

TEST REPORT

Application No.: SHCR2201000082AT
FCC ID: 2AVYF-DB61
IC: 25954-DB61
Applicant: Hangzhou Huacheng Network Technology Co.,Ltd.
Address of Applicant: No.2930, Nanhuan Road, Binjiang District, Hangzhou, China
Manufacturer: Hangzhou Huacheng Network Technology Co.,Ltd.
Address of Manufacturer: No.2930, Nanhuan Road, Binjiang District, Hangzhou, China
Equipment Under Test (EUT):
EUT Name: Video Doorbell
Model No.: DB61i-W-D4,DB61i,DB61i-W-D4-imou,DB61i-W-D4N-imou,DB61i-USA,DB61i-CAN,DB61iXX-XXXX,DB61iXX-XXX-XXXX,DB61iXX-XX-XXX-XXXX,DB61iXX-XX-XXX-XXXX-XXXX (X can be "0-9", "a-z", "A-Z" or blank) □
 □ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Standard(s) : 47 CFR Part 15, Subpart C 15.247
 RSS-247 Issue 2, February 2017
 RSS-Gen Issue 5, February 2021 Amendment 2
Date of Receipt: 2021-12-19
Date of Test: 2021-12-21 to 2022-01-31
Date of Issue: 2022-02-14

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
Laboratory Manager



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For IC Model No.:

DB61i-W-D4,DB61i,DB61i-W-D4-imou,DB61i-W-D4N-CAN-imou,DB61I-USA,DB61I-CAN



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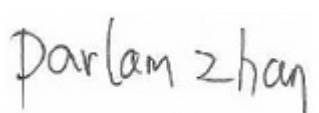
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Testing Center EMC Lab (201612)

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Revision Record			
Version	Description	Date	Remark
00	Original	2022-02-14	/

Authorized for issue by:			
			
		Micheal Niu / Project Engineer	
			
		Parlam Zhan / Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	FCC Requirement	IC Requirement	Method	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	RSS-Gen Clause 6.8	N/A	Customer Declaration

N/A: Not applicable

Radio Spectrum Matter Part				
Item	FCC Requirement	IC Requirement	Method	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.207	RSS-Gen Clause 8.8	ANSI C63.10 (2013) Section 6.2	Pass
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247a(2)	RSS-247 Clause 5.2(a)	ANSI C63.10 (2013) Section 11.8.1	Pass
Conducted Average Output Power	47 CFR Part 15, Subpart C 15.247(b)(3)	RSS-247 Clause 5.4(d)	ANSI C63.10 (2013) Section 11.9.2	Pass
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247(e)	RSS-247 Clause 5.2(b)	ANSI C63.10 (2013) Section 11.10.2	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247(d)	RSS-247 Clause 5.5	ANSI C63.10 (2013) Section 11.13.3.2	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247(d)	RSS-247 Clause 5.5	ANSI C63.10 (2013) Section 11.11	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.10.5	Pass
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	RSS-247 Section 3.3 & RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.4,6.5,6.6	Pass
99% Bandwidth	-	RSS-Gen Section 6.7	ANSI C63.10 Section 6.9.3	Pass

Declaration of EUT Family Grouping:

There are series models mentioned in this report, and they are the similar in electrical and electronic characters. Only the model DB61i-W-D4 was tested since their differences were the model number, trade name, Color and appearance.



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4 General Information

4.1 Details of E.U.T.

Power supply: AC16V-24V or DC12V-24V, 1A, AC/DC wire-powered or DC5V 2A by USB port
DC 3.7V Rechargeable Lithium ion Battery
Battery Model: 1S1P 652023P
Rate Voltage: 3.7V
Charging Limit Voltage: 4.2V
Rated Capacity: 0.2Ah/0.74Wh

Test voltage: AC 120V/60Hz
Serial Number: 8A007AAYAZ6503A
Firmware Version: 20211110
Antenna Gain: Ant 1: 1.58dBi (Provided by the manufacturer)
Ant 2: 3.42dBi (Provided by the manufacturer)
Directional Gain: 5.56dBi

Antenna Type: PCB Antenna
Channel Spacing: 5MHz
Modulation Type: 802.11b: DSSS (CCK, DQPSK, DBPSK)
802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)

Number of Channels: 802.11b/g/n(HT20): 11
802.11n(HT40): 7

Operation Frequency: 802.11b/g/n(HT20): 2412MHz to 2462MHz
802.11n(HT40): 2422MHz to 2452MHz

4.2 Power level setting using in test

Channel	802.11b		802.11g		802.11n(HT20)	
	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
1	37	37	40	40	40	40
6	37	37	40	40	40	40
11	37	37	40	40	40	40
Channel	802.11n(HT40)					
	Ant 1	Ant 2				
3	36	36				
6	36	36				
9	36	36				

4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Adapter	HON-KWANG	A12-3A-10	/
Note Book	Acer	ZQT	NXM0QCN01031403EE876



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4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Conducted Power	0.6dB
6	RF Power Density	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	RF Radiated Power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	Time	3%

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



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4.5 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888

Fax: +86 512 5737 0818

No tests were sub-contracted.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L4354)

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• A2LA (Certificate No. 2541.01)

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC (Designation Number: CN1172)

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

• ISED (CAB identifier: CN0072)

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E

• VCCI (Member No.: 1938)

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals (150kHz-30MHz)						
1	EMI Test Receive	R&S	ESCI	100781	02/01/2021	01/31/2022
2	LISN	R&S	ENV216	101604	10/12/2021	10/11/2022
3	LISN	Schwarzbeck	NNLK 8129	8129-143	10/12/2021	10/11/2022
4	Pulse Limiter	R&S	ESH3-Z2	100609	02/01/2021	01/31/2022
5	CE test Cable	Thermax	/	14	10/16/2021	10/15/2022
6	Test Software	Farad	EZ-EMC	CCS-03A1	N.C.R	N.C.R
RF Conducted Test						
1	Spectrum Analyzer	Agilent	E4446A	MY44020154	04/16/2021	04/15/2022
2	Spectrum Analyzer	Keysight	N9020A	MY55370209	10/11/2021	10/10/2022
3	Spectrum Analyzer	Keysight	N9010A	MY56480443	02/01/2021	01/31/2022
4	Signal Generator	Agilent	N5182A	MY50142015	08/27/2021	08/26/2022
5	Radio Communication Test Station	Anritsu	MT8000A	6262012849	N/A	N/A
6	Radio Communication Analyzer	Anritsu	MT8821C	6201692222	N/A	N/A
7	Universal Radio Communication Tester	R&S	CMW500	159275	10/12/2021	10/11/2022
8	Universal Radio Communication Tester	R&S	CMW500	167239	04/16/2021	04/15/2022
9	Power Meter	Anritsu	ML2495A	1445010	04/15/2021	04/14/2022
10	Switcher	CCSRF	FY562	KUS2001M001-3	10/12/2021	10/11/2022
11	AC Power Source	EXTECH	6605	1570106	N.C.R	N.C.R
12	DC Power Supply	Aglient	E3632A	MY50340053	N.C.R	N.C.R
13	6dB Attenuator	Mini-Circuits	NAT-6-2W	15542-1	N.C.R	N.C.R
14	Power Divider	AI SI	IOWOPE2068	PE2068	N.C.R	N.C.R
15	Filter	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
16	Conducted test cable	/	RF01-RF04	/	04/15/2021	04/14/2022
17	Software	BST	TST-PASS	N/A	N/A	N/A
18	Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	04/15/2021	04/14/2022
19	Thermometer	Anymetre	TH603	CCS007	10/14/2021	10/13/2022
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	101493	10/11/2021	10/10/2022
2	Signal Generator	Agilent	E8257C	MY43321570	10/18/2021	10/17/2022
3	Loop Antenna	Schwarzbeck	HXYZ9170	9170-108	02/22/2021	02/21/2022
4	Bilog Antenna	TESEQ	CBL 6112D	35403	06/21/2021	06/20/2023
5	Bilog Antenna	SCHWARZBECK	VULB9160	9160-3342	04/13/2021	04/12/2023
6	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	267	10/26/2020	10/25/2022
7	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/22/2021	02/21/2023
8	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	BBHA9170171	02/22/2021	02/21/2022
9	Pre-Amplifier(30MHz~18GHz)	LNA	/	/	04/15/2021	04/14/2022
10	Amplifier(18~40GHz)	COM-POWER	PAM-840A	461332	10/18/2021	10/17/2022
11	Low Pass Filter	MICRO-TRONICS	VLFX-950	RV142900829	N.C.R	N.C.R
12	High Pass Filter	Mini-Circuits	VHF-1200	15542	N.C.R	N.C.R
13	Filter (5450MHz~5770 MHz)	MICRO-TRONICS	BRC50704-01	2	N.C.R	N.C.R
14	Filter (5690 MHz~5930 MHz)	MICRO-TRONICS	BRC50705-01	4	N.C.R	N.C.R
15	Filter (5150 MHz~5350 MHz)	MICRO-TRONICS	BRC50703-01	2	N.C.R	N.C.R



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16	Filter (885 MHz~915 MHz)	MICRO-TRONICS	BRM14698	1	N.C.R	N.C.R
17	Filter (815 MHz~860 MHz)	MICRO-TRONICS	BRM14697	1	N.C.R	N.C.R
18	Filter (1745 MHz~1910 MHz)	MICRO-TRONICS	BRM14700	1	N.C.R	N.C.R
19	Filter (1922 MHz~1977 MHz)	MICRO-TRONICS	BRM50715	1	N.C.R	N.C.R
20	Filter (2550 MHz)	MICRO-TRONICS	HPM13362	5	N.C.R	N.C.R
21	Filter (1532 MHz~1845 MHz)	MICRO-TRONICS	BRM50713	1	N.C.R	N.C.R
22	Filter (2.4GHz)	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
23	RE test cable	/	RE01-RE04	/	04/15/2021	04/14/2022
24	Software	Faratronic	EZ_EMG-v 3A1	N/A	N/A	N/A



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

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 6dBi.

EUT Antenna:

The antenna 1 and antenna 2 is PCB Antenna, and no consideration of replacement. The best case gain of the antenna 1 is 1.58dBi and antenna 2 is 3.42dBi.

Antenna location: Refer to Appendix (Internal Photos)



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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 48 % RH Atmospheric Pressure: 1010 mbar

Pretest these modes to find the worst case: a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

The worst case for final test: b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.



