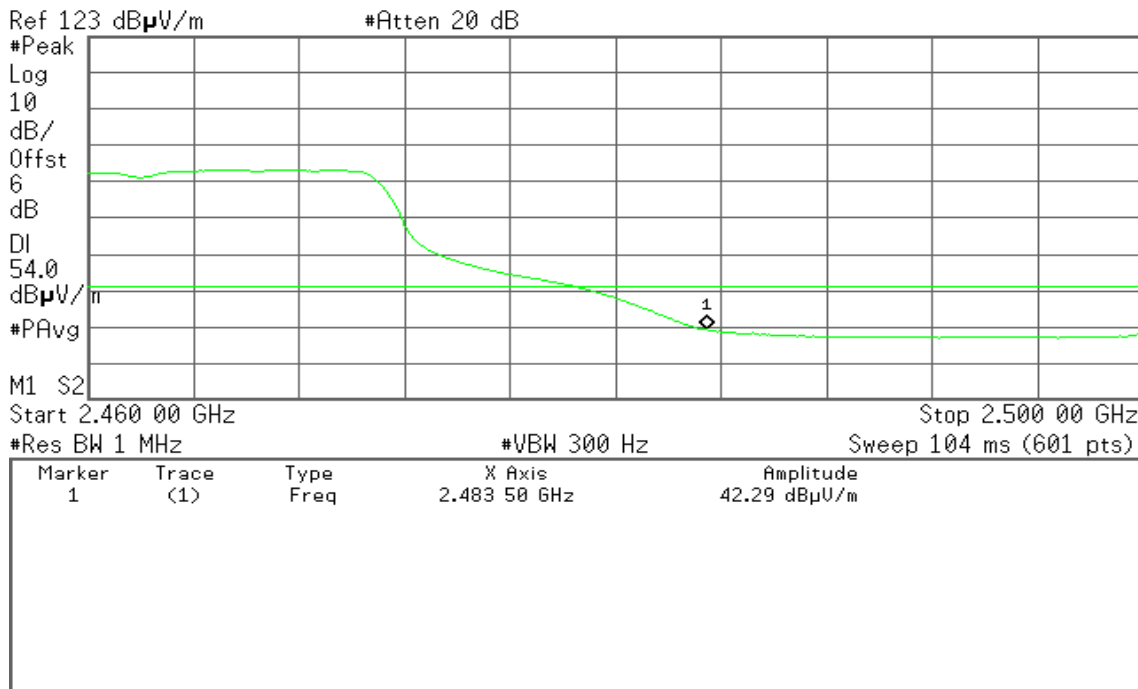


Detector mode: Average

Polarity: Horizontal

Agilent

R L





Band Edges (IEEE 802.11n HT40 mode / CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent

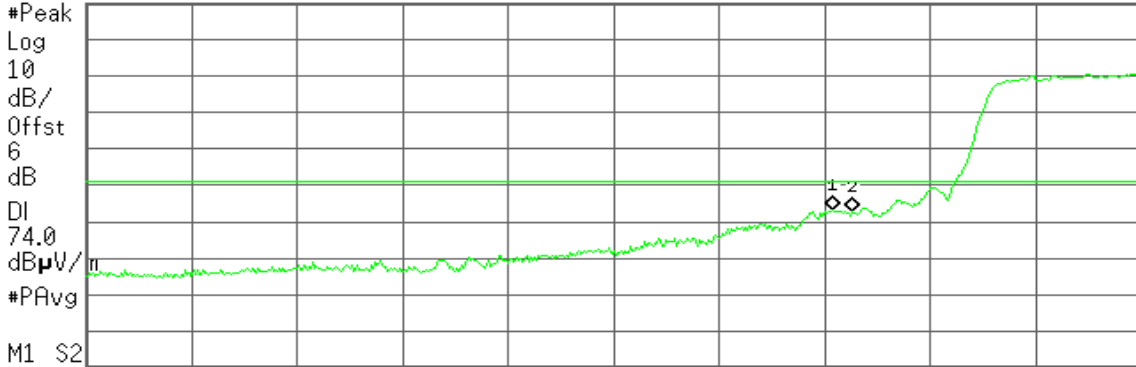
R L

Mkr2 2.390 00 GHz

65.76 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.387 98 GHz	66.22 dBµV/m
2	(1)	Freq	2.390 00 GHz	65.76 dBµV/m

Detector mode: Average

Polarity: Vertical

Agilent

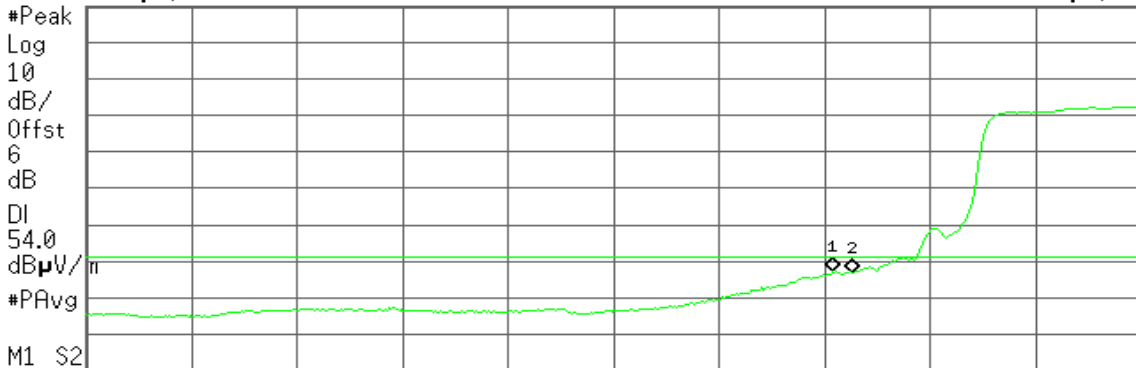
R L

Mkr2 2.390 00 GHz

49.83 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.310 00 GHz

Stop 2.420 00 GHz

#Res BW 1 MHz

#VBW 1.1 kHz

Sweep 78 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.387 98 GHz	58.32 dBµV/m
2	(1)	Freq	2.390 00 GHz	49.83 dBµV/m



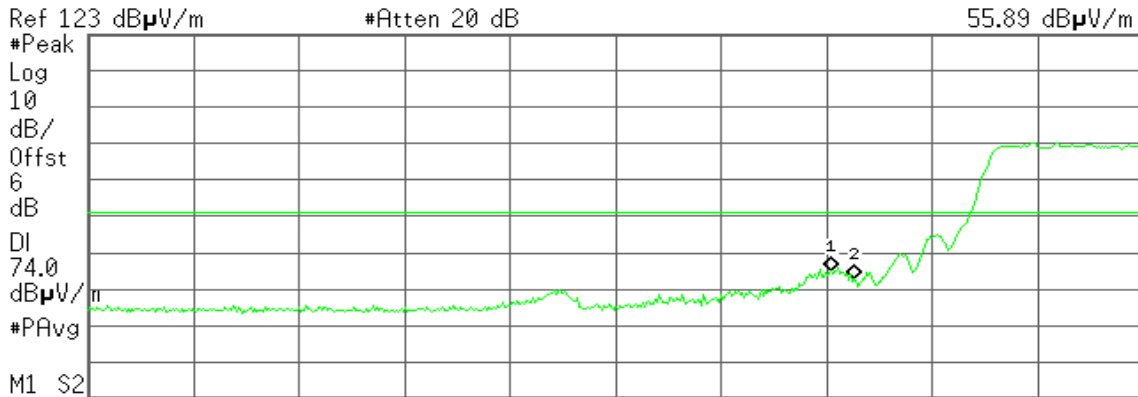
Detector mode: Peak

Polarity: Horizontal

Agilent

R L

Mkr2 2.390 00 GHz
55.89 dBµV/m



#Res BW 1 MHz #VBW 3 MHz #Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.387 62 GHz	58.24 dBµV/m
2	(1)	Freq	2.390 00 GHz	55.89 dBµV/m

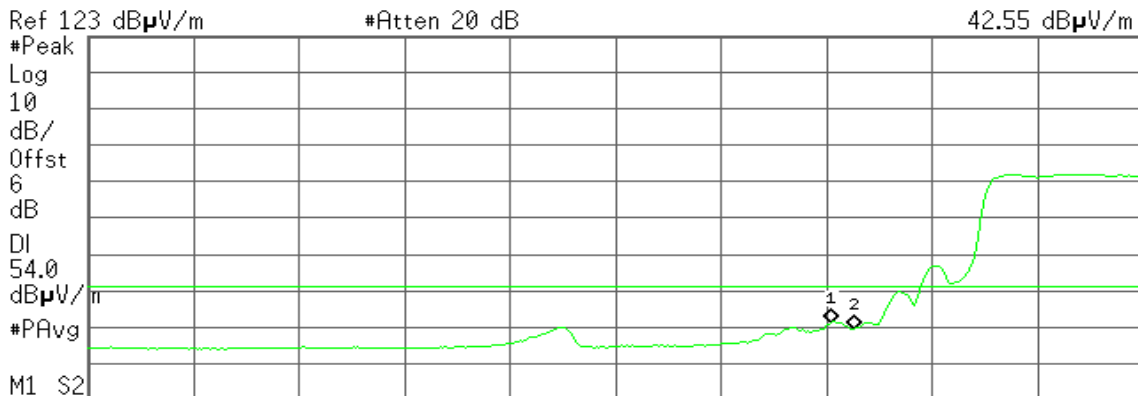
Detector mode: Average

Polarity: Horizontal

Agilent

R L

Mkr2 2.390 00 GHz
42.55 dBµV/m



#Res BW 1 MHz #VBW 1.1 kHz Sweep 78 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.387 62 GHz	44.13 dBµV/m
2	(1)	Freq	2.390 00 GHz	42.55 dBµV/m



Band Edges (IEEE 802.11n HT40 mode / CH High)

Detector mode: Peak

Polarity: Vertical

Agilent

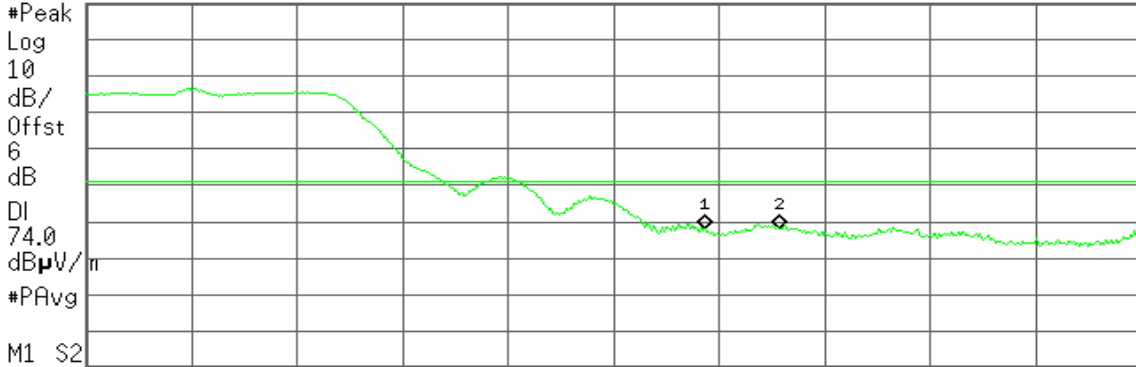
R L

Mkr2 2.486 27 GHz

61.07 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	61.10 dBµV/m
2	(1)	Freq	2.486 27 GHz	61.07 dBµV/m

Detector mode: Average

Polarity: Vertical

Agilent

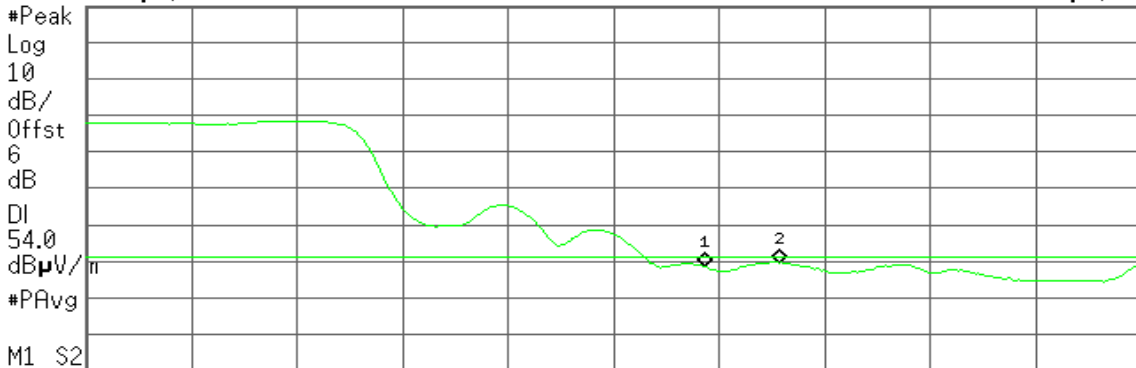
R L

Mkr2 2.486 27 GHz

52.58 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1.1 kHz

Sweep 28.36 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	51.53 dBµV/m
2	(1)	Freq	2.486 27 GHz	52.58 dBµV/m



Detector mode: Peak

Polarity: Horizontal

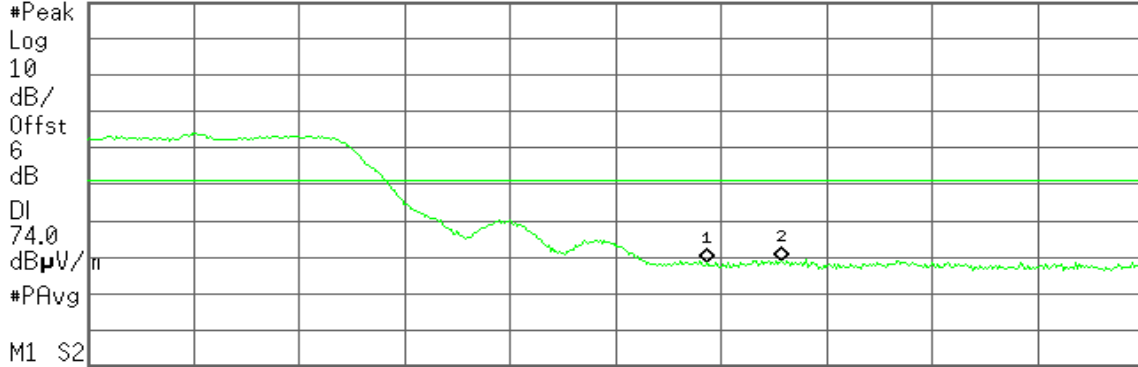
Agilent

R L

Mkr2 2.486 27 GHz
51.87 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



M1 S2
Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 3 MHz

#Sweep 100 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	51.56 dBµV/m
2	(1)	Freq	2.486 27 GHz	51.87 dBµV/m

Detector mode: Average

Polarity: Horizontal

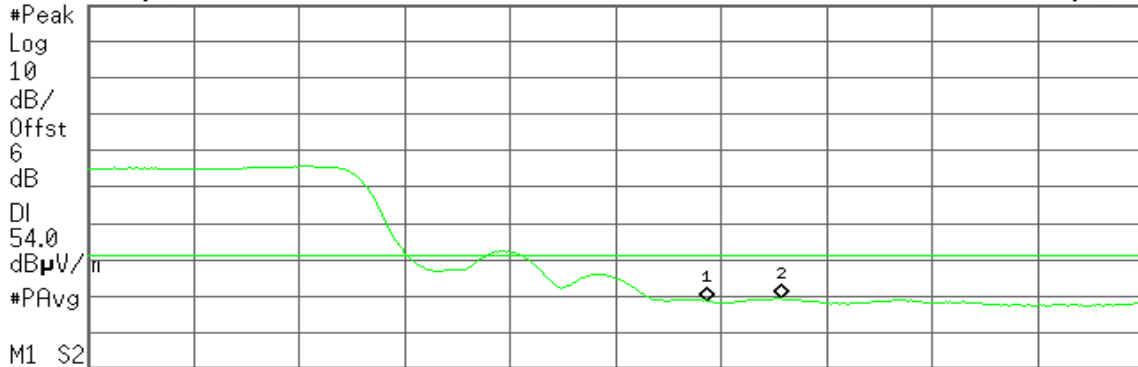
Agilent

R L

Mkr2 2.486 27 GHz
42.40 dBµV/m

Ref 123 dBµV/m

#Atten 20 dB



M1 S2
Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 1 MHz

#VBW 1.1 kHz

Sweep 28.36 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.483 50 GHz	41.80 dBµV/m
2	(1)	Freq	2.486 27 GHz	42.40 dBµV/m