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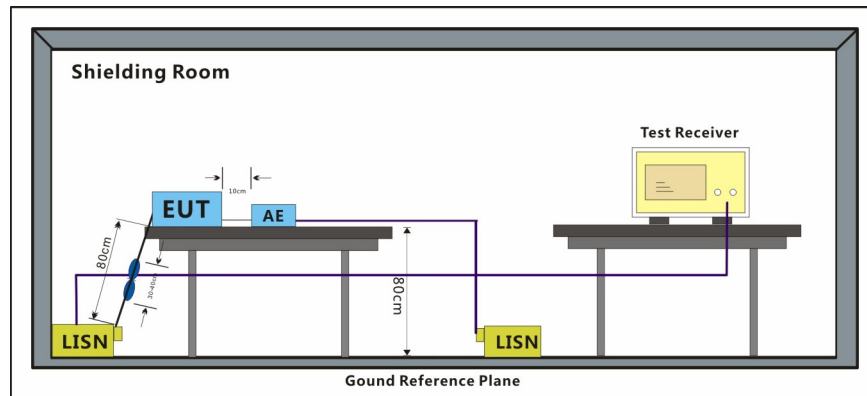
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7.1.2 Test Setup Diagram

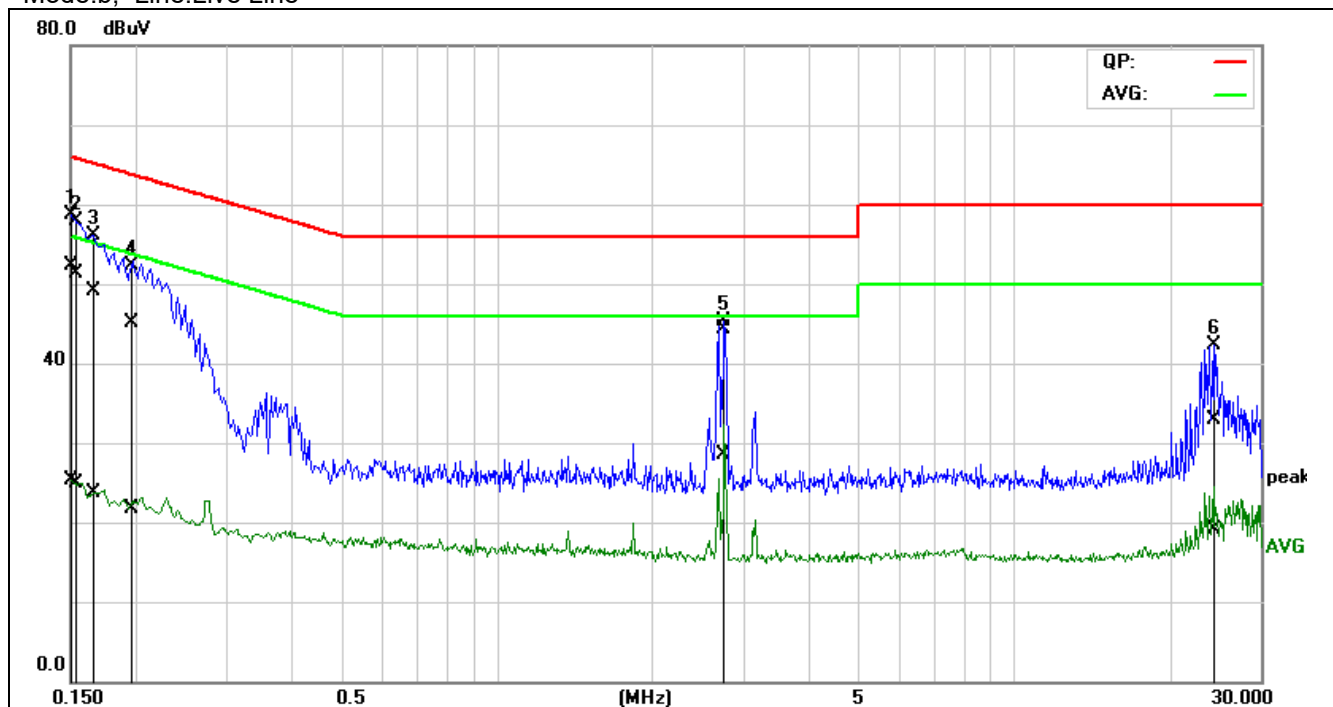


7.1.3 Measurement Procedure and Data

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 50\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

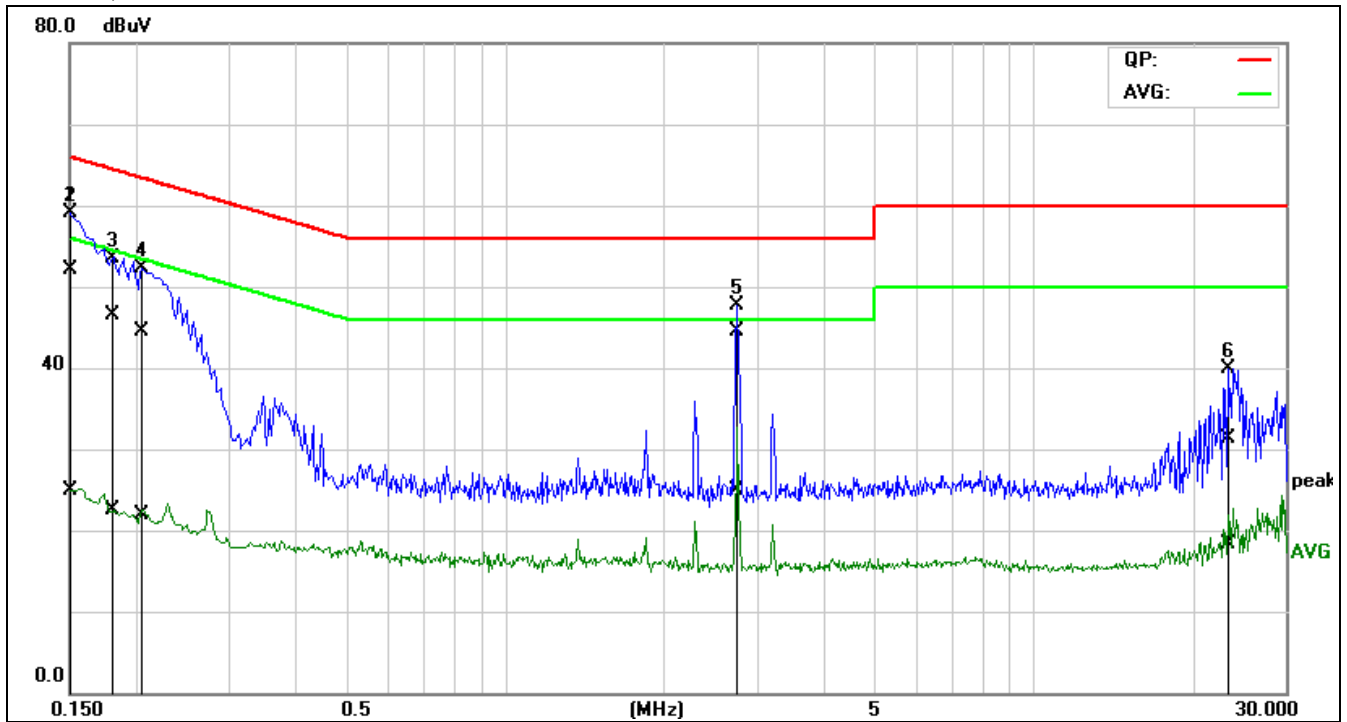
Remark: $\text{LISN} = \text{Read Level} + \text{Cable Loss} + \text{LISN Factor}$

Mode:b; Line:Live Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1505	32.59	5.57	19.76	52.35	25.33	65.97	55.97	-13.62	-30.64	Pass
2	0.1546	31.58	5.14	19.76	51.34	24.90	65.74	55.75	-14.40	-30.85	Pass
3	0.1638	29.37	3.85	19.76	49.13	23.61	65.26	55.27	-16.13	-31.66	Pass
4	0.1938	25.35	2.03	19.75	45.10	21.78	63.87	53.87	-18.77	-32.09	Pass
5*	2.7572	24.63	8.71	19.74	44.37	28.45	56.00	46.00	-11.63	-17.55	Pass
6	24.3640	12.59	-1.16	20.22	32.81	19.06	60.00	50.00	-27.19	-30.94	Pass

Mode:b; Line:Neutral Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1500	32.42	5.24	19.76	52.18	25.00	65.99	56.00	-13.81	-31.00	Pass
2	0.1508	32.30	5.22	19.76	52.06	24.98	65.95	55.96	-13.89	-30.98	Pass
3	0.1785	26.83	2.75	19.76	46.59	22.51	64.55	54.56	-17.96	-32.05	Pass
4	0.2021	24.79	2.07	19.76	44.55	21.83	63.52	53.52	-18.97	-31.69	Pass
5*	2.7400	24.70	5.08	19.74	44.44	24.82	56.00	46.00	-11.56	-21.18	Pass
6	23.4135	11.15	-1.83	20.18	31.33	18.35	60.00	50.00	-28.67	-31.65	Pass



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7.2 Minimum 6dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247a(2)

Test Method: ANSI C63.10 (2013) Section 11.8.1

Limit: ≥ 500 kHz

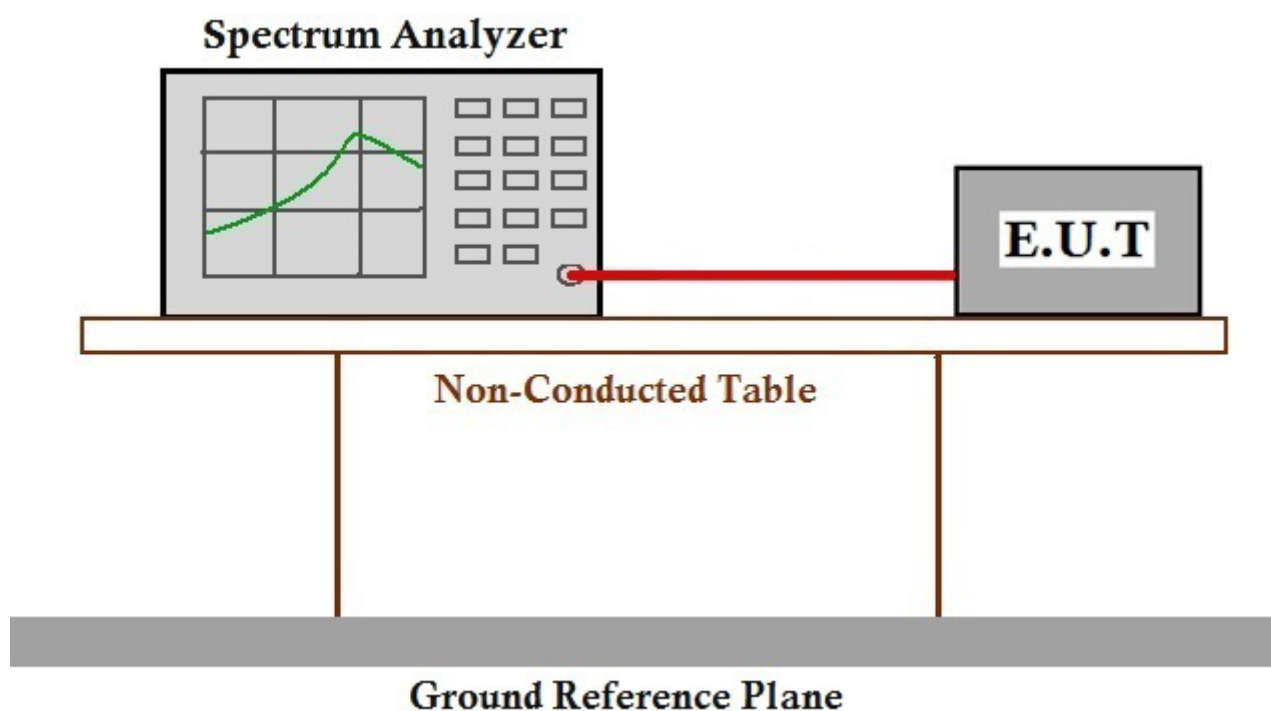
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHCR220100008201



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7.3 Conducted Average Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3)

Test Method: ANSI C63.10 (2013) Section 11.9.2

Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥ 50 hopping channels
	0.25 for $25 \leq$ hopping channels < 50
	1 for digital modulation
2400-2483.5	1 for ≥ 75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

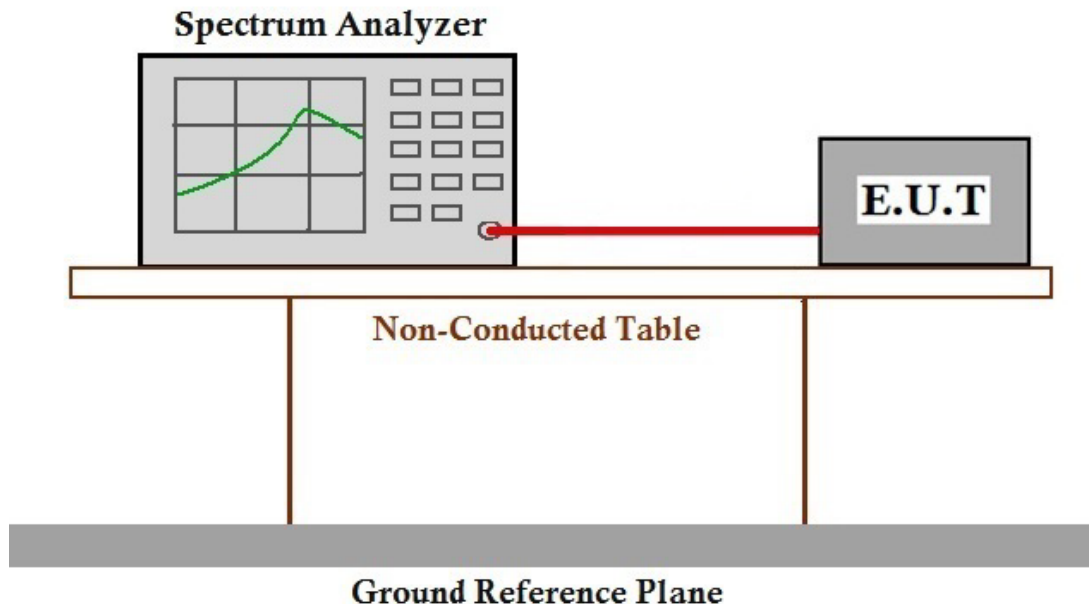
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b: Charge + TX mode_ Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHCR220100008201



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7.4 Power Spectrum Density

Test Requirement 47 CFR Part 15, Subpart C 15.247(e)
 Test Method: ANSI C63.10 (2013) Section 11.10.2
 Limit: $\leq 8\text{dBm}$ in any 3 kHz band during any time interval of continuous transmission

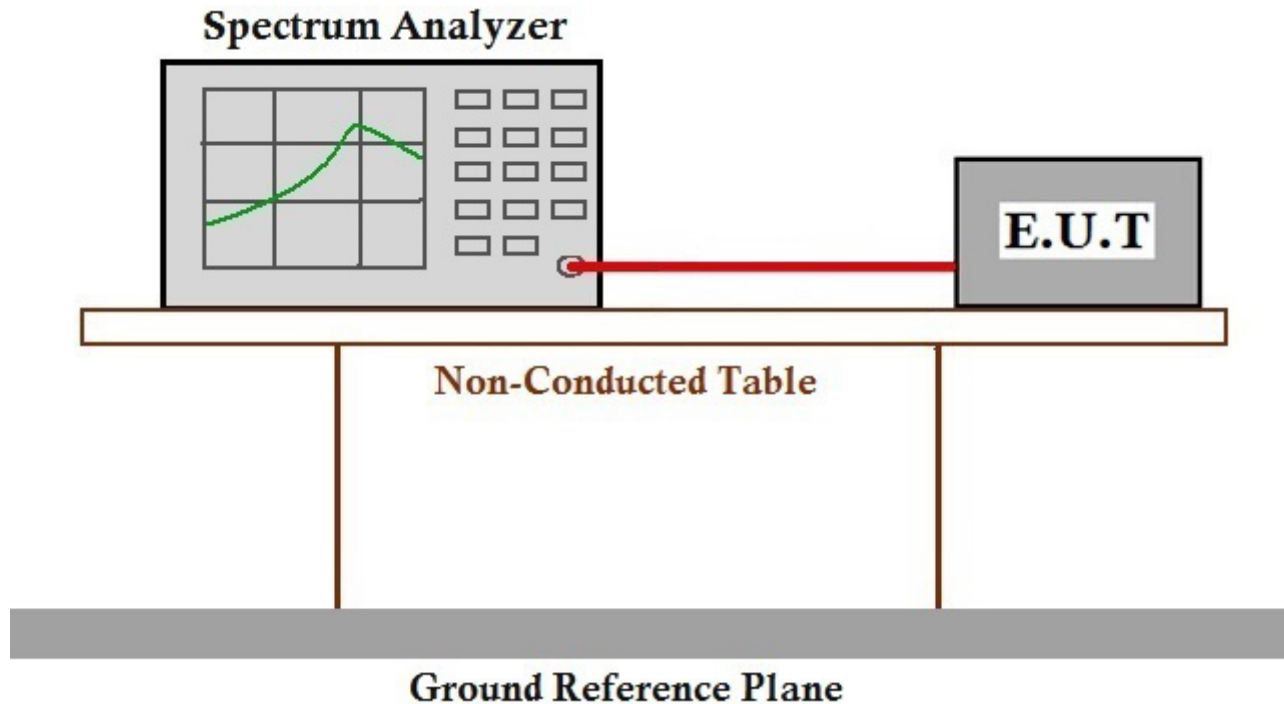
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b: Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHCR220100008201



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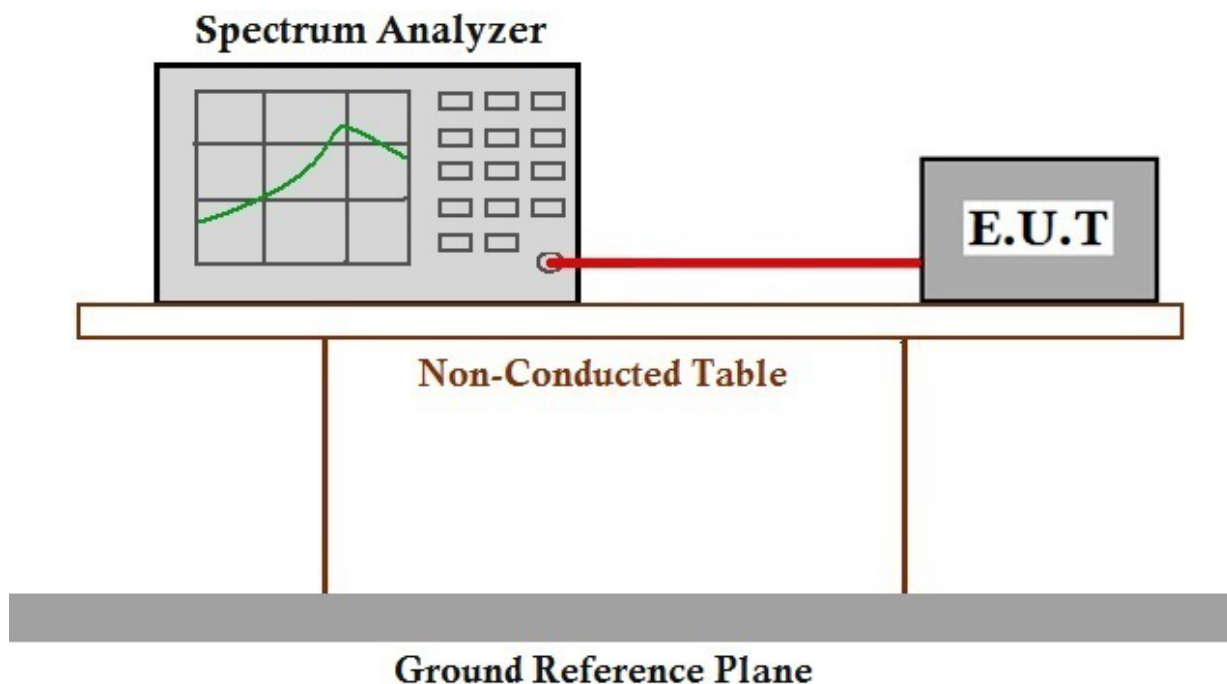
7.5 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c))

7.5.1 E.U.T. Operation

Operating Environment:					
Temperature:	24 °C	Humidity:	50 % RH	Atmospheric Pressure:	1010 mbar
Test mode	b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.				

7.5.2 Test Setup Diagram



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7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHCR220100008201



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7.6 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.11
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c))

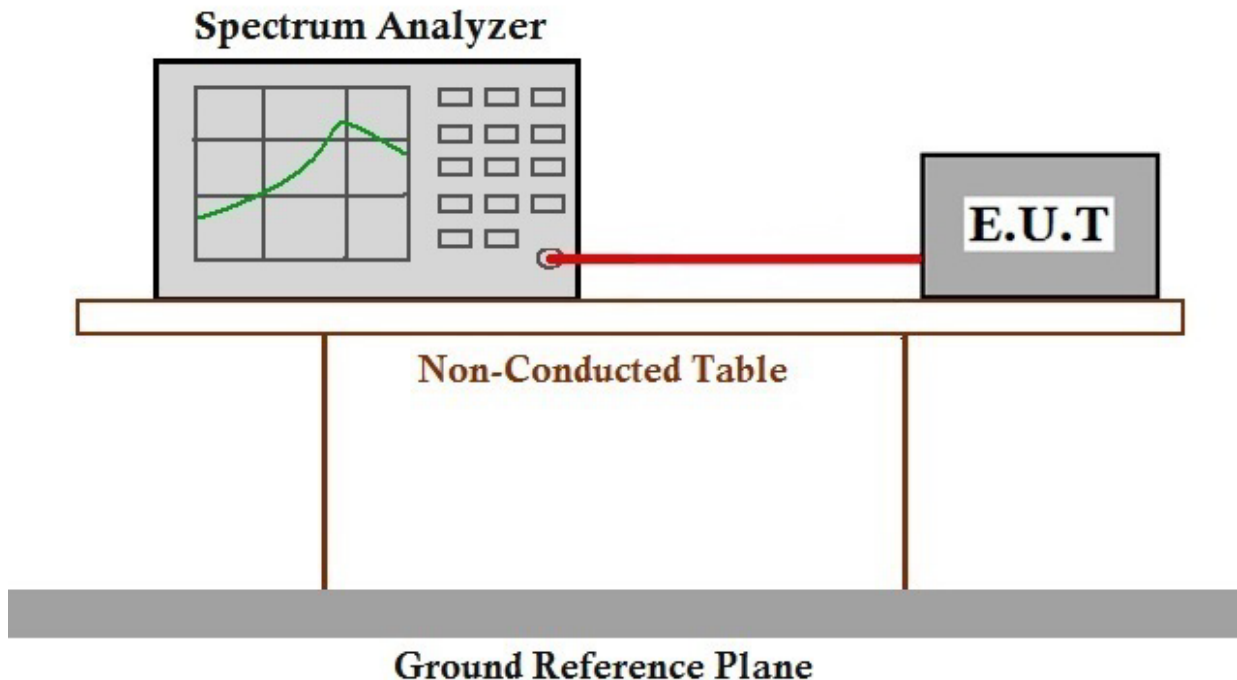
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

7.6.2 Test Setup Diagram



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7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHCR220100008201



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7.7 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)

Test Method: ANSI C63.10 (2013) Section 6.10.5

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
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: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Pretest these modes to find the worst case: a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

The worst case for final test: b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.