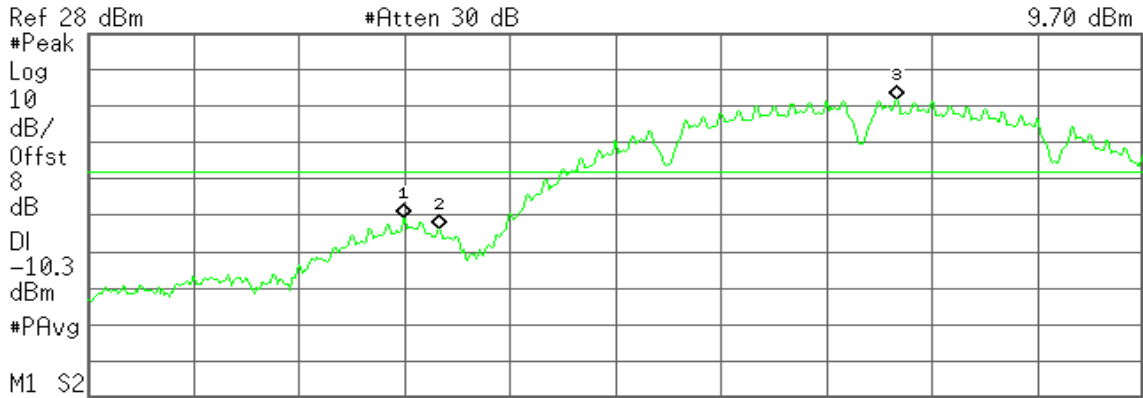
Test Plot

Conducted Band Edges (IEEE 802.11b mode / CH Low)

Agilent

R T

Mkr3 2.413 00 GHz
9.70 dBm



Start 2.390 00 GHz Stop 2.420 00 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.64 ms (601 pts)

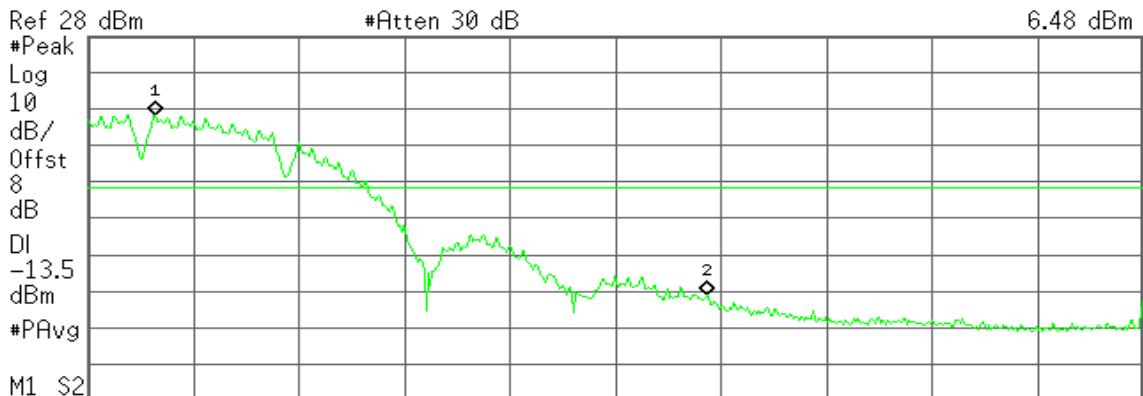
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.399 00 GHz	-22.67 dBm
2	(1)	Freq	2.400 00 GHz	-25.67 dBm
3	(1)	Freq	2.413 00 GHz	9.70 dBm

Conducted Band Edges (IEEE 802.11b mode / CH High)

Agilent

R T

Mkr1 2.462 53 GHz
6.48 dBm



Start 2.460 00 GHz Stop 2.500 00 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 4.84 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.462 53 GHz	6.48 dBm
2	(1)	Freq	2.483 58 GHz	-43.02 dBm

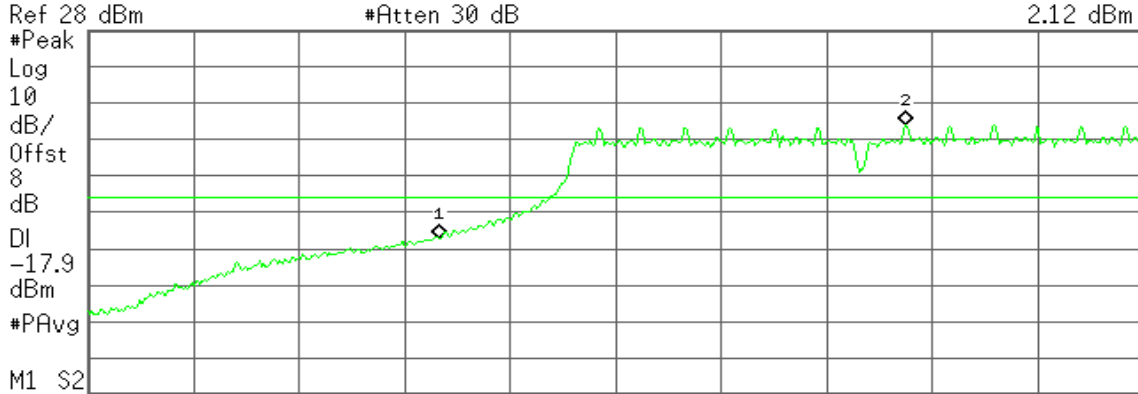


Conducted Band Edges (IEEE 802.11g mode / CH Low)

Agilent

R T

Mkr2 2.413 25 GHz
2.12 dBm



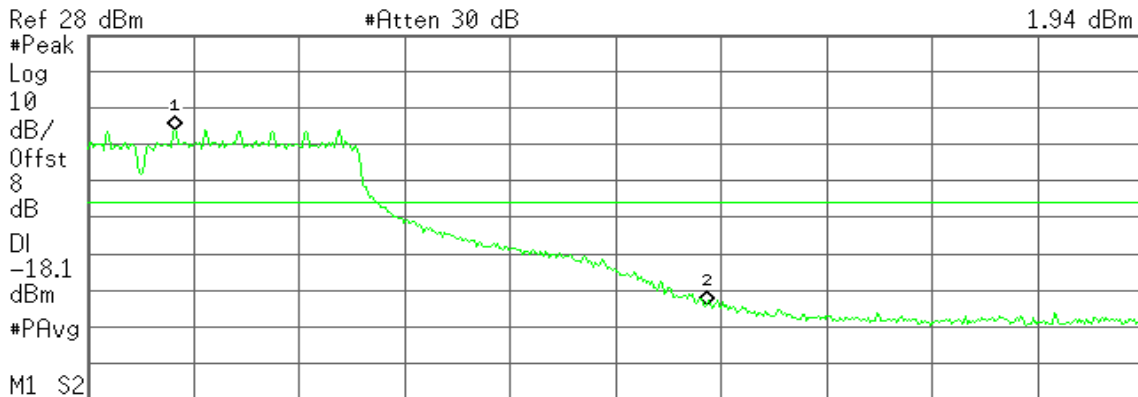
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.400 00 GHz	-29.03 dBm
2	(1)	Freq	2.413 25 GHz	2.12 dBm

Conducted Band Edges (IEEE 802.11g mode / CH High)

Agilent

R L

Mkr1 2.463 27 GHz
1.94 dBm



Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.463 27 GHz	1.94 dBm
2	(1)	Freq	2.483 50 GHz	-46.04 dBm



Conducted Band Edges (IEEE 802.11n HT20 mode / CH Low)

Agilent

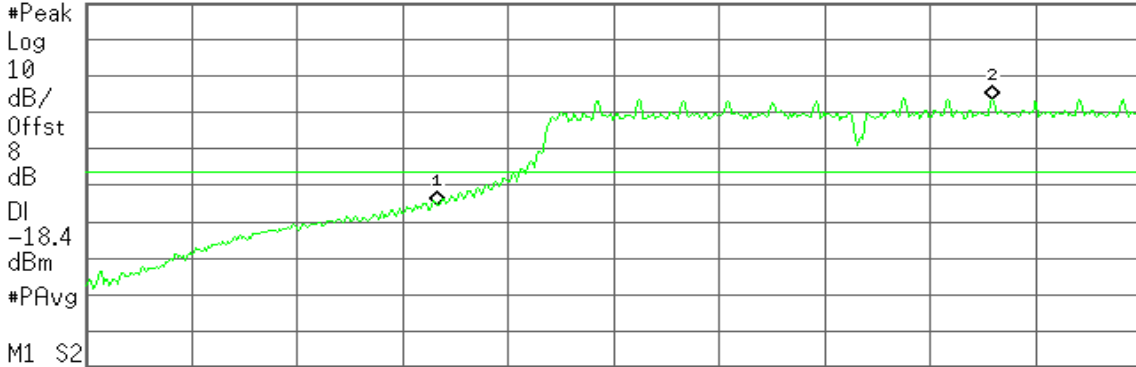
R T

Mkr2 2.415 75 GHz

1.65 dBm

Ref 28 dBm

#Atten 30 dB



Start 2.390 00 GHz

Stop 2.420 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 3.64 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.400 00 GHz	-27.40 dBm
2	(1)	Freq	2.415 75 GHz	1.65 dBm

Conducted Band Edges (IEEE 802.11n HT20 mode / CH High)

Agilent

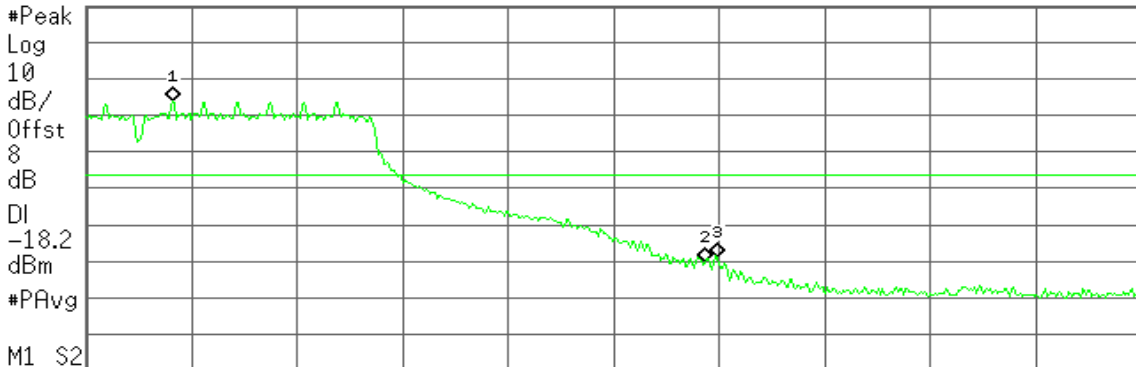
R L

Mkr1 2.463 27 GHz

1.84 dBm

Ref 28 dBm

#Atten 30 dB



Start 2.460 00 GHz

Stop 2.500 00 GHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 4.84 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.463 27 GHz	1.84 dBm
2	(1)	Freq	2.483 50 GHz	-41.92 dBm
3	(1)	Freq	2.483 93 GHz	-40.67 dBm

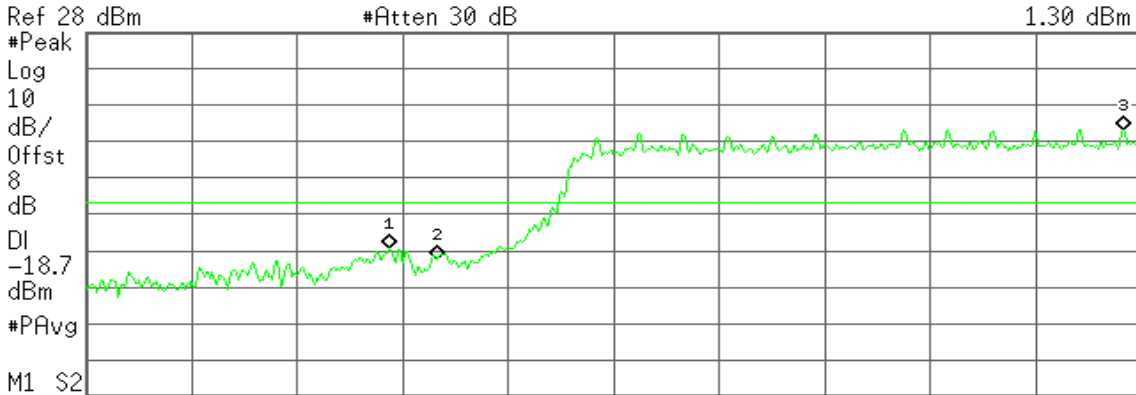


Conducted Band Edges (IEEE 802.11n HT40 mode / CH Low)

Agilent

R L

Mkr3 2.419 50 GHz
1.30 dBm



Ref 28 dBm #Atten 30 dB M1 S2
Start 2.390 00 GHz Stop 2.420 00 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.64 ms (601 pts)

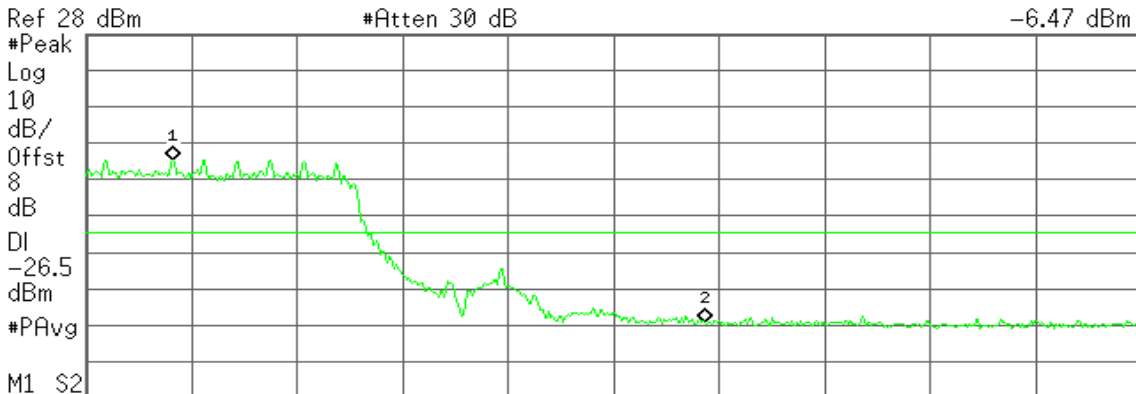
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.398 60 GHz	-31.12 dBm
2	(1)	Freq	2.400 00 GHz	-34.42 dBm
3	(1)	Freq	2.419 50 GHz	1.30 dBm

Conducted Band Edges (IEEE 802.11n HT40 mode / CH High)

Agilent

R T

Mkr1 2.463 27 GHz
-6.47 dBm



Ref 28 dBm #Atten 30 dB M1 S2
Start 2.460 00 GHz Stop 2.500 00 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 4.84 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.463 27 GHz	-6.47 dBm
2	(1)	Freq	2.483 50 GHz	-51.09 dBm

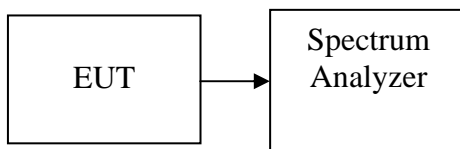


7.5 PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, 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.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

Test Configuration



TEST PROCEDURE

Per KDB 558074 v03r01

This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW \geq 3 kHz.
4. Set the VBW \geq 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

TEST RESULTS

No non-compliance noted



Test Data

Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	1.79	8.00	PASS
Mid	2437	1.44		PASS
High	2462	-0.15		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-14.15	8.00	PASS
Mid	2437	-13.76		PASS
High	2462	-13.41		PASS

Test mode: IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-13.51	8.00	PASS
Mid	2437	-13.54		PASS
High	2462	-13.08		PASS

Test mode: IEEE 802.11n HT40 mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-13.05	8.00	PASS
Mid	2437	-11.88		PASS
High	2452	-19.86		PASS



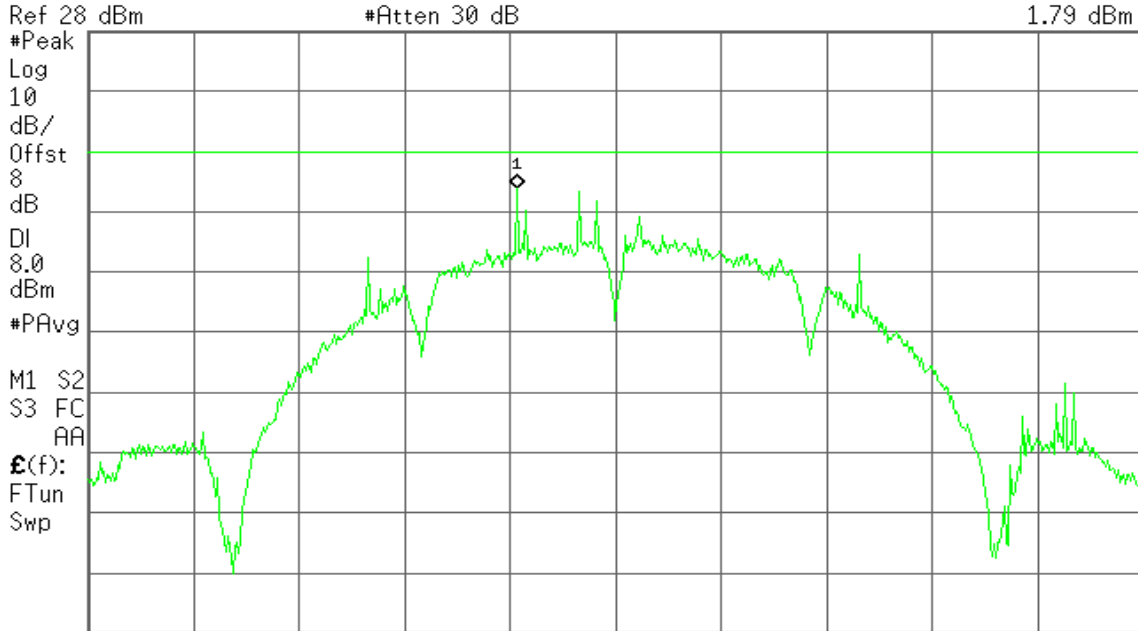
Test Plot

**IEEE 802.11b mode
PPSD (CH Low)**

Agilent

R L

Mkr1 2.409 20 GHz
1.79 dBm



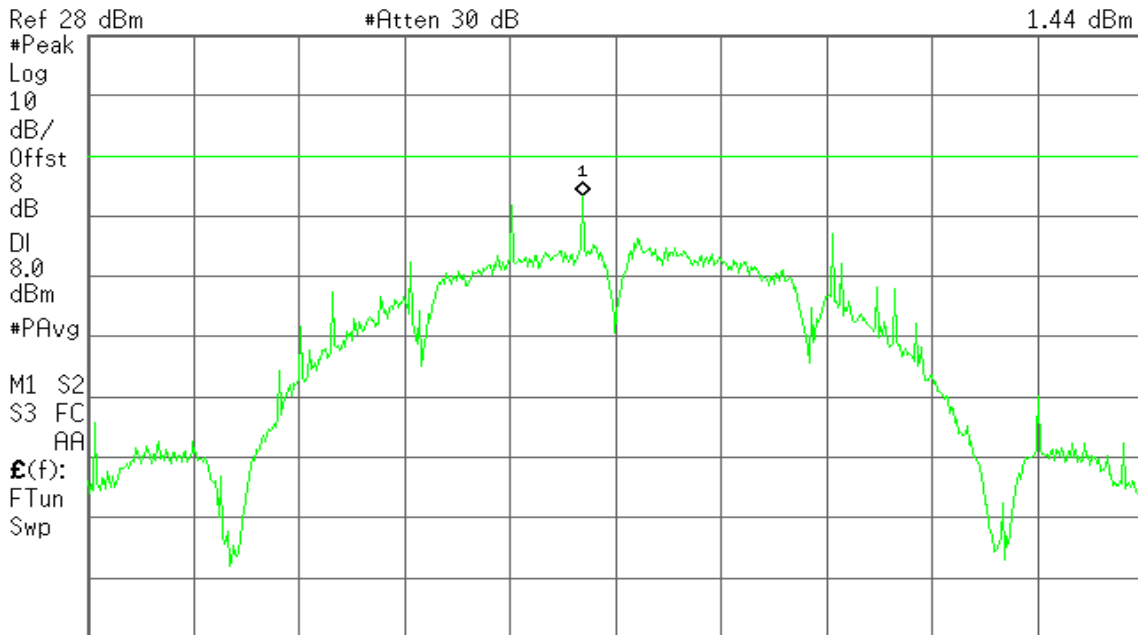
Center 2.412 00 GHz #Res BW 3 kHz #VBW 10 kHz Sweep 3.163 s (601 pts) Span 30 MHz

PPSD (CH Mid)

Agilent

R T

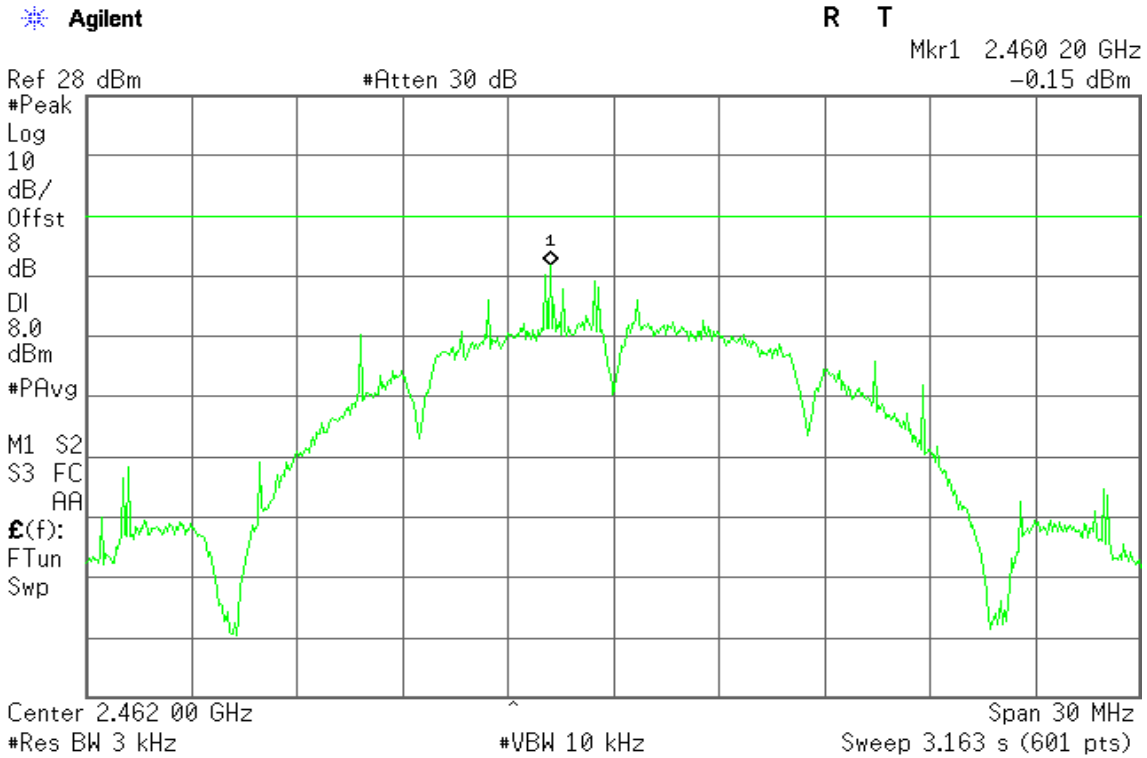
Mkr1 2.436 05 GHz
1.44 dBm



Center 2.437 00 GHz #Res BW 3 kHz #VBW 10 kHz Sweep 3.163 s (601 pts) Span 30 MHz

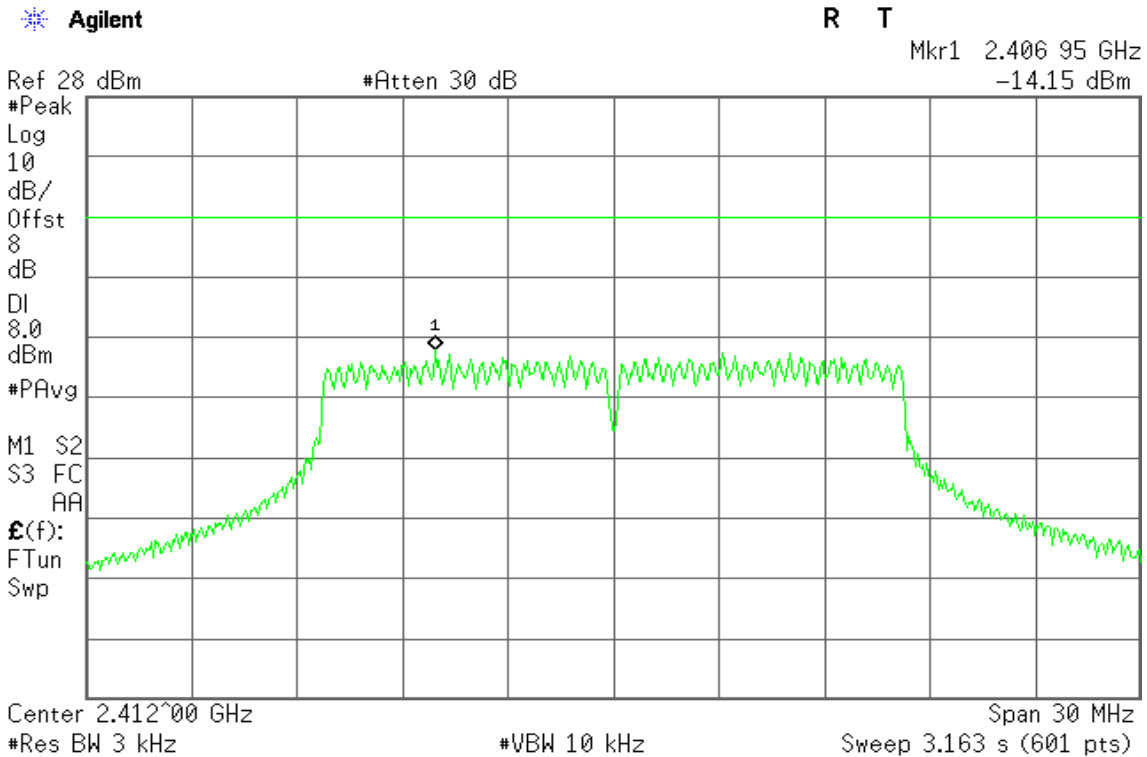


PPSD (CH High)



IEEE 802.11g mode

PPSD (CH Low)



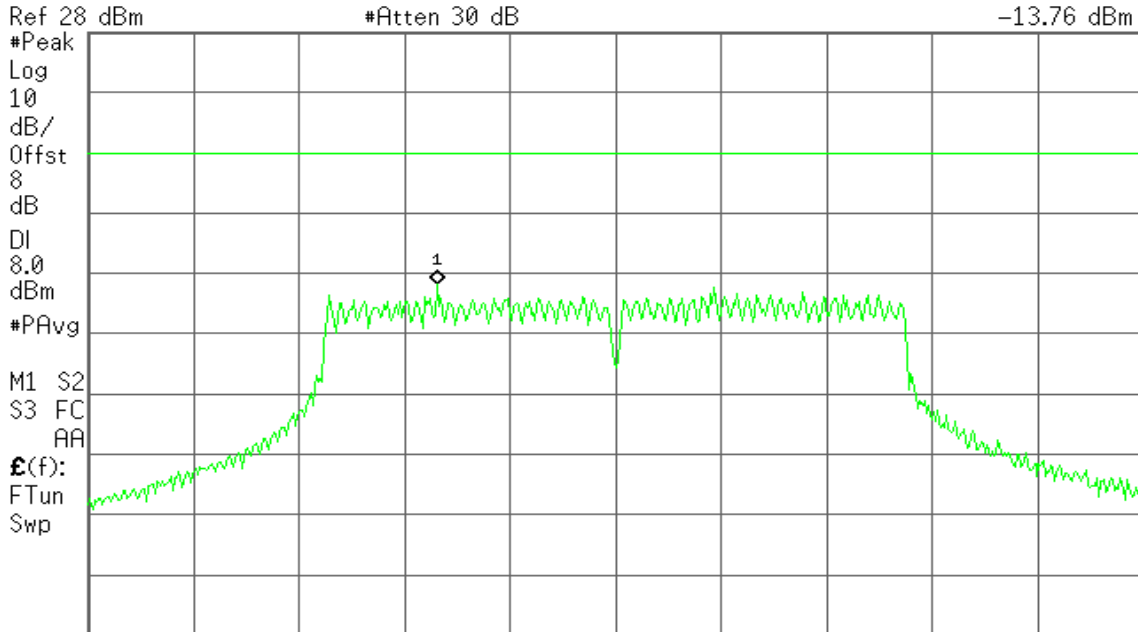


PPSD (CH Mid)

Agilent

R T

Mkr1 2.431 95 GHz
-13.76 dBm



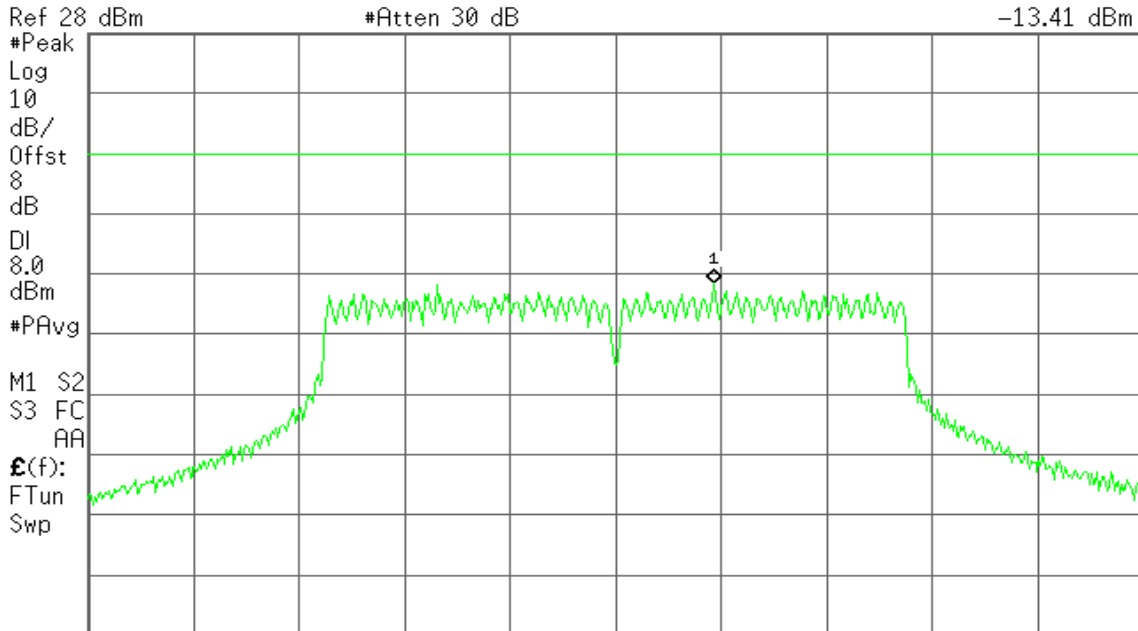
Ref 28 dBm #Atten 30 dB
Center 2.437 00 GHz Span 30 MHz
#Res BW 3 kHz #VBW 10 kHz Sweep 3.163 s (601 pts)

PPSD (CH High)

Agilent

R T

Mkr1 2.464 80 GHz
-13.41 dBm



Ref 28 dBm #Atten 30 dB
Center 2.462 00 GHz Span 30 MHz
#Res BW 3 kHz #VBW 10 kHz Sweep 3.163 s (601 pts)