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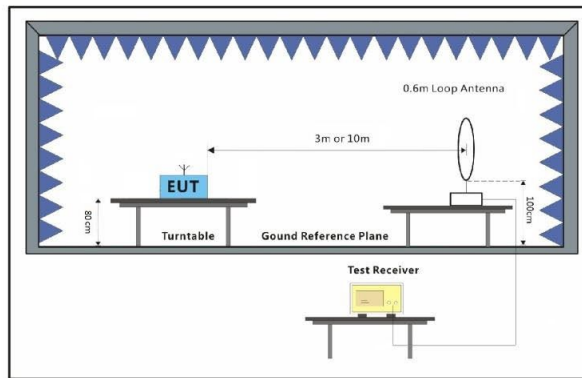
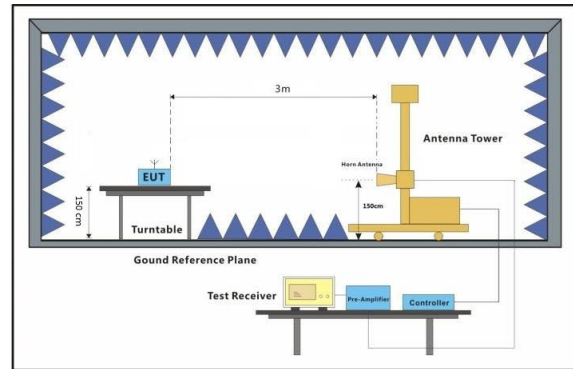
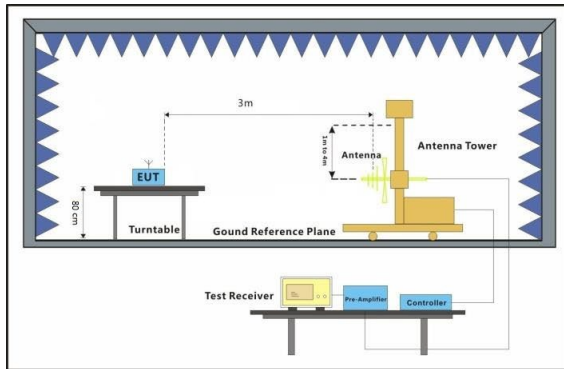
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7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Remark 3: This test item was investigated while operating in SISO and MIMO mode, however, it was determined that SISO antenna 1 operation for b/g modulation and MIMO antenna operation for n modulation produced the worst emissions. So the emissions produced from other operation are not recorded in report.



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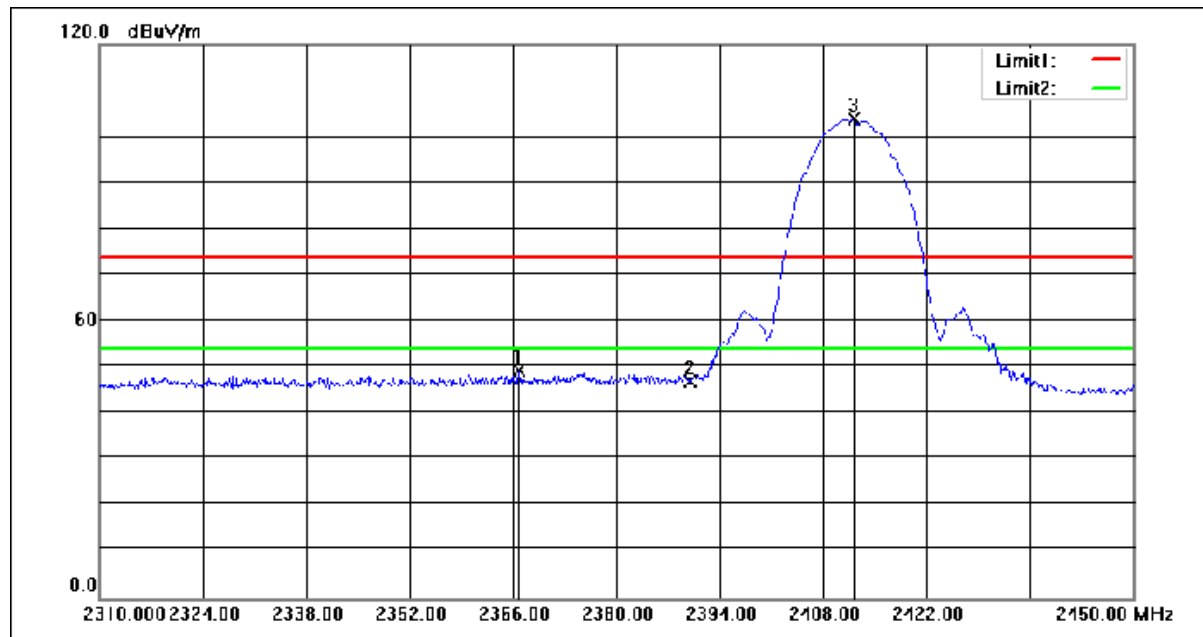
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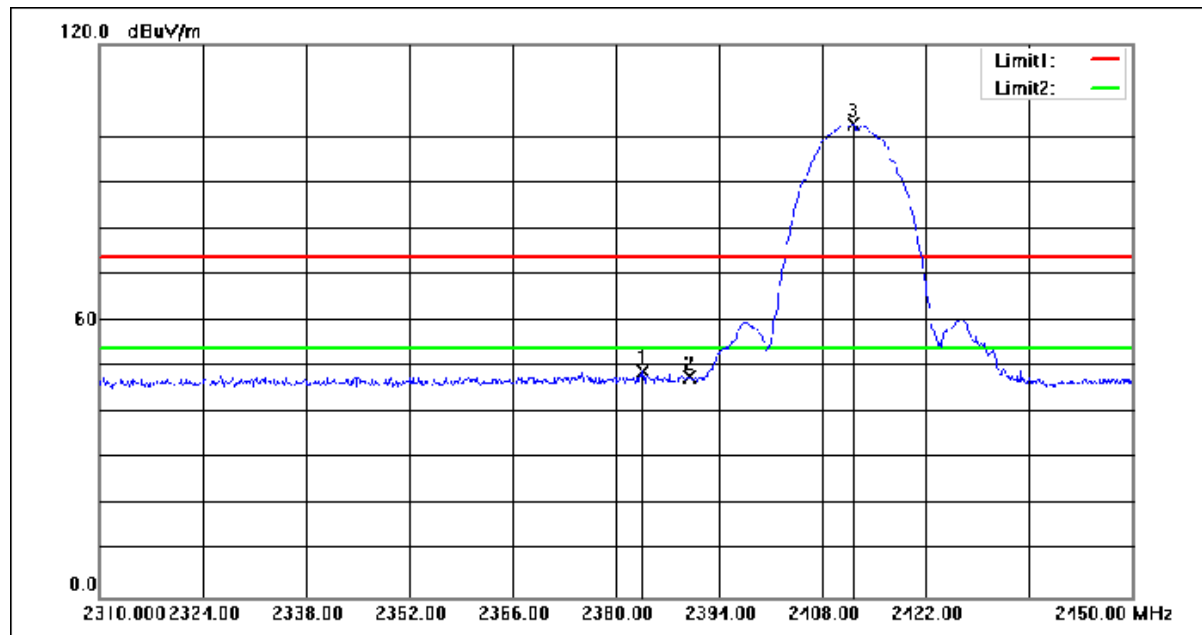
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Mode:b; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:Low



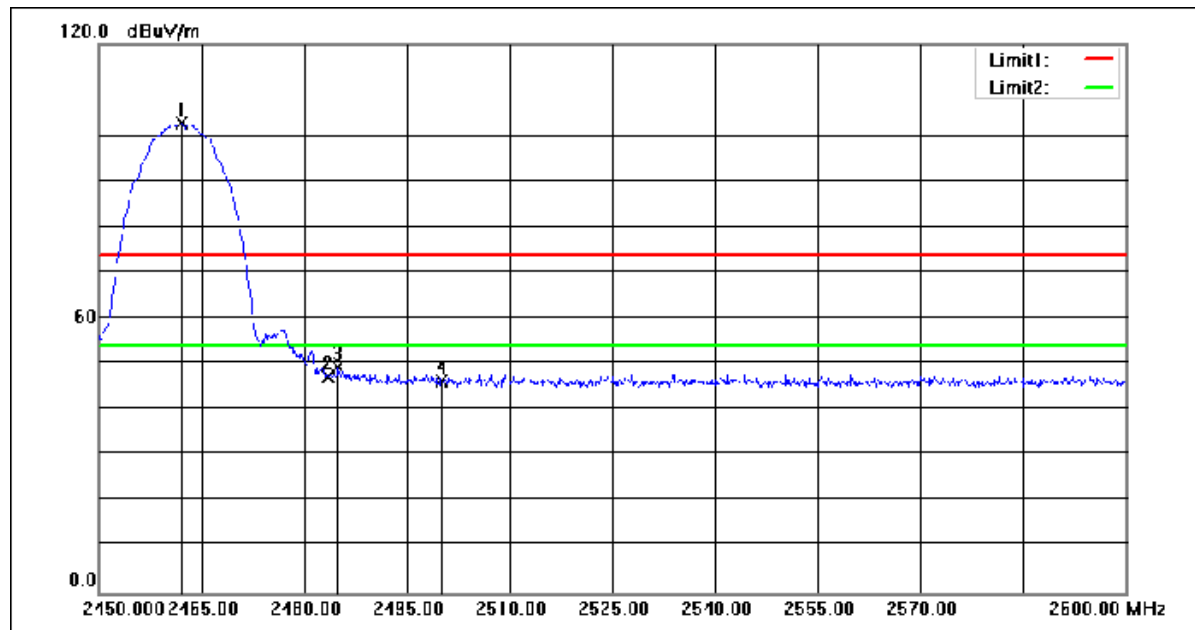
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2366.840	63.32	-14.08	49.24	74.00	-24.76	peak
2	2390.000	61.05	-14.01	47.04	74.00	-26.96	peak
3	2412.200	117.90	-13.94	103.96	74.00	29.96	peak