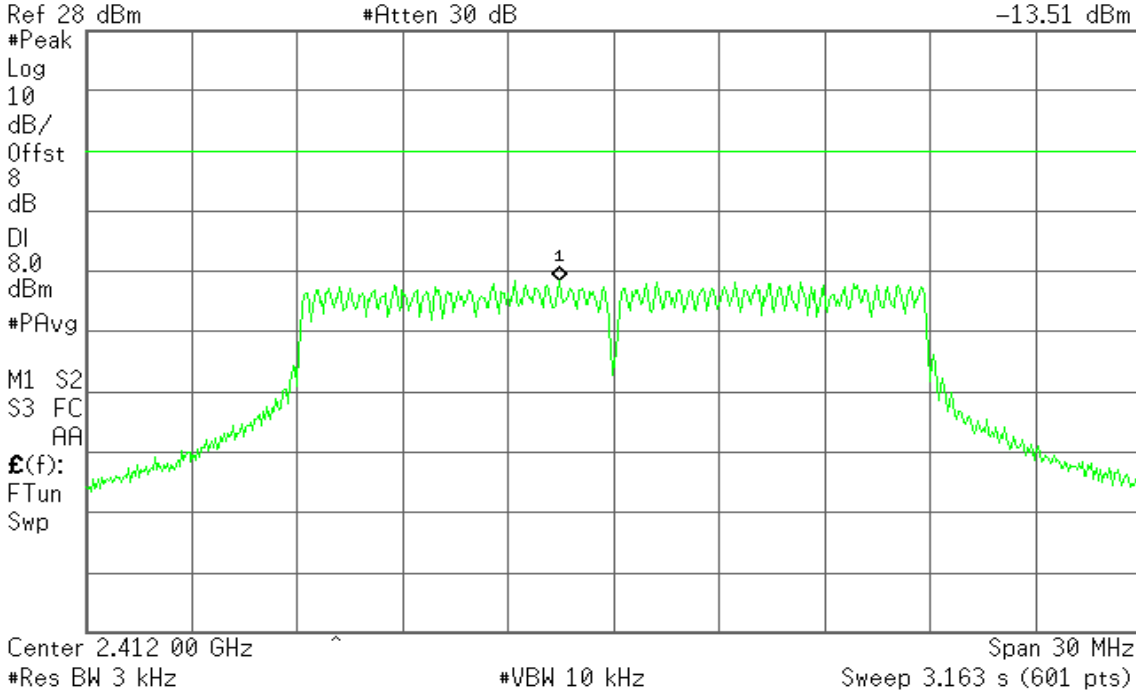
IEEE 802.11n HT20 mode

PPSD (CH Low)

Agilent

R L

Mkr1 2.410 45 GHz
-13.51 dBm

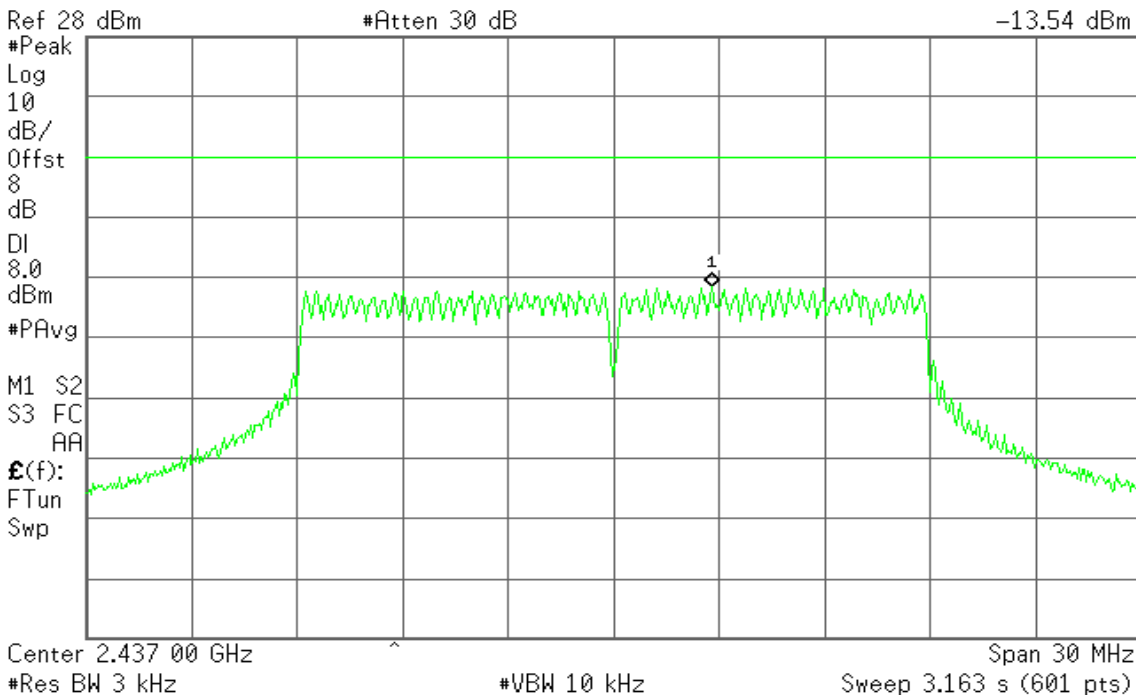


PPSD (CH Mid)

Agilent

R L

Mkr1 2.439 80 GHz
-13.54 dBm



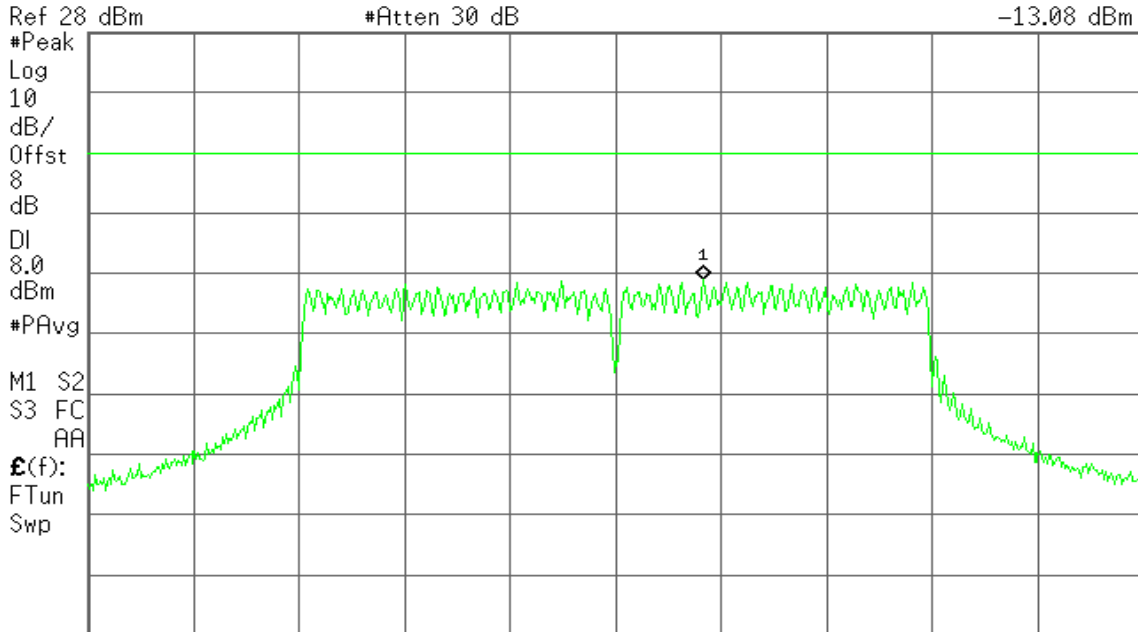


PPSD (CH High)

Agilent

R T

Mkr1 2.464 50 GHz
-13.08 dBm



Center 2.462 00 GHz Span 30 MHz
#Res BW 3 kHz #VBW 10 kHz Sweep 3.163 s (601 pts)

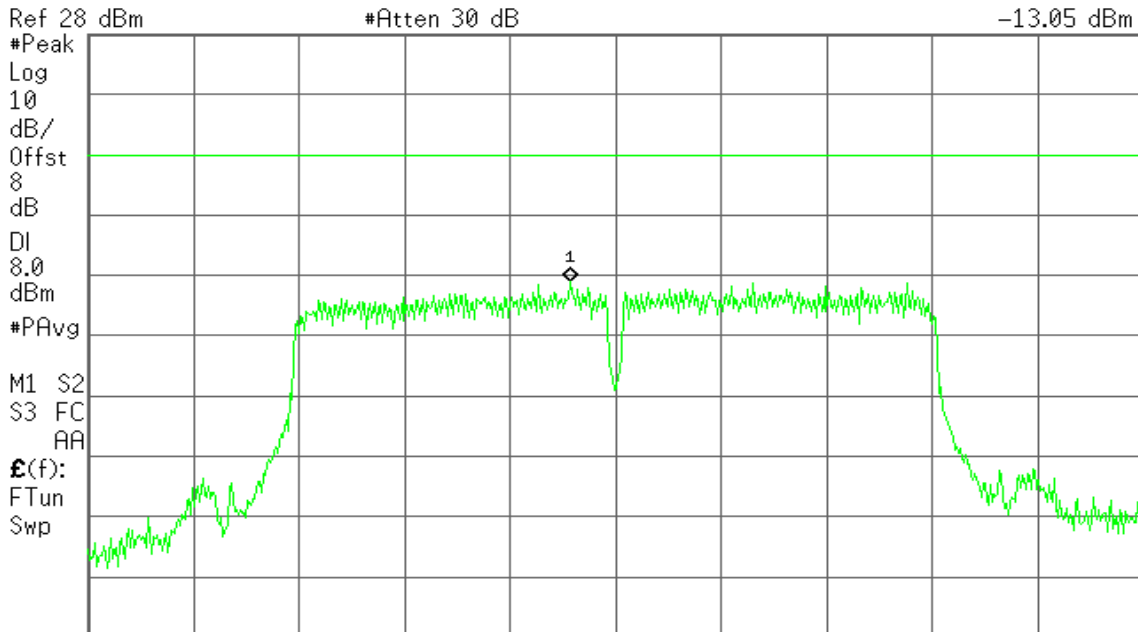
IEEE 802.11n HT40 mode

PPSD (CH Low)

Agilent

R L

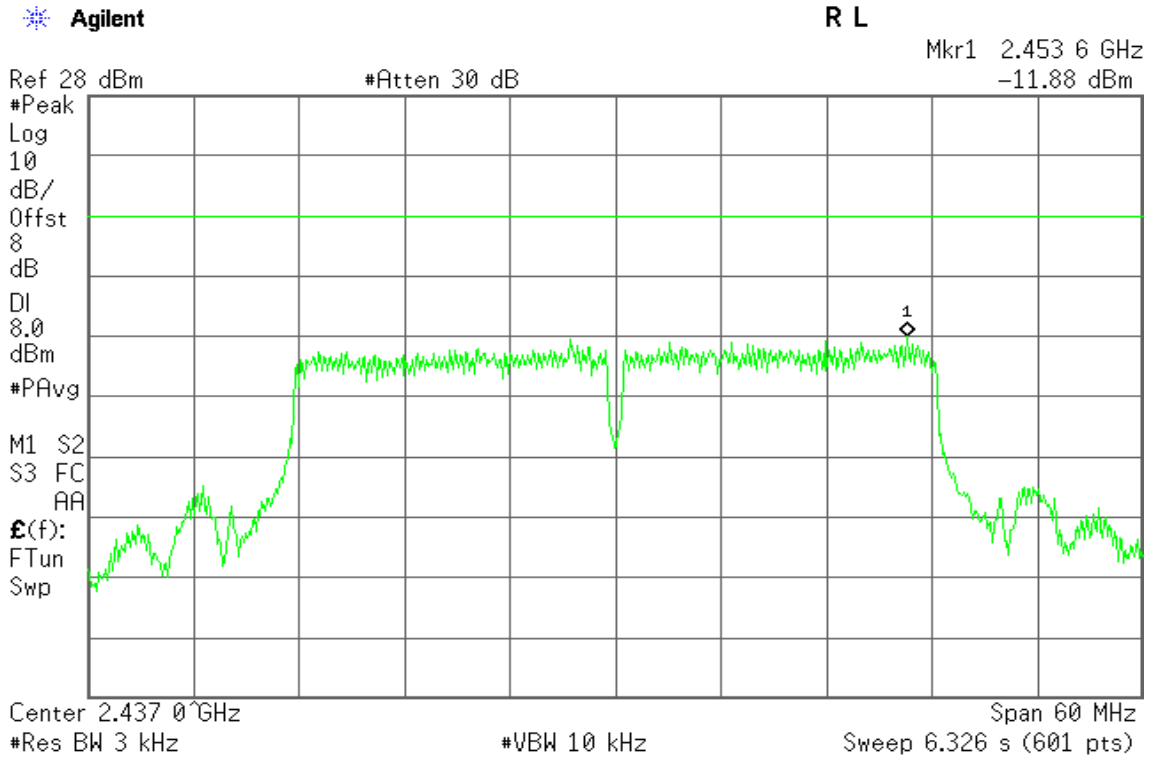
Mkr1 2.419 4 GHz
-13.05 dBm



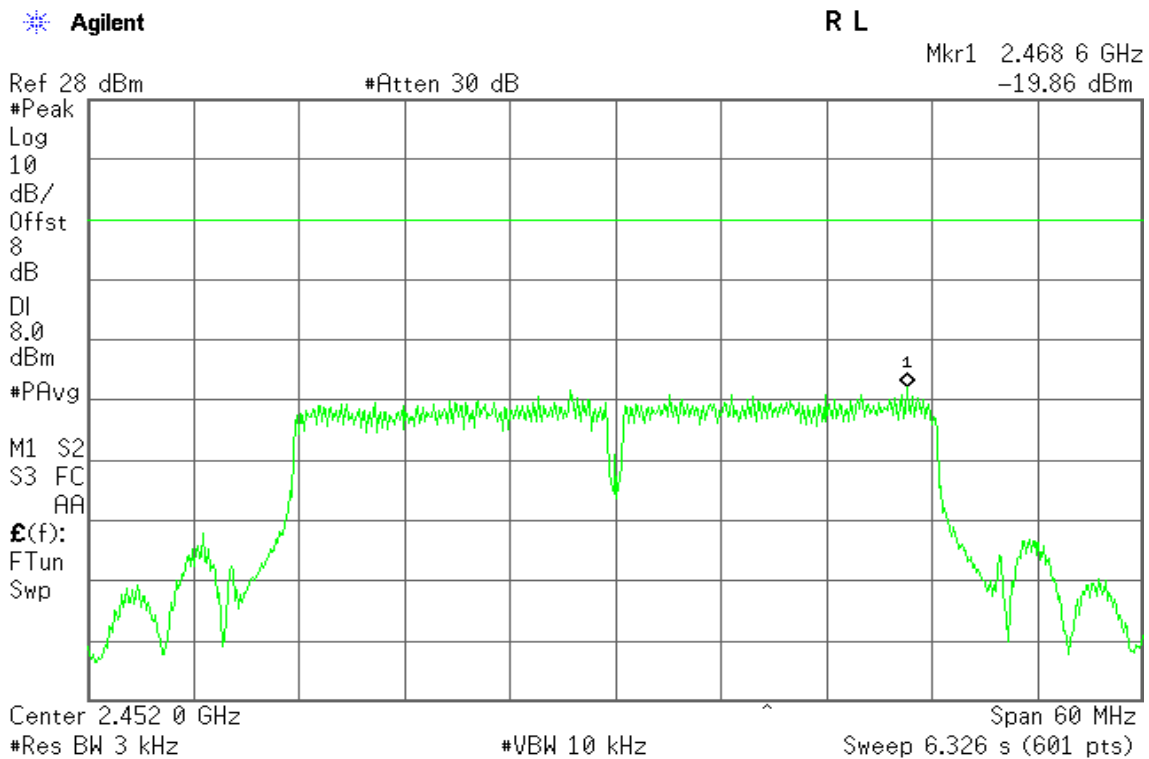
Center 2.422 0 GHz Span 60 MHz
#Res BW 3 kHz #VBW 10 kHz Sweep 6.326 s (601 pts)



PPSD (CH Mid)



PPSD (CH High)





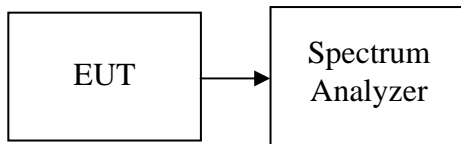
7.6 SPURIOUS EMISSIONS

7.6.1 Conducted Measurement

LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 26GHz range for IEEE 802.11b/g, 30MHz to 40GHz range for IEEE 802.11a with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted



Test Plot

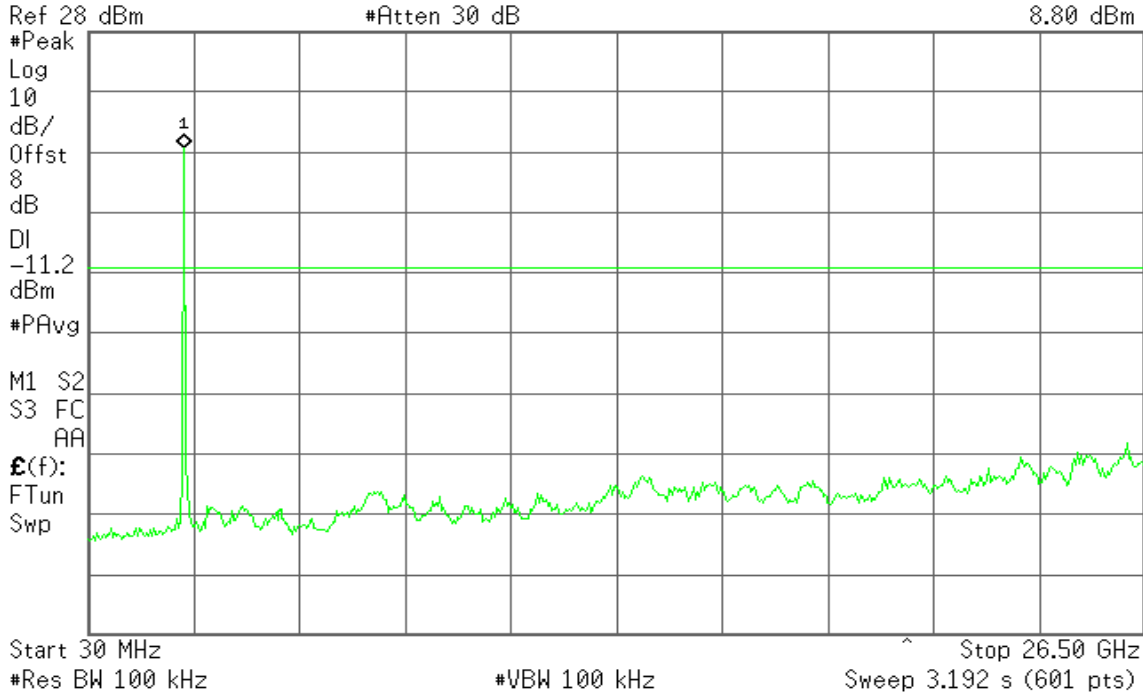
IEEE 802.11b mode

CH Low

Agilent

R L

Mkr1 2.41 GHz
8.80 dBm

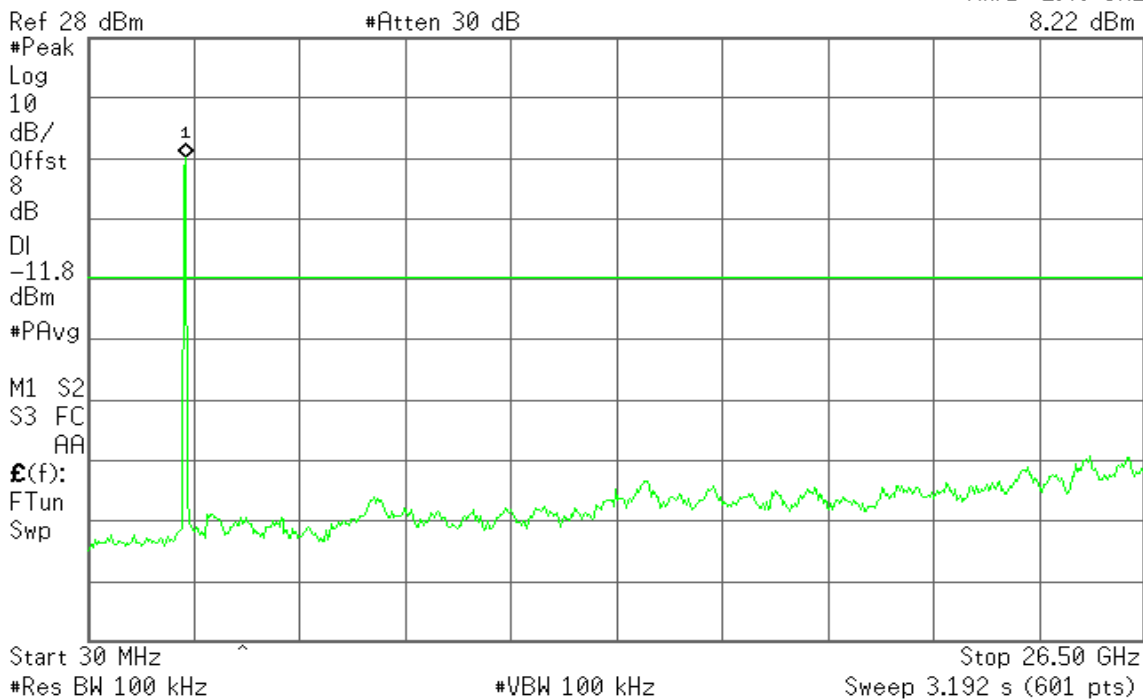


CH Mid

Agilent

R L

Mkr1 2.46 GHz
8.22 dBm



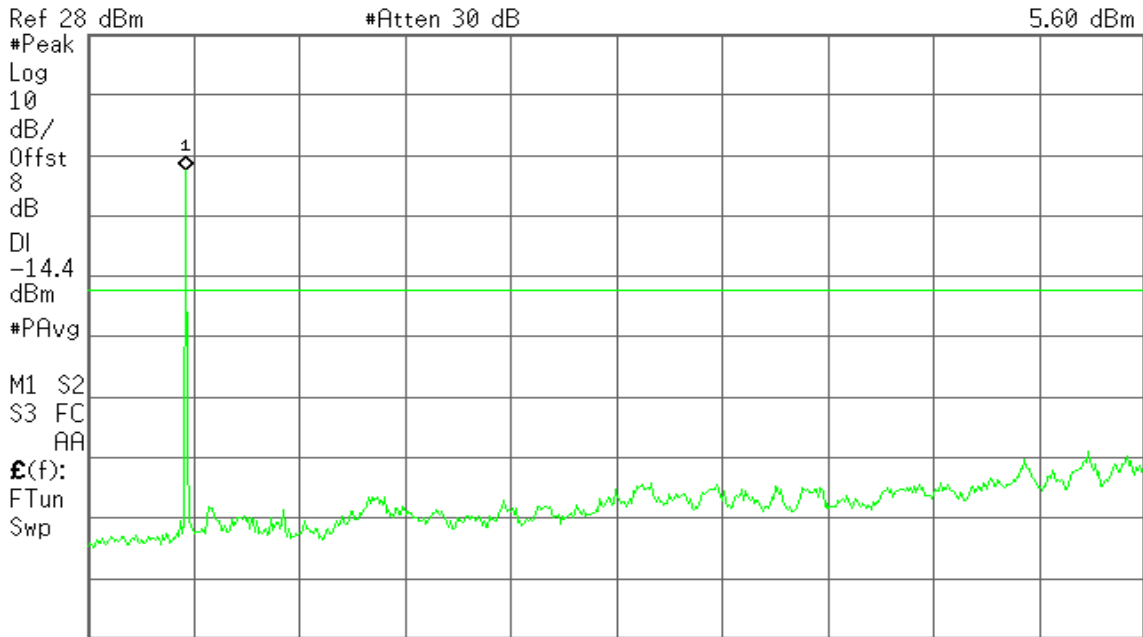


CH High

Agilent

R L T

Mkr1 2.46 GHz
5.60 dBm



Start 30 MHz Stop 26.50 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.192 s (601 pts)

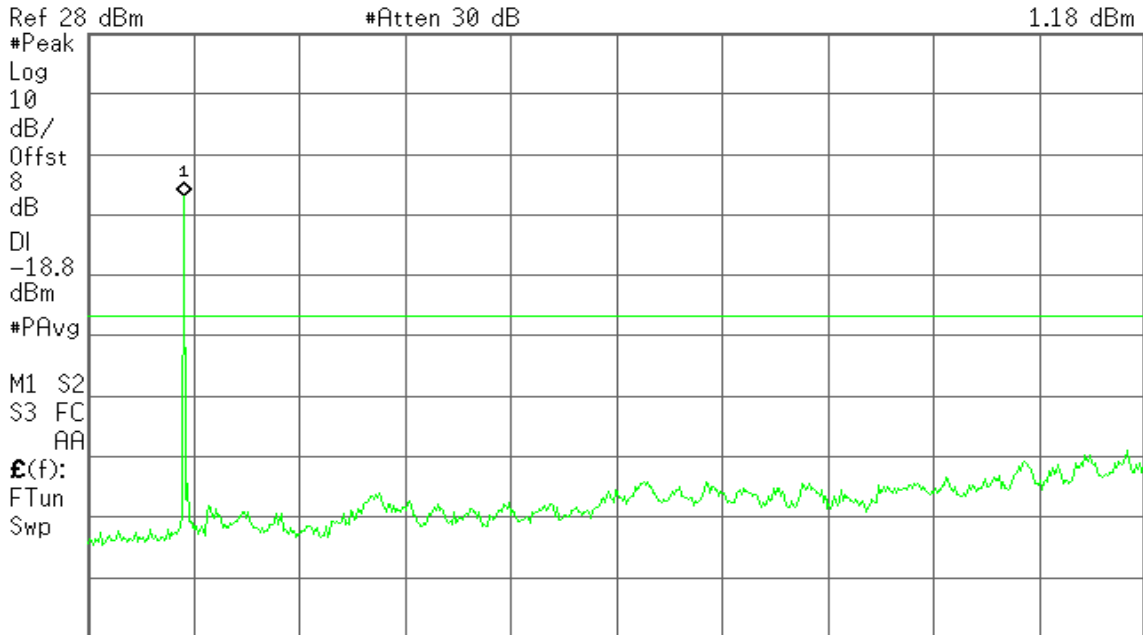
IEEE 802.11g mode

CH Low

Agilent

R L

Mkr1 2.41 GHz
1.18 dBm



Start 30 MHz ^ Stop 26.50 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.192 s (601 pts)

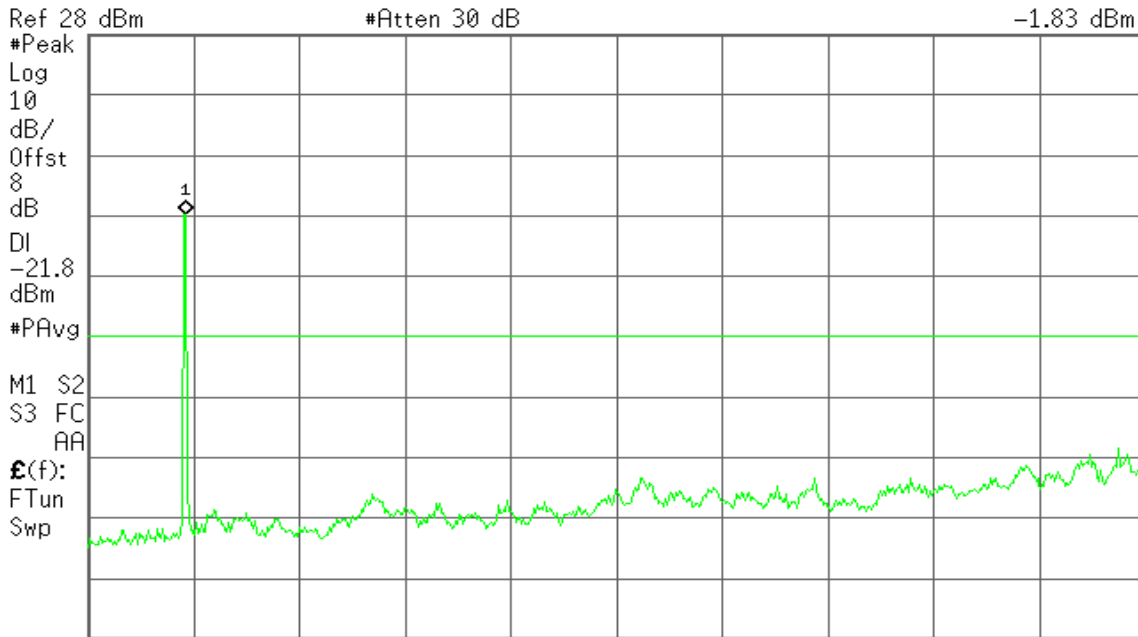


CH Mid

Agilent

R T

Mkr1 2.46 GHz
-1.83 dBm



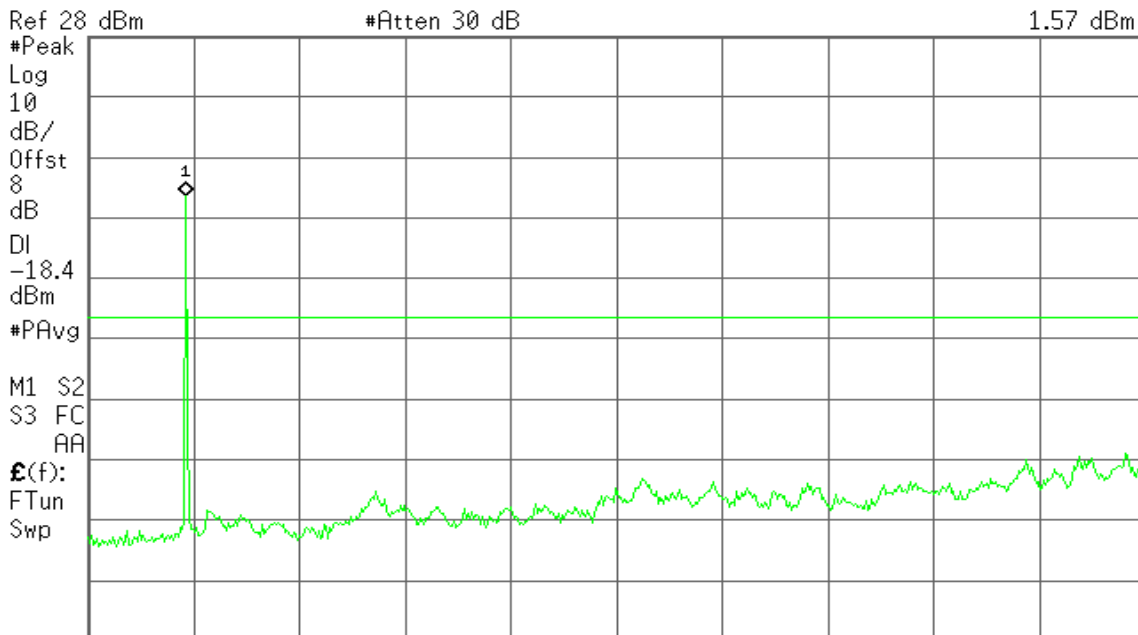
Start 30 MHz Stop 26.50 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.192 s (601 pts)

CH High

Agilent

R L

Mkr1 2.46 GHz
1.57 dBm



Start 30 MHz Stop 26.50 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.192 s (601 pts)