Mode:b; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:Low



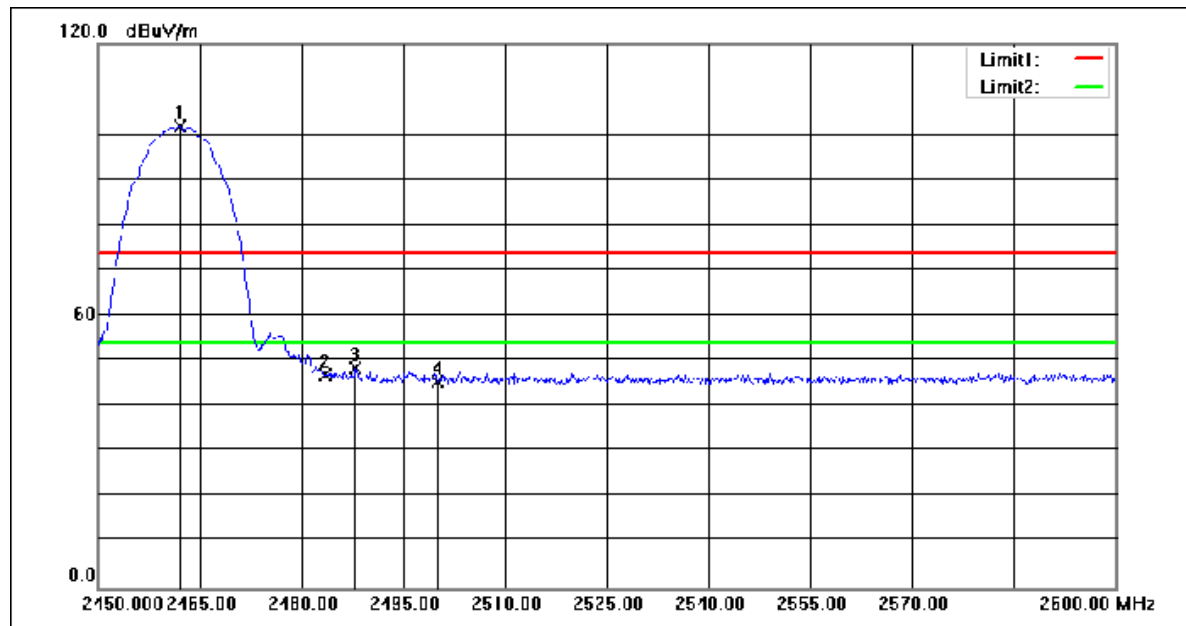
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2383.640	63.20	-14.03	49.17	74.00	-24.83	peak
2	2390.000	61.75	-14.01	47.74	74.00	-26.26	peak
3	2412.200	116.73	-13.94	102.79	74.00	28.79	peak

Mode:b; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2462.000	116.46	-13.78	102.68	74.00	28.68	peak
2	2483.500	60.95	-13.71	47.24	74.00	-26.76	peak
3	2484.950	63.04	-13.70	49.34	74.00	-24.66	peak
4	2500.000	60.09	-13.64	46.45	74.00	-27.55	peak

Mode:b; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2462.000	115.73	-13.78	101.95	74.00	27.95	peak
2	2483.500	60.54	-13.71	46.83	74.00	-27.17	peak
3	2487.950	62.08	-13.69	48.39	74.00	-25.61	peak
4	2500.000	59.06	-13.64	45.42	74.00	-28.58	peak



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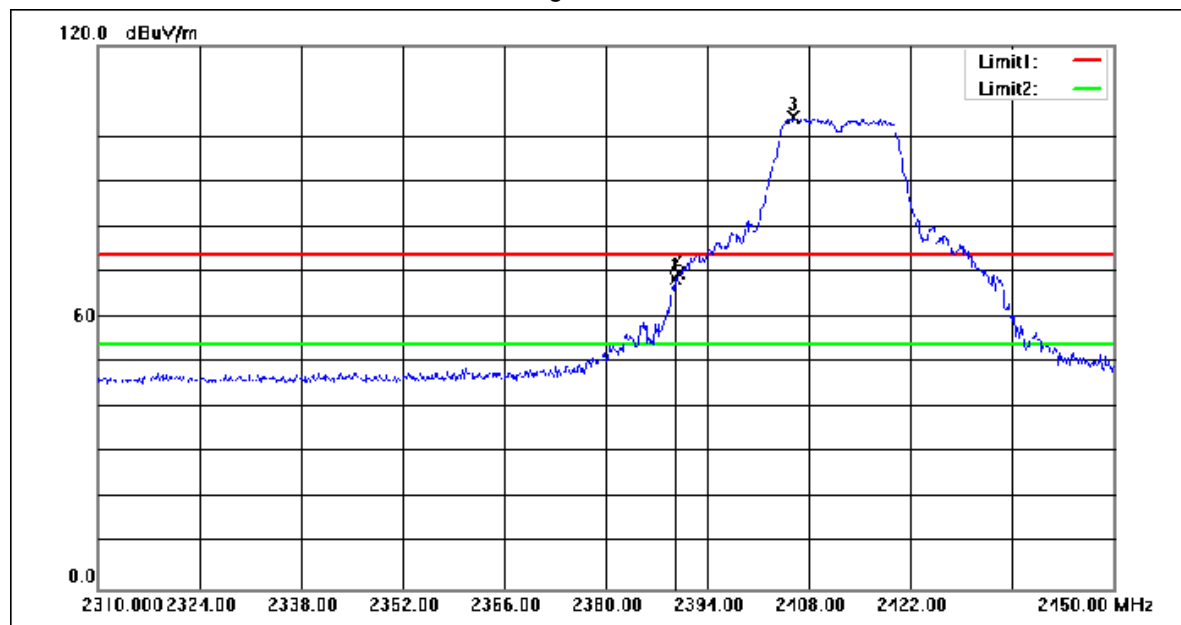
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Mode:b; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.520	82.51	-14.01	68.50	74.00	-5.50	peak
2	2390.000	83.81	-14.01	69.80	74.00	-4.20	peak
3	2405.760	118.09	-13.97	104.12	74.00	30.12	peak



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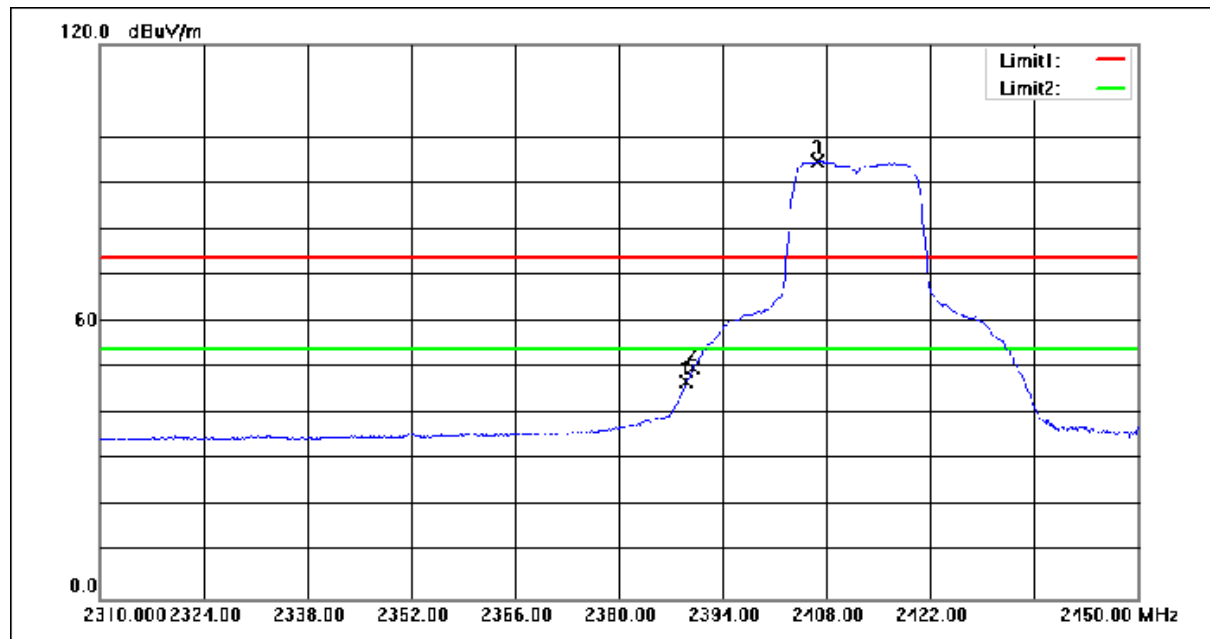
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Mode:b; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.100	60.91	-14.01	46.90	54.00	-7.10	AVG
2	2390.000	63.98	-14.01	49.97	54.00	-4.03	AVG
3	2406.740	108.61	-13.95	94.66	54.00	40.66	AVG