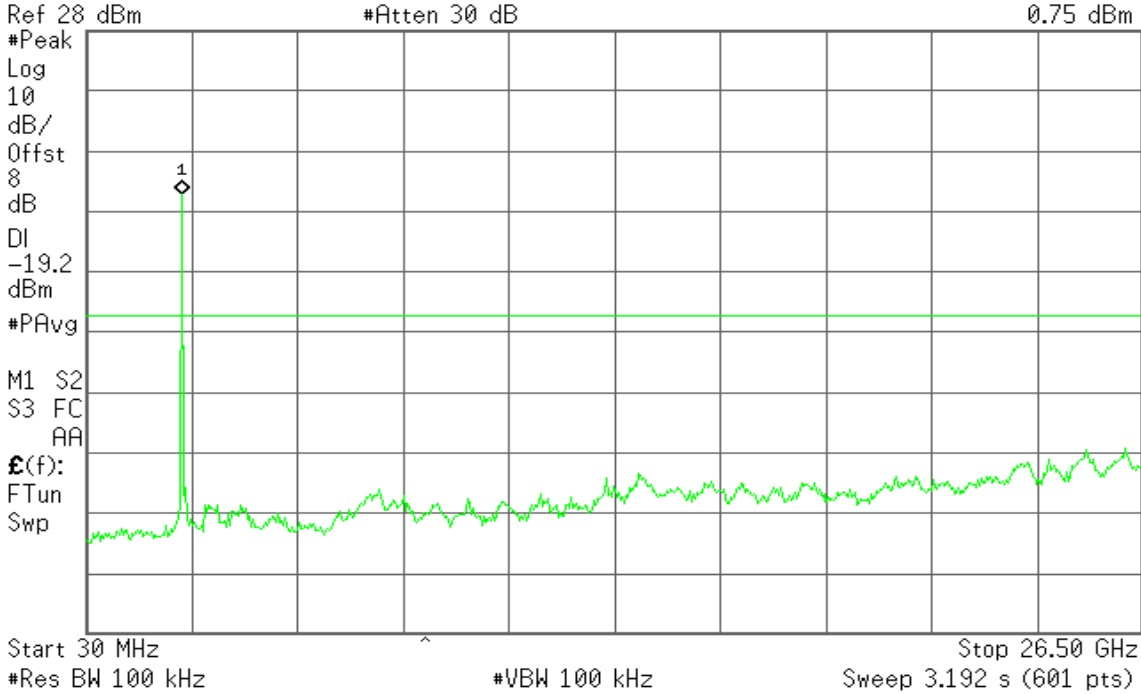
IEEE 802.11n HT20 mode

CH Low

Agilent

R L

Mkr1 2.41 GHz
0.75 dBm

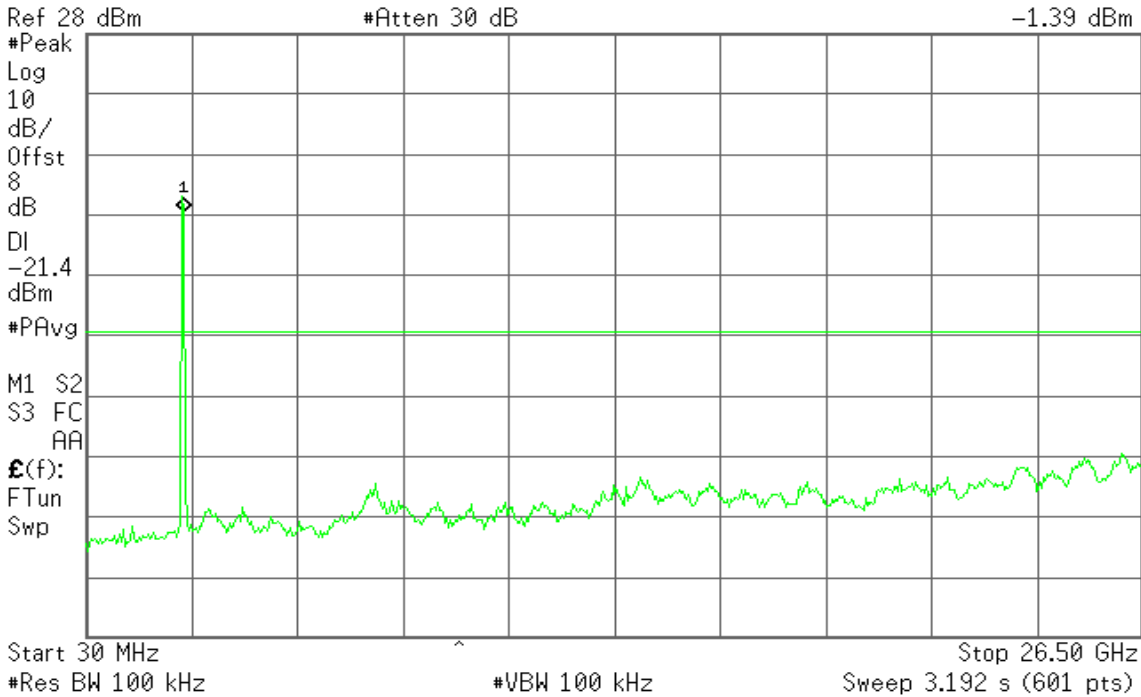


CH Mid

Agilent

R L

Mkr1 2.46 GHz
-1.39 dBm



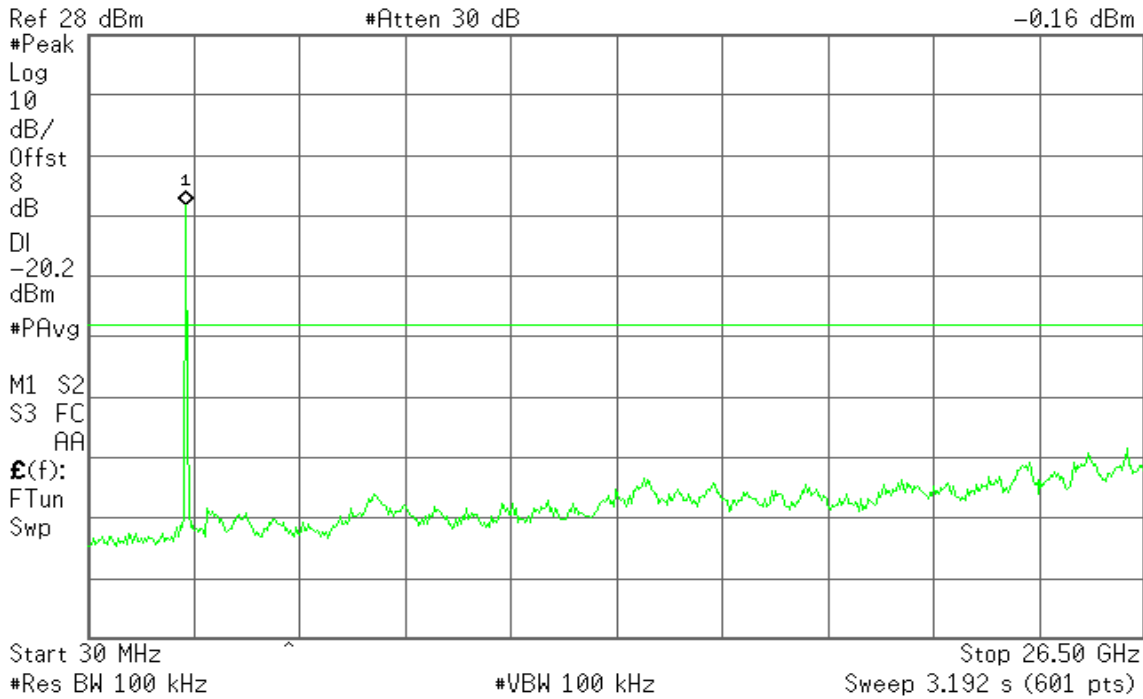


CH High

Agilent

R L

Mkr1 2.46 GHz
-0.16 dBm



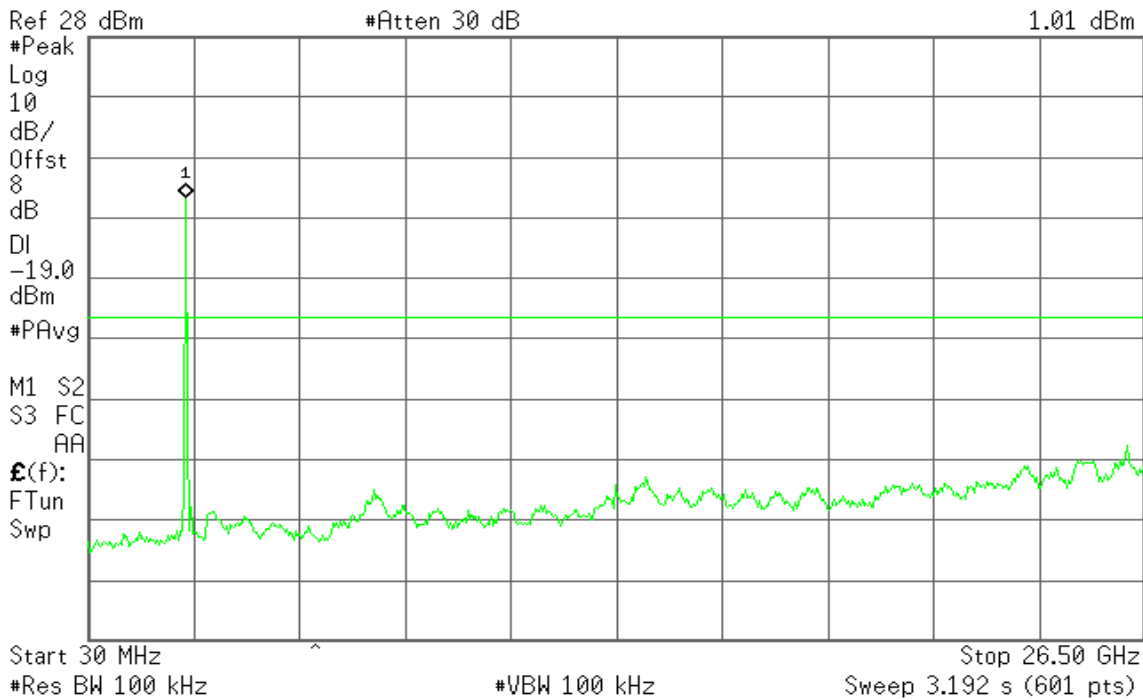
IEEE 802.11n HT40 mode

CH Low

Agilent

R T

Mkr1 2.46 GHz
1.01 dBm



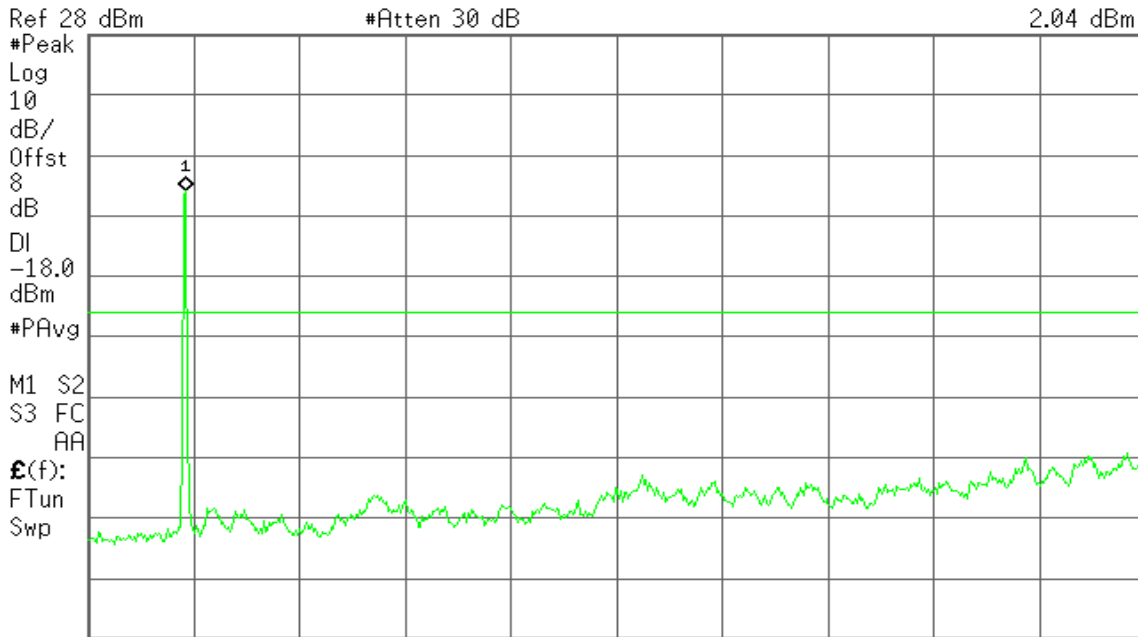


CH Mid

Agilent

R T

Mkr1 2.46 GHz
2.04 dBm



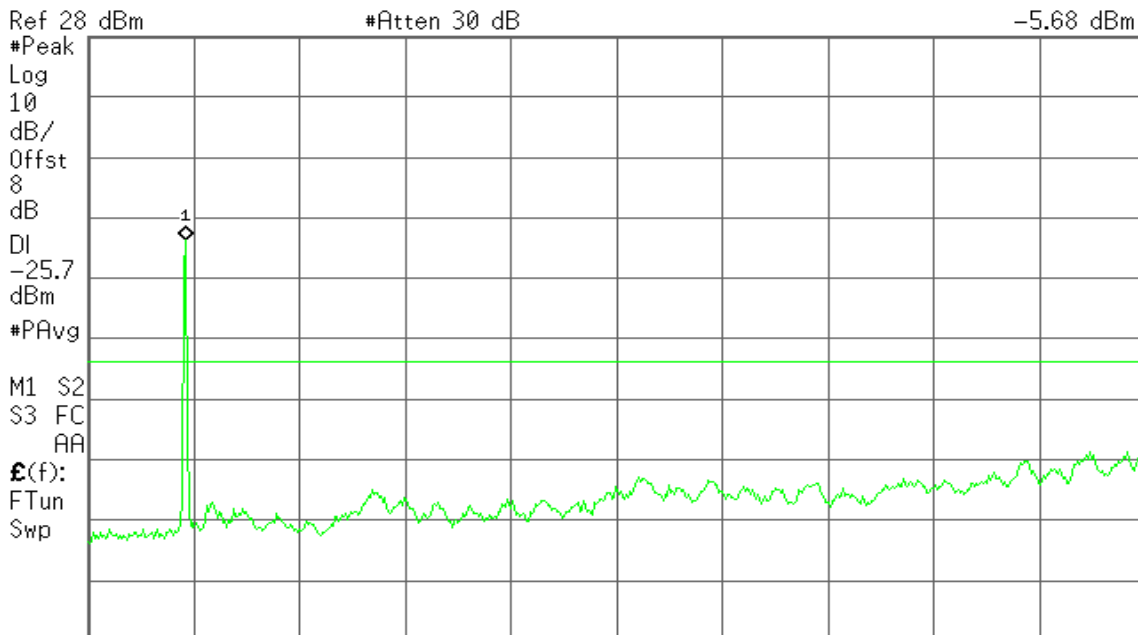
Start 30 MHz Stop 26.50 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.192 s (601 pts)

CH High

Agilent

R T

Mkr1 2.46 GHz
-5.68 dBm



Start 30 MHz Stop 26.50 GHz
#Res BW 100 kHz #VBW 100 kHz Sweep 3.192 s (601 pts)



7.6.2 Radiated Emissions

LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

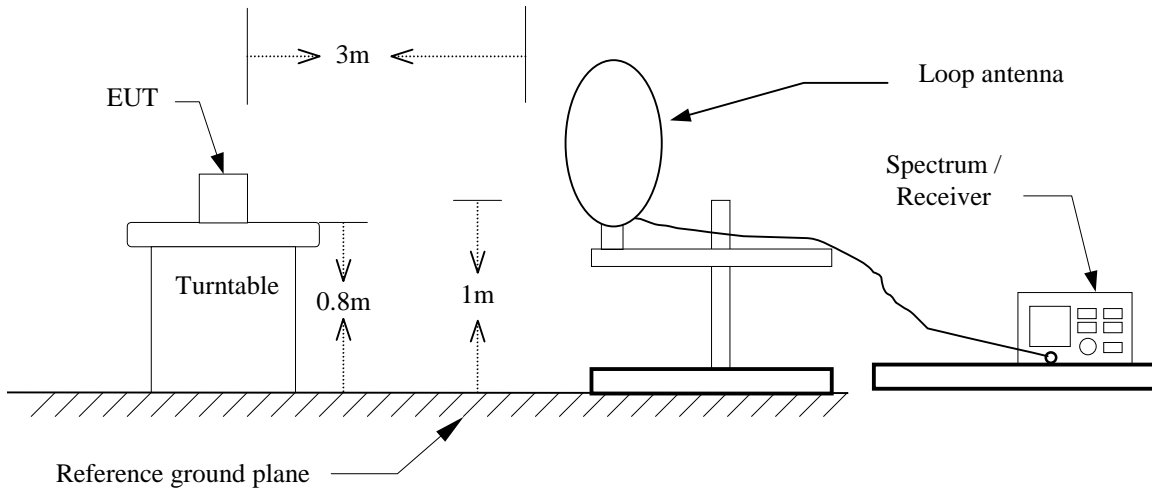
2. In the above emission table, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (µV/m at 3-meter)	Field Strength (dBµV/m at 3-meter)
0.009 - 0.490	2400/F(kHz) +80	20LOG((2400/F(kHz))+80)
0.490 - 1.705	24000/F(kHz) +40	20LOG((24000/F(kHz))+40)
1.705 – 30.0	30	69.54
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