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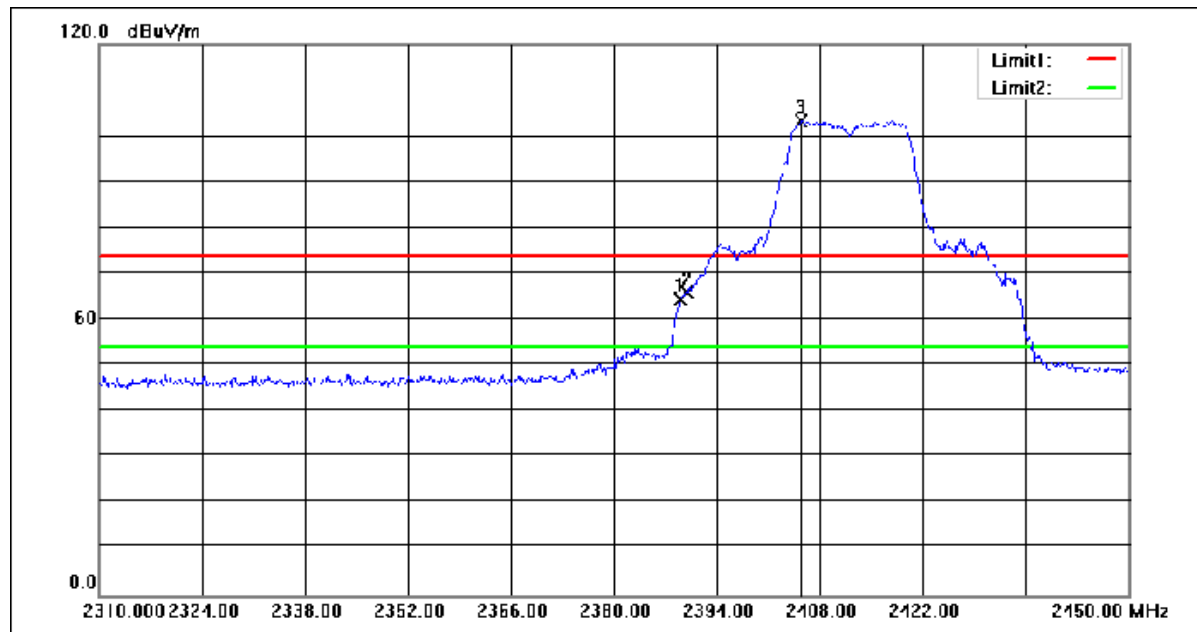
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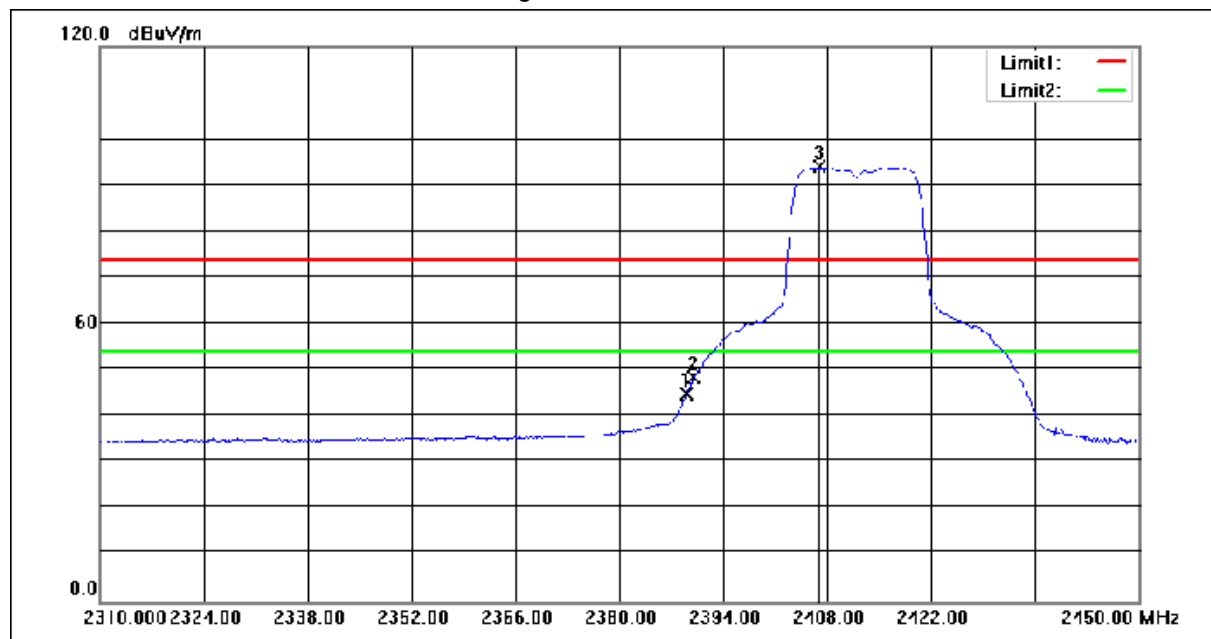
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Mode:b; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:Low



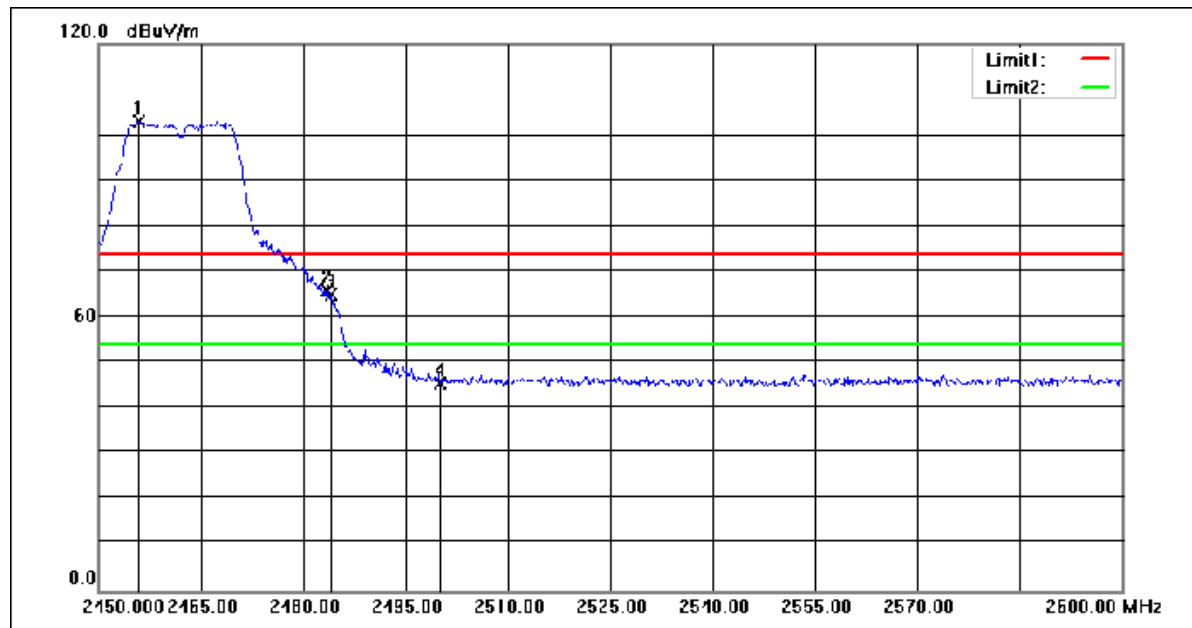
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1	2389.100	78.36	-14.01	64.35	74.00	-9.65	peak
2	2390.000	79.96	-14.01	65.95	74.00	-8.05	peak
3	2405.480	117.20	-13.97	103.23	74.00	29.23	peak

Mode:b; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:Low



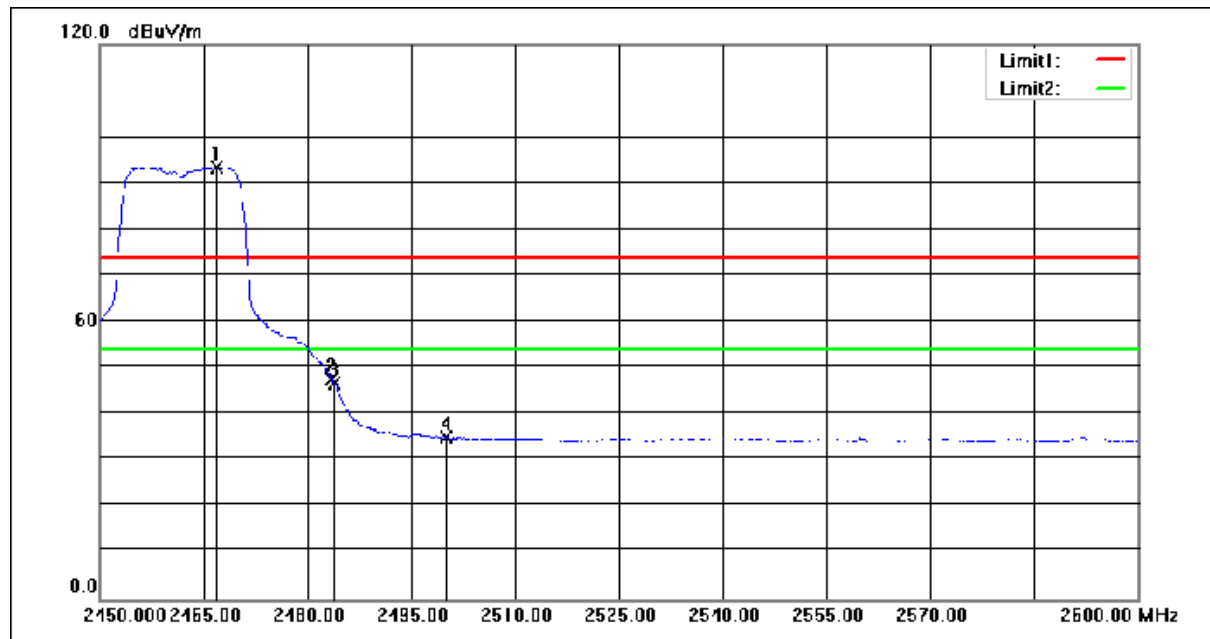
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1	2389.100	58.93	-14.01	44.92	54.00	-9.08	AVG
2	2390.000	62.47	-14.01	48.46	54.00	-5.54	AVG
3	2406.880	107.85	-13.95	93.90	54.00	39.90	AVG

Mode:b; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:High



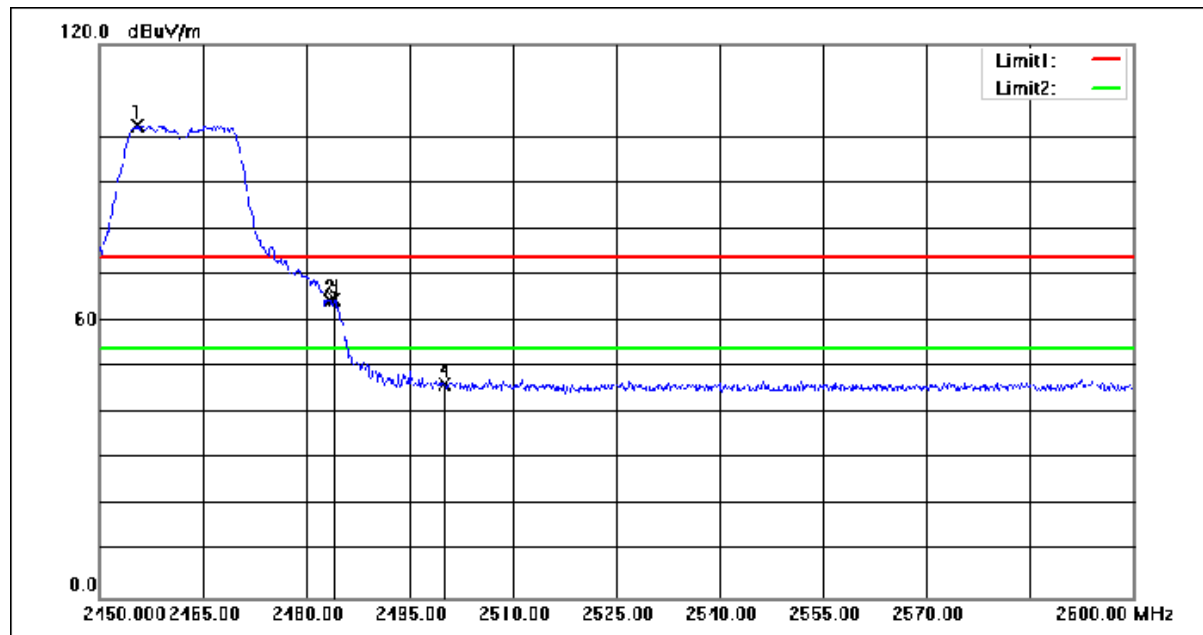
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2455.850	116.77	-13.79	102.98	74.00	28.98	peak
2	2483.500	79.51	-13.71	65.80	74.00	-8.20	peak
3	2484.050	78.65	-13.70	64.95	74.00	-9.05	peak
4	2500.000	59.03	-13.64	45.39	74.00	-28.61	peak

Mode:b; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:High



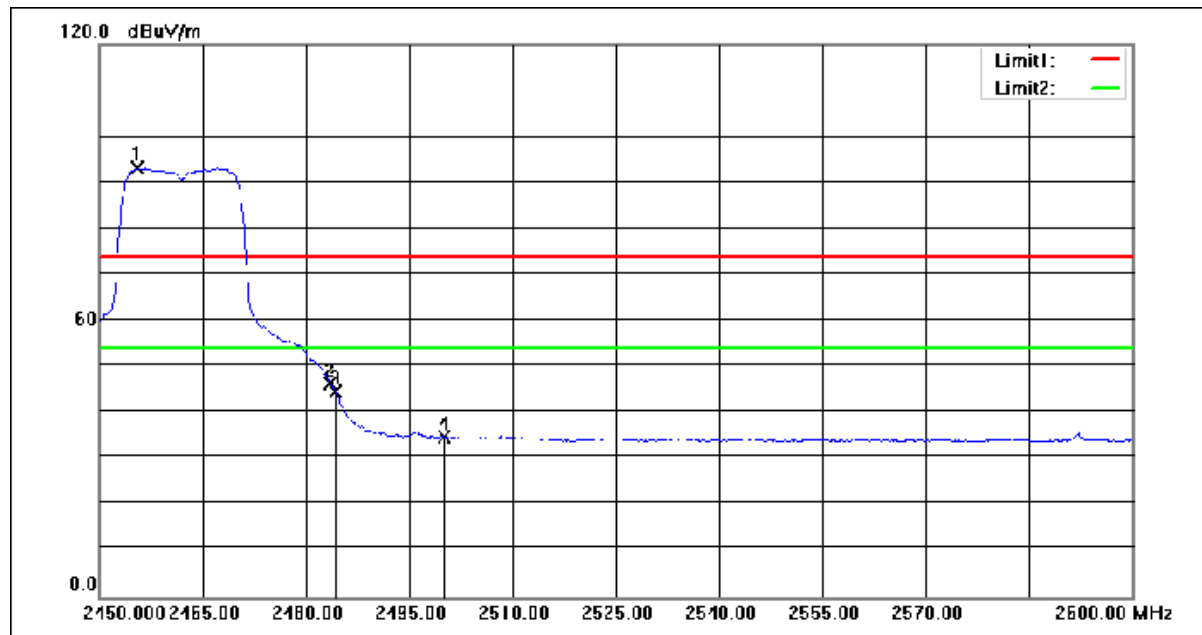
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2466.950	107.27	-13.76	93.51	54.00	39.51	AVG
2	2483.500	61.19	-13.71	47.48	54.00	-6.52	AVG
3	2483.900	60.43	-13.70	46.73	54.00	-7.27	AVG
4	2500.000	48.56	-13.64	34.92	54.00	-19.08	AVG

Mode:b; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:High



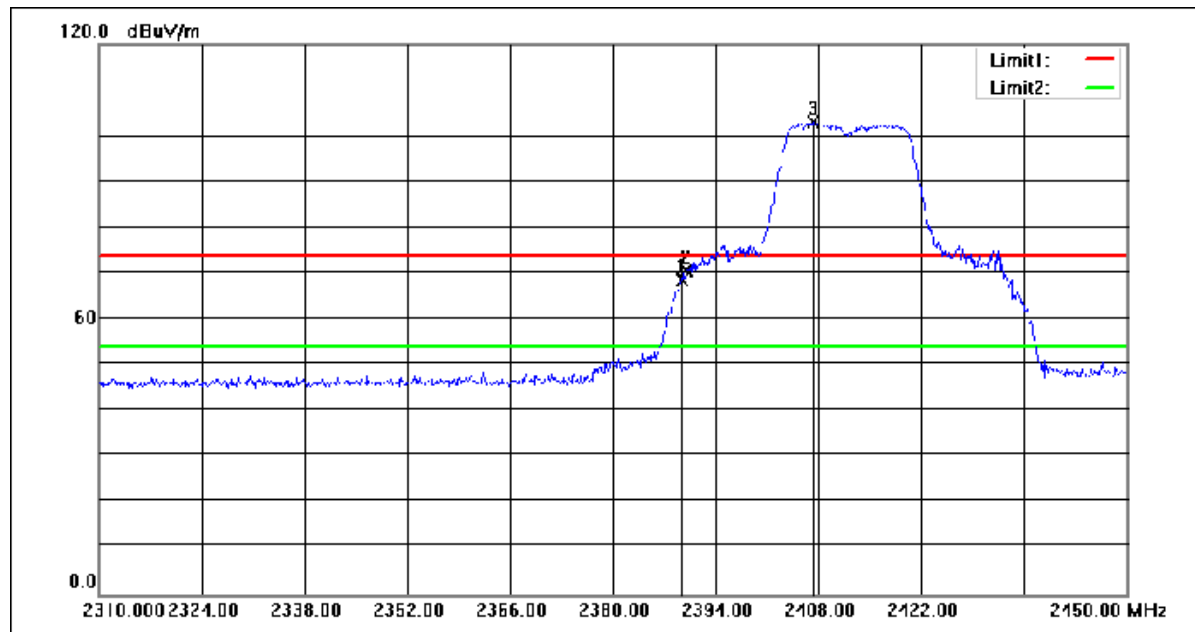
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2455.400	116.18	-13.79	102.39	74.00	28.39	peak
2	2483.500	78.08	-13.71	64.37	74.00	-9.63	peak
3	2484.050	78.45	-13.70	64.75	74.00	-9.25	peak
4	2500.000	60.04	-13.64	46.40	74.00	-27.60	peak

Mode:b; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:High



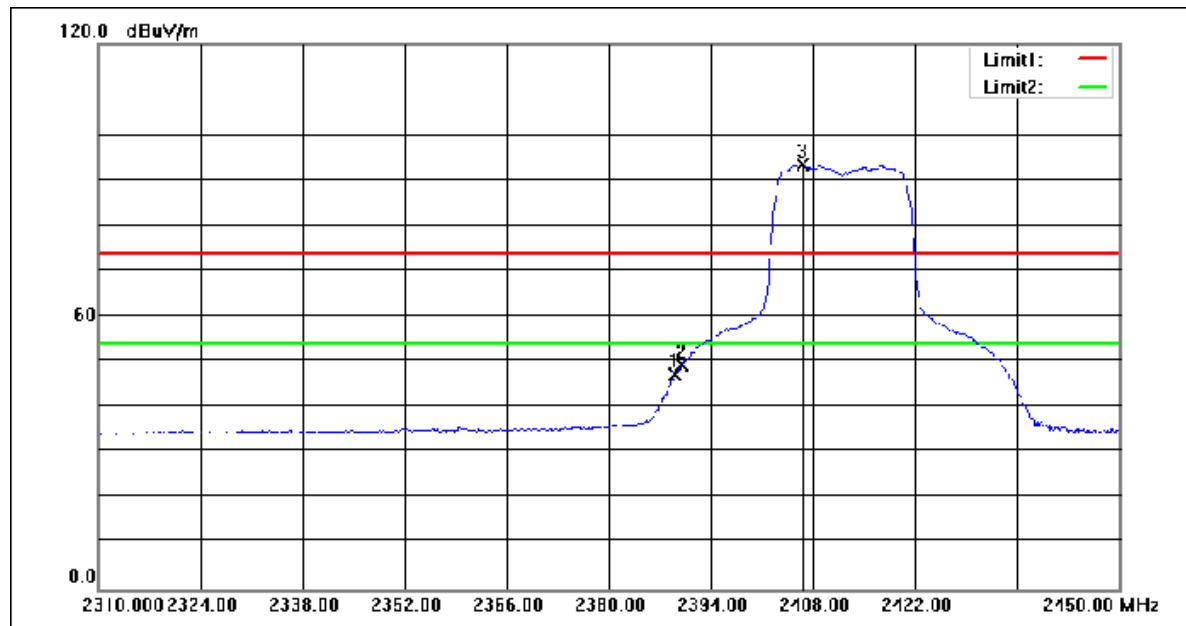
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2455.550	106.87	-13.79	93.08	54.00	39.08	AVG
2	2483.500	60.19	-13.71	46.48	54.00	-7.52	AVG
3	2484.350	58.13	-13.70	44.43	54.00	-9.57	AVG
4	2500.000	48.36	-13.64	34.72	54.00	-19.28	AVG

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.380	82.70	-14.01	68.69	74.00	-5.31	peak
2	2390.000	84.77	-14.01	70.76	74.00	-3.24	peak
3	2407.300	116.85	-13.95	102.90	74.00	28.90	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.100	61.17	-14.01	47.16	54.00	-6.84	AVG
2	2390.000	63.47	-14.01	49.46	54.00	-4.54	AVG
3	2406.600	107.50	-13.95	93.55	54.00	39.55	AVG



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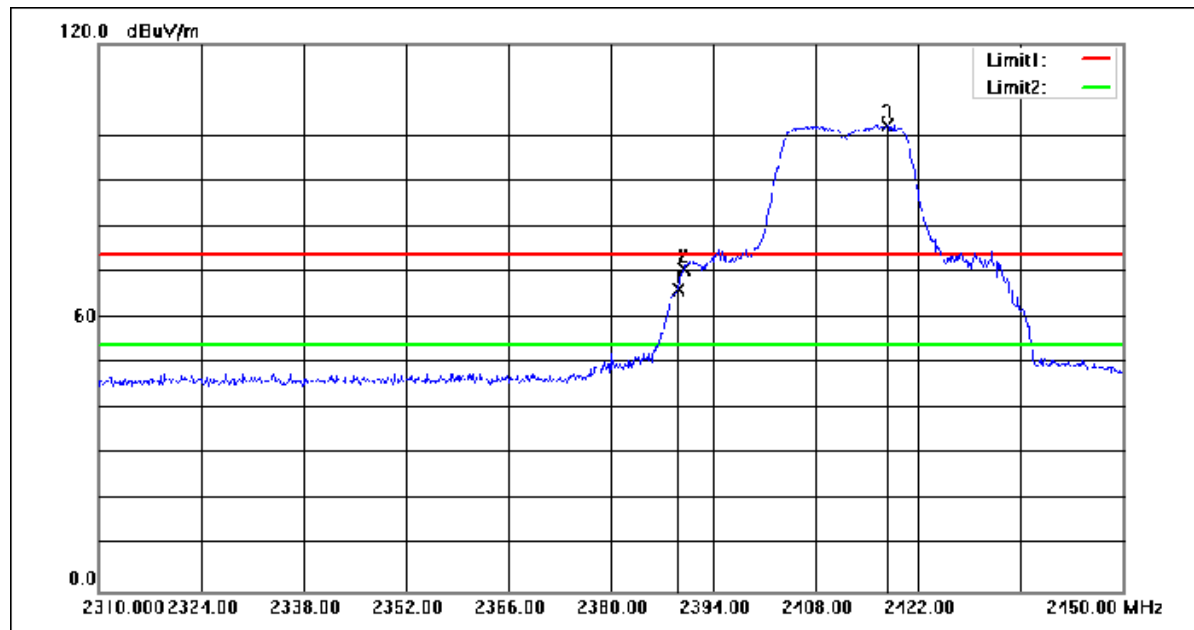
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Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.240	80.25	-14.01	66.24	74.00	-7.76	peak
2	2390.000	84.73	-14.01	70.72	74.00	-3.28	peak
3	2417.800	116.05	-13.92	102.13	74.00	28.13	peak