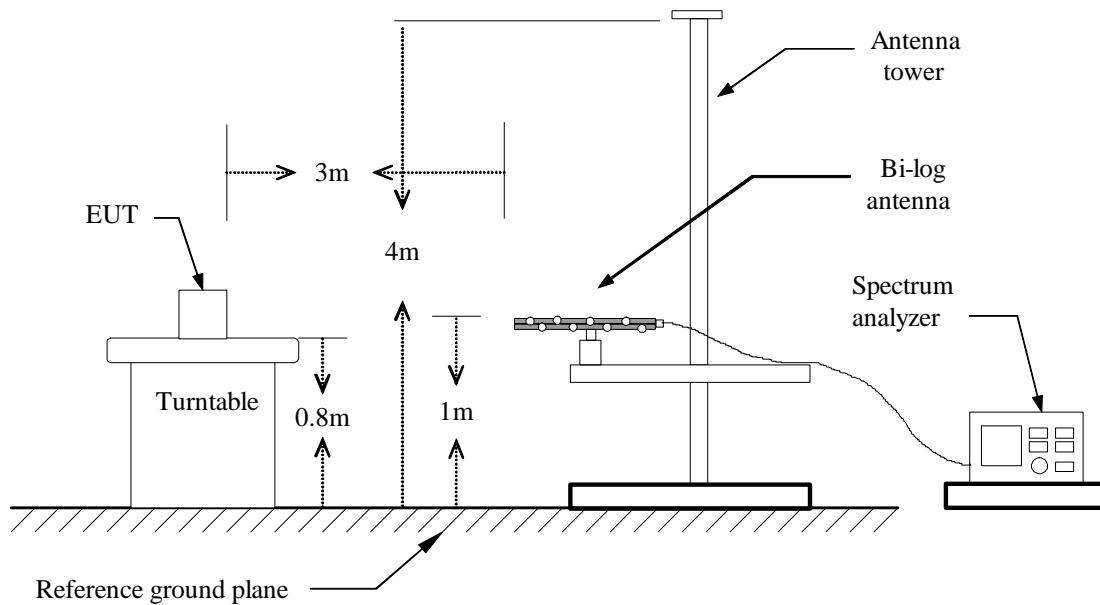


Test Configuration

9kHz ~ 30MHz

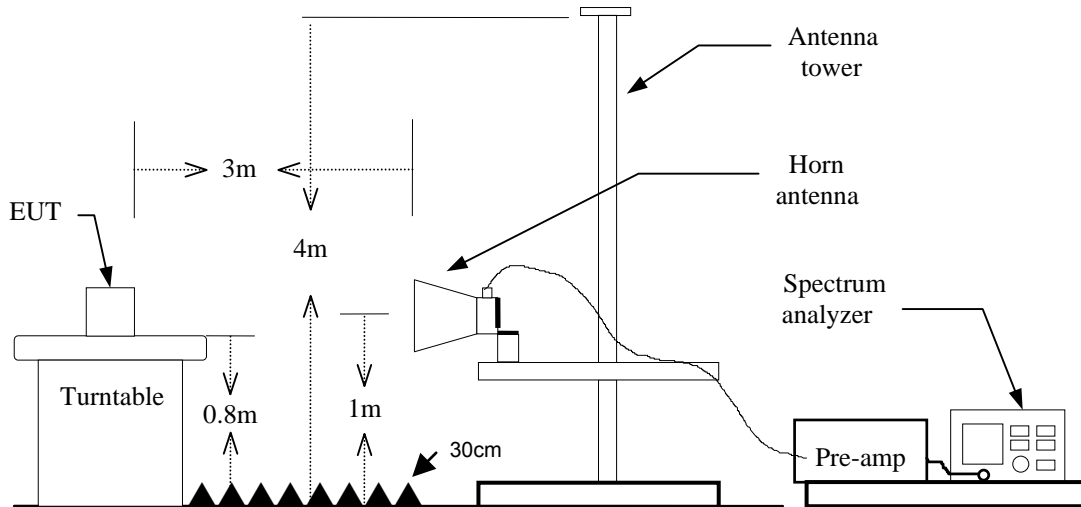


30MHz ~ 1GHz





Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 30MHz

RBW=10kHz / VBW=30kHz / Sweep=AUTO

30 ~ 1000MHz:

RBW=100kHz / VBW=300KHz / Sweep=AUTO

Above 1GHz:

- a) PEAK: RBW=1MHz / VBW=3MHz / Sweep=AUTO
- b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.



DATA SAMPLE

Below 1 GHz

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. (H/V)	Remark
x.xx	43.20	-20.71	22.49	40.00	-17.51	V	QP

Frequency (MHz) = Emission frequency in MHz
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading
 Correction Factor (dB/m) = Antenna factor – Amplifier gain + Cable loss
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
 Limit (dBuV/m) = Limit stated in standard
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)
 Q.P. = Quasi-Peak

Above 1 GHz

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. H/V	Remark
x.xx	45.25	6.91	52.16	74.00	-21.84	H	peak
x.xx	32.33	6.91	39.24	54.00	-14.76	H	AVG

Frequency (MHz) = Emission frequency in MHz
 Reading (dBuV) = Uncorrected Analyzer / Receiver reading
 Correction Factor (dB/m) = Antenna factor + Cable loss – Amplifier gain
 Result (dBuV/m) = Reading (dBuV) + Corr. Factor (dB/m)
 Limit (dBuV/m) = Limit stated in standard
 Margin (dB) = Result (dBuV/m) – Limit (dBuV/m)



Below 1 GHz

Operation Mode: Normal Link **Test Date:** 2014/02/21
Temperature: 26°C **Tested by:** Francis Lee
Humidity: 56% RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol. (H/V)	Remark
98.8700	58.30	-16.68	41.62	43.50	-1.88	V	QP
250.1900	56.70	-13.48	43.22	46.00	-2.78	V	QP
262.8000	46.80	-12.68	34.12	46.00	-11.88	V	QP
487.8400	45.30	-9.40	35.90	46.00	-10.10	V	QP
500.4500	53.70	-9.24	44.46	46.00	-1.54	V	QP
749.7400	42.60	-6.14	36.46	46.00	-9.54	V	QP
98.8700	49.70	-16.68	33.02	43.50	-10.48	H	QP
250.1900	56.20	-13.48	42.72	46.00	-3.28	H	QP
262.8000	53.40	-12.68	40.72	46.00	-5.28	H	QP
299.6600	50.80	-12.49	38.31	46.00	-7.69	H	QP
299.6600	52.00	-12.49	39.51	46.00	-6.49	H	QP
500.4500	53.70	-9.24	44.46	46.00	-1.54	H	QP
749.7400	50.60	-6.14	44.46	46.00	-1.54	H	QP

Remark:

1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).



Above 1 GHz

Operation Mode: TX / IEEE 802.11b mode / CH Low **Test Date:** 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1514.000	53.85	-5.19	48.66	74.00	-25.34	V	peak
2006.000	53.25	-1.44	51.81	74.00	-22.19	V	peak
2500.000	59.04	-0.93	58.11	74.00	-15.89	V	peak
2500.000	49.72	-0.93	48.79	54.00	-5.21	V	AVG
2700.000	54.36	-1.47	52.89	74.00	-21.11	V	peak
2700.000	42.56	-1.47	41.09	54.00	-12.91	V	AVG
2890.000	53.87	-0.80	53.07	74.00	-20.93	V	peak
2890.000	41.50	-0.80	40.70	54.00	-13.30	V	AVG
3835.000	41.53	2.91	44.44	74.00	-29.56	V	peak
4825.000	45.39	2.68	48.07	74.00	-25.93	V	peak
7235.000	41.13	10.21	51.34	74.00	-22.66	V	peak
1422.000	53.65	-7.36	46.29	74.00	-27.71	H	peak
2124.000	54.26	-3.73	50.53	74.00	-23.47	H	peak
2718.000	54.39	-3.21	51.18	74.00	-22.82	H	peak
3555.000	42.32	3.14	45.46	74.00	-28.54	H	peak
4825.000	42.29	5.88	48.17	74.00	-25.83	H	peak
7705.000	39.72	9.09	48.81	74.00	-25.19	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11b mode / CH Mid **Test Date:** 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1606.000	53.72	-4.84	48.88	74.00	-25.12	V	peak
1936.000	53.89	-2.31	51.58	74.00	-22.42	V	peak
2500.000	59.43	-0.93	58.50	74.00	-15.50	V	peak
2500.000	53.51	-0.93	52.58	54.00	-1.42	V	AVG
2926.000	53.94	-0.82	53.12	74.00	-20.88	V	peak
2926.000	42.50	-0.82	41.68	54.00	-12.32	V	AVG
3680.000	42.26	2.56	44.82	74.00	-29.18	V	peak
4875.000	45.86	3.81	49.67	74.00	-24.33	V	peak
7760.000	39.48	10.97	50.45	74.00	-23.55	V	peak
1396.000	53.67	-7.00	46.67	74.00	-27.33	H	peak
2180.000	53.48	-3.60	49.88	74.00	-24.12	H	peak
2726.000	53.64	-3.14	50.50	74.00	-23.50	H	peak
4330.000	41.71	7.44	49.15	74.00	-24.85	H	peak
4875.000	42.51	6.73	49.24	74.00	-24.76	H	peak
7525.000	39.51	10.82	50.33	74.00	-23.67	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode:TX / IEEE 802.11b mode / CH High Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1510.000	53.45	-5.21	48.24	74.00	-25.76	V	peak
2286.000	54.70	-1.52	53.18	74.00	-20.82	V	peak
2286.000	44.98	-1.52	43.46	54.00	-10.54	V	AVG
2614.000	56.08	-2.07	54.01	74.00	-19.99	V	peak
2614.000	43.72	-2.07	41.65	54.00	-12.35	V	AVG
2894.000	53.64	-0.75	52.89	74.00	-21.11	V	peak
2894.000	42.51	-0.75	41.76	54.00	-12.24	V	AVG
3640.000	42.14	2.75	44.89	74.00	-29.11	V	peak
4925.000	43.09	4.61	47.70	74.00	-26.30	V	peak
7400.000	39.18	11.30	50.48	74.00	-23.52	V	peak
1396.000	54.21	-7.00	47.21	74.00	-26.79	H	peak
2172.000	53.67	-3.62	50.05	74.00	-23.95	H	peak
2770.000	53.55	-2.75	50.80	74.00	-23.20	H	peak
4270.000	40.41	7.16	47.57	74.00	-26.43	H	peak
4925.000	41.49	7.26	48.75	74.00	-25.25	H	peak
7530.000	39.33	10.80	50.13	74.00	-23.87	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode:TX / IEEE 802.11g mode / CH Low Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1530.000	53.71	-5.12	48.59	74.00	-25.41	V	peak
1968.000	54.62	-1.81	52.81	74.00	-21.19	V	peak
1968.000	42.90	-1.81	41.09	54.00	-12.91	V	AVG
2286.000	55.53	-1.52	54.01	74.00	-19.99	V	peak
2286.000	44.42	-1.52	42.90	54.00	-11.10	V	AVG
2500.000	59.70	-0.93	58.77	74.00	-15.23	V	peak
2500.000	52.91	-0.93	51.98	54.00	-2.02	V	AVG
2792.000	54.53	-2.05	52.48	74.00	-21.52	V	peak
2792.000	43.22	-2.05	41.17	54.00	-12.83	V	AVG
3635.000	41.66	2.77	44.43	74.00	-29.57	V	peak
4825.000	42.45	2.68	45.13	74.00	-28.87	V	peak
7425.000	39.83	11.36	51.19	74.00	-22.81	V	peak
1398.000	53.68	-6.95	46.73	74.00	-27.27	H	peak
2166.000	54.13	-3.63	50.50	74.00	-23.50	H	peak
2782.000	53.51	-2.64	50.87	74.00	-23.13	H	peak
3850.000	41.69	5.16	46.85	74.00	-27.15	H	peak
5510.000	39.32	8.89	48.21	74.00	-25.79	H	peak
7130.000	40.06	10.40	50.46	74.00	-23.54	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode:TX / IEEE 802.11g mode / CH Mid Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1508.000	54.01	-5.22	48.79	74.00	-25.21	V	peak
1986.000	53.73	-1.52	52.21	74.00	-21.79	V	peak
1986.000	46.60	-1.52	45.08	54.00	-8.92	V	AVG
2356.000	55.81	-1.62	54.19	74.00	-19.81	V	peak
2356.000	46.87	-1.62	45.25	54.00	-8.75	V	AVG
2500.000	59.34	-0.93	58.41	74.00	-15.59	V	peak
2500.000	53.55	-0.93	52.62	54.00	-1.38	V	AVG
2728.000	55.54	-1.65	53.89	74.00	-20.11	V	peak
2728.000	44.16	-1.65	42.51	54.00	-11.49	V	AVG
3625.000	41.84	2.82	44.66	74.00	-29.34	V	peak
5200.000	40.61	5.54	46.15	74.00	-27.85	V	peak
7590.000	38.44	11.87	50.31	74.00	-23.69	V	peak
1386.000	53.77	-7.26	46.51	74.00	-27.49	H	peak
2114.000	54.38	-3.75	50.63	74.00	-23.37	H	peak
2818.000	54.24	-2.34	51.90	74.00	-22.10	H	peak
4375.000	40.31	7.11	47.42	74.00	-26.58	H	peak
5625.000	39.69	8.92	48.61	74.00	-25.39	H	peak
6920.000	40.28	9.47	49.75	74.00	-24.25	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode:TX / IEEE 802.11g mode / CH High Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1484.000	54.35	-5.48	48.87	74.00	-25.13	V	peak
2002.000	54.02	-1.35	52.67	74.00	-21.33	V	peak
2002.000	42.82	-1.35	41.47	54.00	-12.53	V	AVG
2688.000	54.55	-1.55	53.00	74.00	-21.00	V	peak
2688.000	43.96	-1.55	42.41	54.00	-11.59	V	AVG
2914.000	53.44	-0.75	52.69	74.00	-21.31	V	peak
2914.000	42.91	-0.75	42.16	54.00	-11.84	V	AVG
3620.000	41.91	2.84	44.75	74.00	-29.25	V	peak
4925.000	40.72	4.61	45.33	74.00	-28.67	V	peak
7590.000	39.27	11.87	51.14	74.00	-22.86	V	peak
1406.000	53.82	-7.03	46.79	74.00	-27.21	H	peak
2170.000	53.53	-3.63	49.90	74.00	-24.10	H	peak
2816.000	54.08	-2.36	51.72	74.00	-22.28	H	peak
4210.000	41.14	6.15	47.29	74.00	-26.71	H	peak
5635.000	38.91	8.81	47.72	74.00	-26.28	H	peak
7385.000	38.94	11.39	50.33	74.00	-23.67	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11n HT20 mode / CH Low

Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1380.000	54.38	-7.41	46.97	74.00	-27.03	V	peak
2168.000	53.49	-3.63	49.86	74.00	-24.14	V	peak
2500.000	59.44	-3.81	55.63	74.00	-18.37	V	peak
2500.000	53.42	-3.81	49.61	54.00	-4.39	V	AVG
2846.000	54.16	-2.13	52.03	74.00	-21.97	V	peak
2846.000	42.93	-2.13	40.80	54.00	-13.20	V	AVG
3665.000	41.03	2.63	43.66	74.00	-30.34	V	peak
5435.000	39.01	6.33	45.34	74.00	-28.66	V	peak
7500.000	39.30	11.54	50.84	74.00	-23.16	V	peak
1398.000	53.94	-6.95	46.99	74.00	-27.01	H	peak
2184.000	54.45	-3.60	50.85	74.00	-23.15	H	peak
2766.000	53.72	-2.78	50.94	74.00	-23.06	H	peak
3690.000	41.82	3.81	45.63	74.00	-28.37	H	peak
5570.000	39.08	9.10	48.18	74.00	-25.82	H	peak
7285.000	38.57	11.62	50.19	74.00	-23.81	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11n HT20 mode /
CH Mid

Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1522.000	54.24	-5.16	49.08	74.00	-24.92	V	peak
1984.000	53.08	-1.55	51.53	74.00	-22.47	V	peak
2314.000	55.42	-1.57	53.85	74.00	-20.15	V	peak
2314.000	45.09	-1.57	43.52	54.00	-10.48	V	AVG
2500.000	59.20	-0.93	58.27	74.00	-15.73	V	peak
2500.000	52.99	-0.93	52.06	54.00	-1.94	V	AVG
2866.000	53.93	-1.15	52.78	74.00	-21.22	V	peak
2866.000	43.17	-1.15	42.02	54.00	-11.98	V	AVG
3710.000	41.82	2.59	44.41	74.00	-29.59	V	peak
5000.000	40.20	5.32	45.52	74.00	-28.48	V	peak
7570.000	39.03	11.80	50.83	74.00	-23.17	V	peak
1368.000	53.99	-7.72	46.27	74.00	-27.73	H	peak
2154.000	54.10	-3.66	50.44	74.00	-23.56	H	peak
2658.000	54.20	-3.37	50.83	74.00	-23.17	H	peak
4335.000	39.22	7.40	46.62	74.00	-27.38	H	peak
5535.000	38.57	8.98	47.55	74.00	-26.45	H	peak
7400.000	39.36	11.31	50.67	74.00	-23.33	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11n HT20 mode / CH High

Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1538.000	53.90	-5.08	48.82	74.00	-25.18	V	peak
2010.000	53.98	-1.53	52.45	74.00	-21.55	V	peak
2010.000	42.93	-1.53	41.40	54.00	-12.60	V	AVG
2330.000	55.78	-1.59	54.19	74.00	-19.81	V	peak
2330.000	44.69	-1.59	43.10	54.00	-10.90	V	AVG
2736.000	55.56	-1.70	53.86	74.00	-20.14	V	peak
2736.000	42.18	-1.70	40.48	54.00	-13.52	V	AVG
3755.000	42.09	3.14	45.23	74.00	-28.77	V	peak
4925.000	41.66	4.61	46.27	74.00	-27.73	V	peak
7650.000	39.29	11.34	50.63	74.00	-23.37	V	peak
1412.000	53.97	-7.15	46.82	74.00	-27.18	H	peak
2162.000	53.86	-3.64	50.22	74.00	-23.78	H	peak
2682.000	53.94	-3.37	50.57	74.00	-23.43	H	peak
3855.000	40.15	5.17	45.32	74.00	-28.68	H	peak
4890.000	40.17	6.98	47.15	74.00	-26.85	H	peak
7390.000	38.76	11.36	50.12	74.00	-23.88	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11n HT40 mode / CH Low

Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1630.000	53.83	-5.04	48.79	74.00	-25.21	V	peak
2008.000	53.05	-1.48	51.57	74.00	-22.43	V	peak
2700.000	54.60	-1.47	53.13	74.00	-20.87	V	peak
2700.000	44.08	-1.47	42.61	54.00	-11.39	V	AVG
2890.000	53.92	-0.80	53.12	74.00	-20.88	V	peak
2890.000	42.95	-0.80	42.15	54.00	-11.85	V	AVG
3740.000	41.86	2.96	44.82	74.00	-29.18	V	peak
5000.000	40.11	5.32	45.43	74.00	-28.57	V	peak
7545.000	39.23	11.71	50.94	74.00	-23.06	V	peak
1422.000	54.41	-7.36	47.05	74.00	-26.95	H	peak
2168.000	54.58	-3.63	50.95	74.00	-23.05	H	peak
2748.000	53.77	-2.94	50.83	74.00	-23.17	H	peak
4300.000	39.40	7.66	47.06	74.00	-26.94	H	peak
5935.000	38.85	9.08	47.93	74.00	-26.07	H	peak
7095.000	39.31	10.25	49.56	74.00	-24.44	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11n HT40 mode / CH Mid

Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1574.000	53.77	-4.91	48.86	74.00	-25.14	V	peak
1990.000	53.80	-1.46	52.34	74.00	-21.66	V	peak
1990.000	42.87	-1.46	41.41	54.00	-12.59	V	AVG
2184.000	54.18	-1.69	52.49	74.00	-21.51	V	peak
2184.000	43.14	-1.69	41.45	54.00	-12.55	V	AVG
2704.000	55.31	-1.50	53.81	74.00	-20.19	V	peak
2704.000	44.38	-1.50	42.88	54.00	-11.12	V	AVG
3805.000	40.61	3.58	44.19	74.00	-29.81	V	peak
4875.000	42.02	3.81	45.83	74.00	-28.17	V	peak
7580.000	38.44	11.84	50.28	74.00	-23.72	V	peak
1756.000	54.91	-7.13	47.78	74.00	-26.22	H	peak
2128.000	53.83	-3.72	50.11	74.00	-23.89	H	peak
2758.000	53.48	-2.85	50.63	74.00	-23.37	H	peak
3770.000	41.50	4.70	46.20	74.00	-27.80	H	peak
5625.000	39.70	8.92	48.62	74.00	-25.38	H	peak
7325.000	38.31	11.69	50.00	74.00	-24.00	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



Operation Mode: TX / IEEE 802.11n HT40 mode / CH High

Test Date: 2014/02/17~18

Temperature: 26°C

Tested by: Francis Lee

Humidity: 56%RH

Polarity: Ver. / Hor.

Freq. (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Pol H/V	Remark
1532.000	53.56	-5.11	48.45	74.00	-25.55	V	peak
1984.000	53.49	-1.55	51.94	74.00	-22.06	V	peak
2514.000	63.34	-1.10	62.24	74.00	-11.76	V	peak
2514.000	53.80	-1.10	52.70	54.00	-1.30	V	AVG
2896.000	53.97	-0.72	53.25	74.00	-20.75	V	peak
2896.000	42.92	-0.72	42.20	54.00	-11.80	V	AVG
3600.000	41.58	2.93	44.51	74.00	-29.49	V	peak
5715.000	39.30	5.82	45.12	74.00	-28.88	V	peak
7585.000	39.14	11.85	50.99	74.00	-23.01	V	peak
1444.000	54.22	-7.82	46.40	74.00	-27.60	H	peak
2162.000	53.59	-3.64	49.95	74.00	-24.05	H	peak
2778.000	53.77	-2.68	51.09	74.00	-22.91	H	peak
3770.000	41.95	4.70	46.65	74.00	-27.35	H	peak
5425.000	38.89	8.51	47.40	74.00	-26.60	H	peak
7375.000	38.01	11.44	49.45	74.00	-24.55	H	peak

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit.
4. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



7.7 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

* Decreases with the logarithm of the frequency.

Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode: Normal Link **Test Date:** 2014/02/19
Temperature: 25°C **Tested by:** Francis Lee
Humidity: 57% RH

Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.1817	35.94	24.56	0.06	36.00	24.62	64.40	54.41	-28.40	-29.79	L1
0.1835	36.60	24.97	0.06	36.66	25.03	64.32	54.33	-27.66	-29.30	L1
0.2777	37.43	26.22	0.08	37.51	26.30	60.88	50.88	-23.37	-24.58	L1
0.5471	39.90	28.76	0.09	39.99	28.85	56.00	46.00	-16.01	-17.15	L1
7.5961	37.35	27.71	0.19	37.54	27.90	60.00	50.00	-22.46	-22.10	L1
16.2285	52.43	46.58	0.26	52.69	46.84	60.00	50.00	-7.31	-3.16	L1
18.2431	52.03	43.75	0.27	52.30	44.02	60.00	50.00	-7.70	-5.98	L1
0.1843	34.81	17.28	0.06	34.87	17.34	64.29	54.29	-29.42	-36.95	L2
0.5270	36.52	20.05	0.09	36.61	20.14	56.00	46.00	-19.39	-25.86	L2
0.6492	38.63	23.00	0.09	38.72	23.09	56.00	46.00	-17.28	-22.91	L2
7.4008	32.73	24.63	0.18	32.91	24.81	60.00	50.00	-27.09	-25.19	L2
16.2282	43.05	40.12	0.26	43.31	40.38	60.00	50.00	-16.69	-9.62	L2
18.2436	41.90	34.49	0.27	42.17	34.76	60.00	50.00	-17.83	-15.24	L2

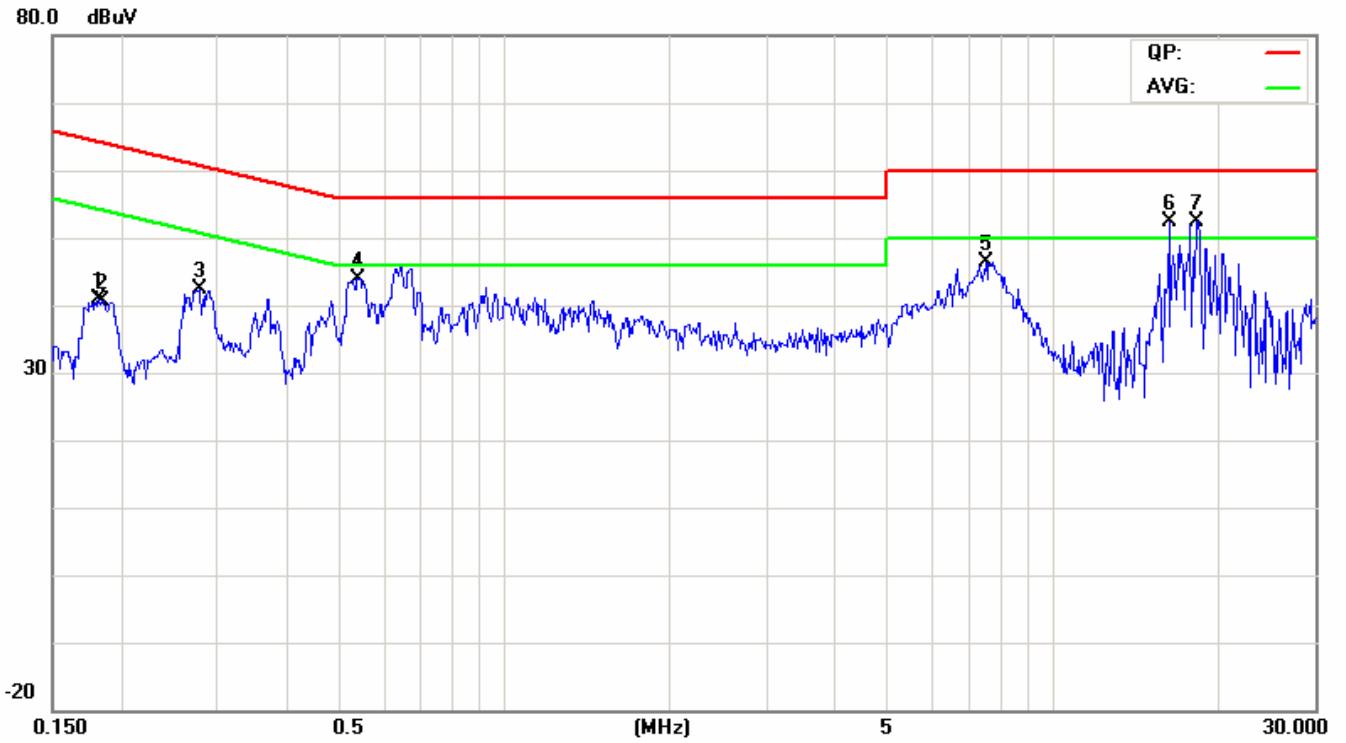
Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

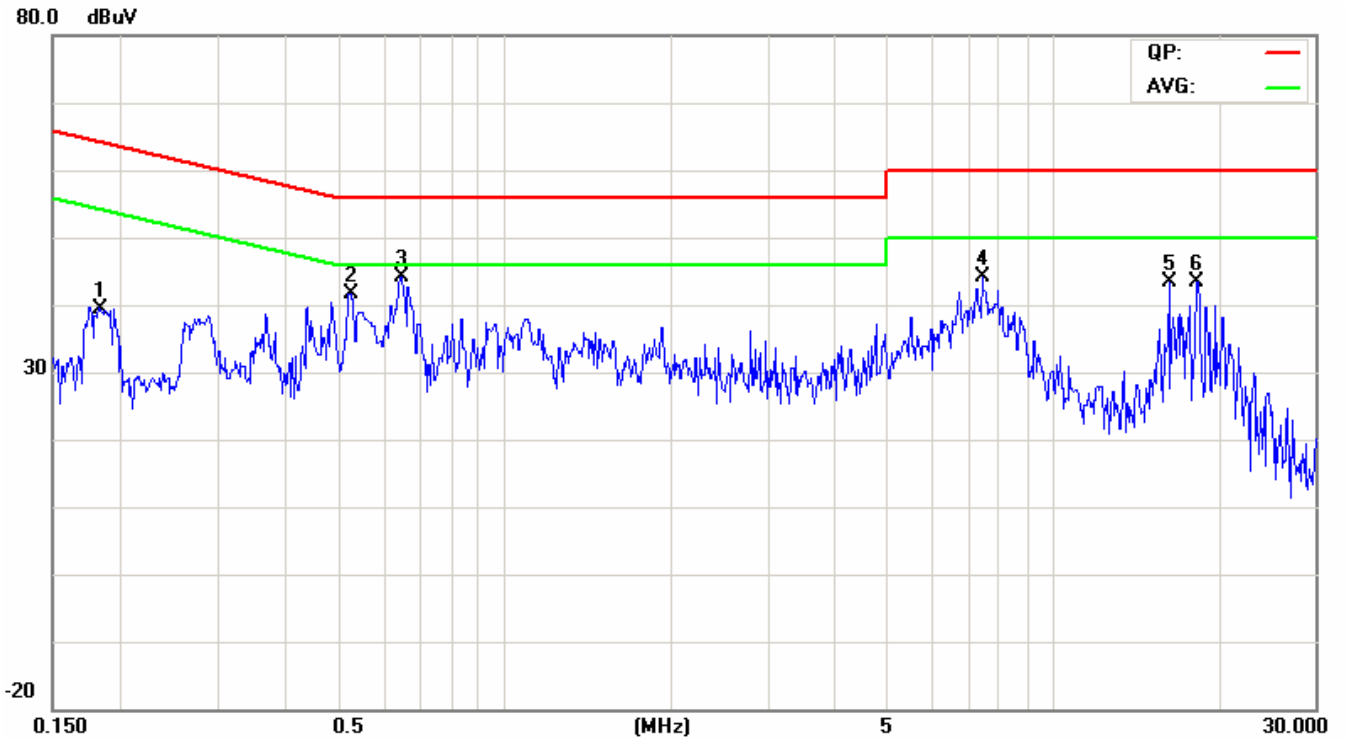


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)





8 APPENDIX I PHOTOGRAPHS OF TEST SETUP

Radiated Emissions Setup Photos Below 1GHz



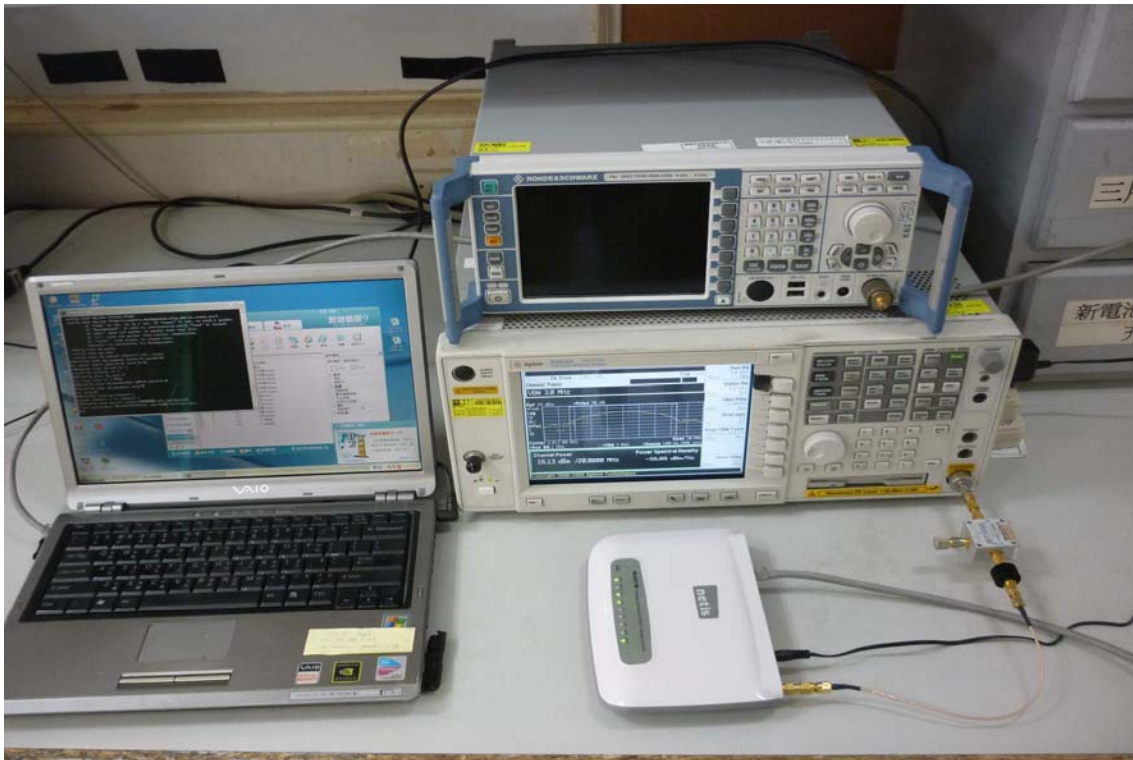


Above 1GHz





Conducted Emissions Setup Photo





Powerline Conducted Emissions Setup Photos





9 APPENDIX II: PHOTOGRAPHS OF EUT

Refer to T140210D14 Photographs.