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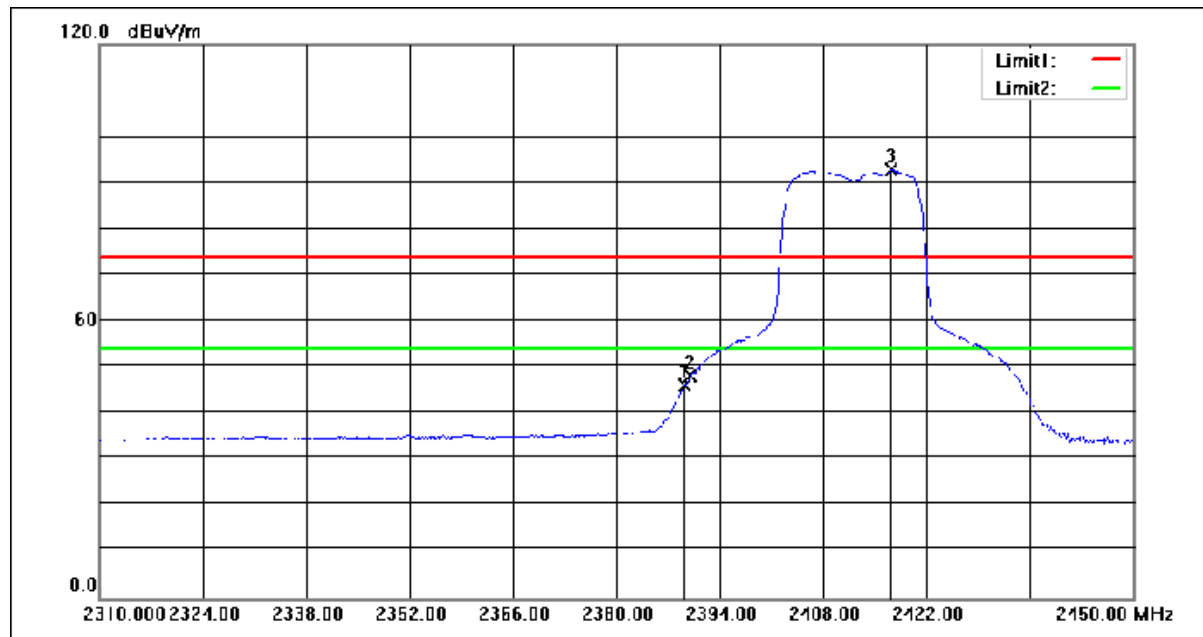
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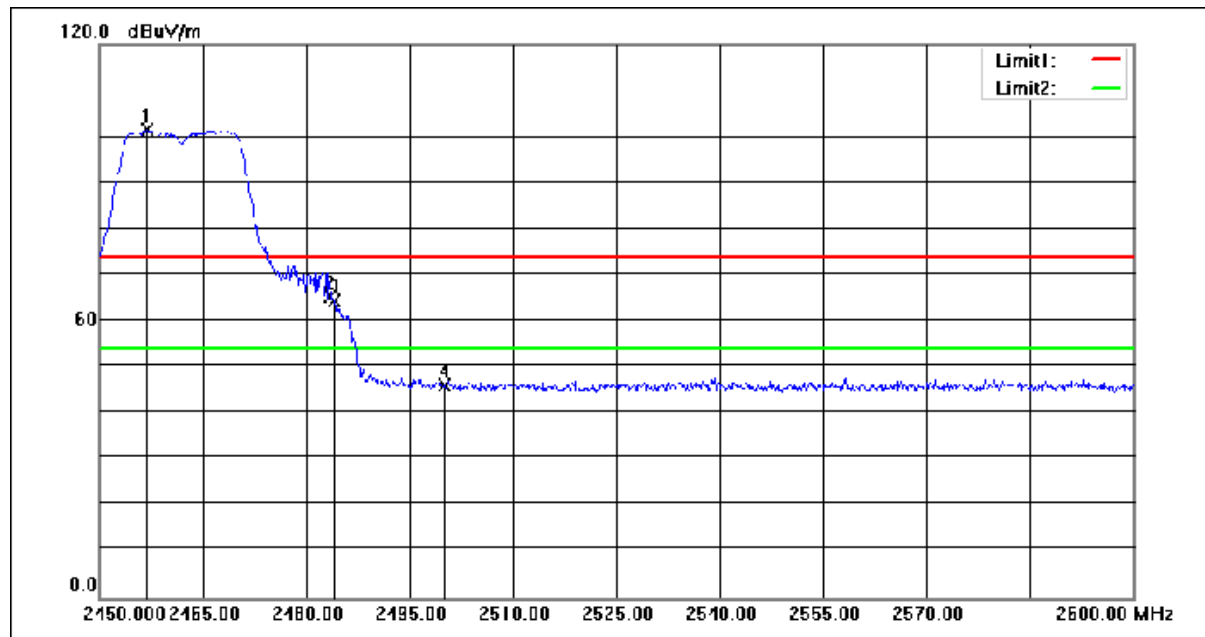
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Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low



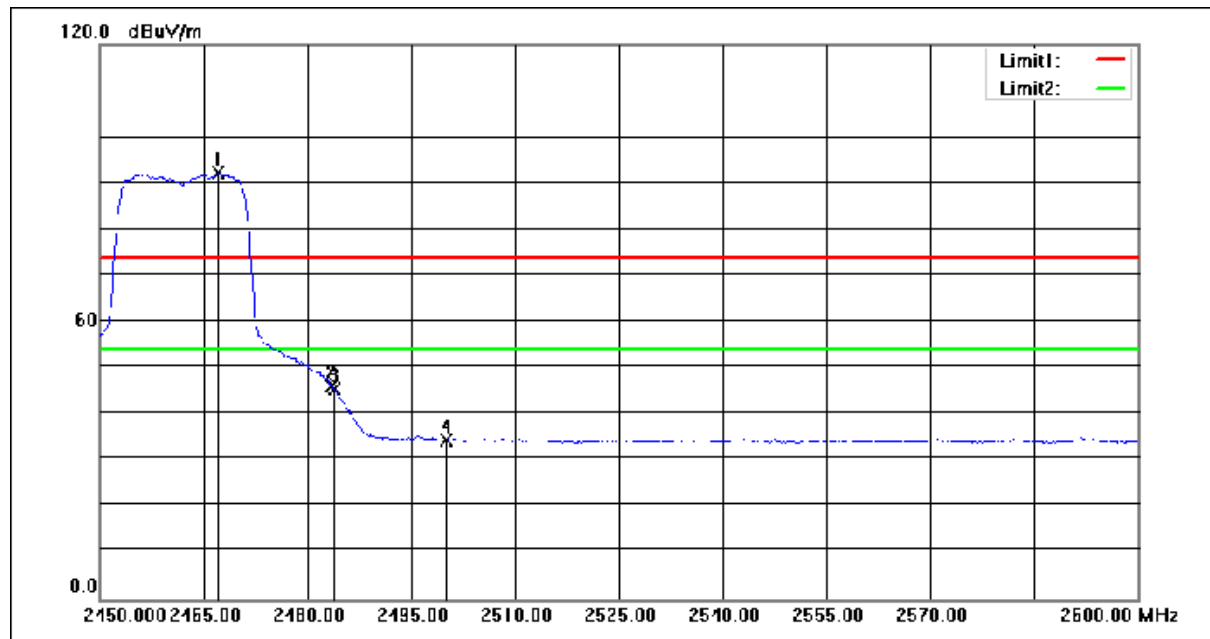
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.240	59.98	-14.01	45.97	54.00	-8.03	AVG
2	2390.000	62.08	-14.01	48.07	54.00	-5.93	AVG
3	2417.240	106.71	-13.93	92.78	54.00	38.78	AVG

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High



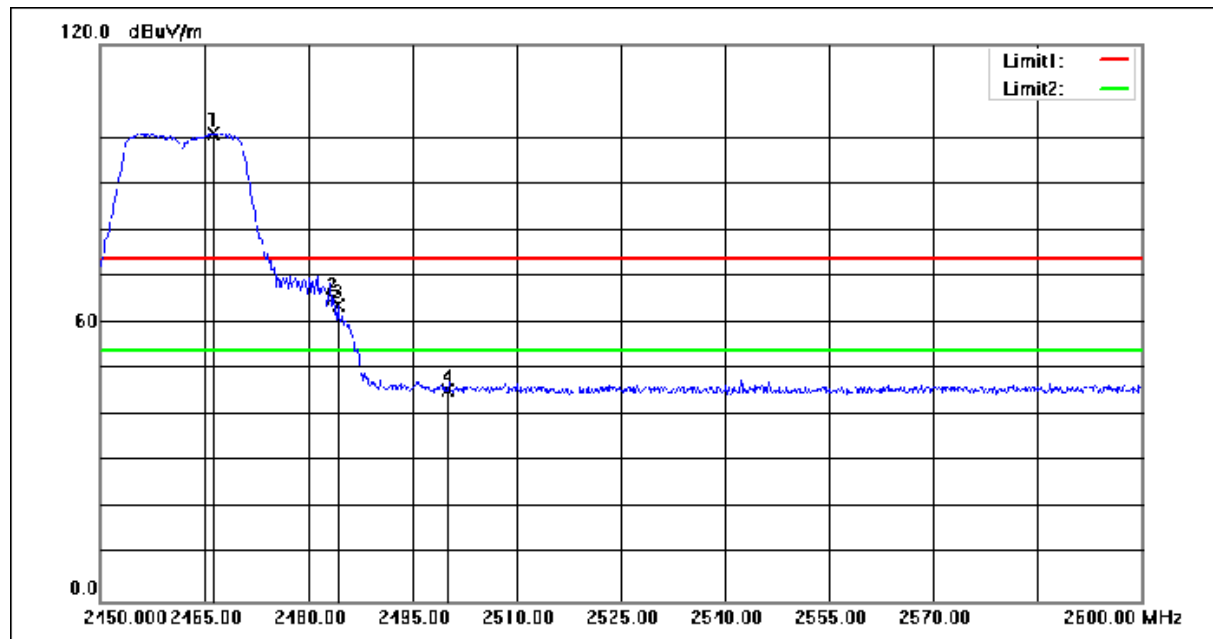
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2456.900	115.23	-13.79	101.44	74.00	27.44	peak
2	2483.500	78.98	-13.71	65.27	74.00	-8.73	peak
3	2484.050	78.09	-13.70	64.39	74.00	-9.61	peak
4	2500.000	59.70	-13.64	46.06	74.00	-27.94	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2467.100	105.87	-13.76	92.11	54.00	38.11	AVG
2	2483.500	59.78	-13.71	46.07	54.00	-7.93	AVG
3	2483.900	59.15	-13.70	45.45	54.00	-8.55	AVG
4	2500.000	48.00	-13.64	34.36	54.00	-19.64	AVG

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2466.200	114.59	-13.76	100.83	74.00	26.83	peak
2	2483.500	78.89	-13.71	65.18	74.00	-8.82	peak
3	2484.200	77.31	-13.70	63.61	74.00	-10.39	peak
4	2500.000	59.10	-13.64	45.46	74.00	-28.54	peak



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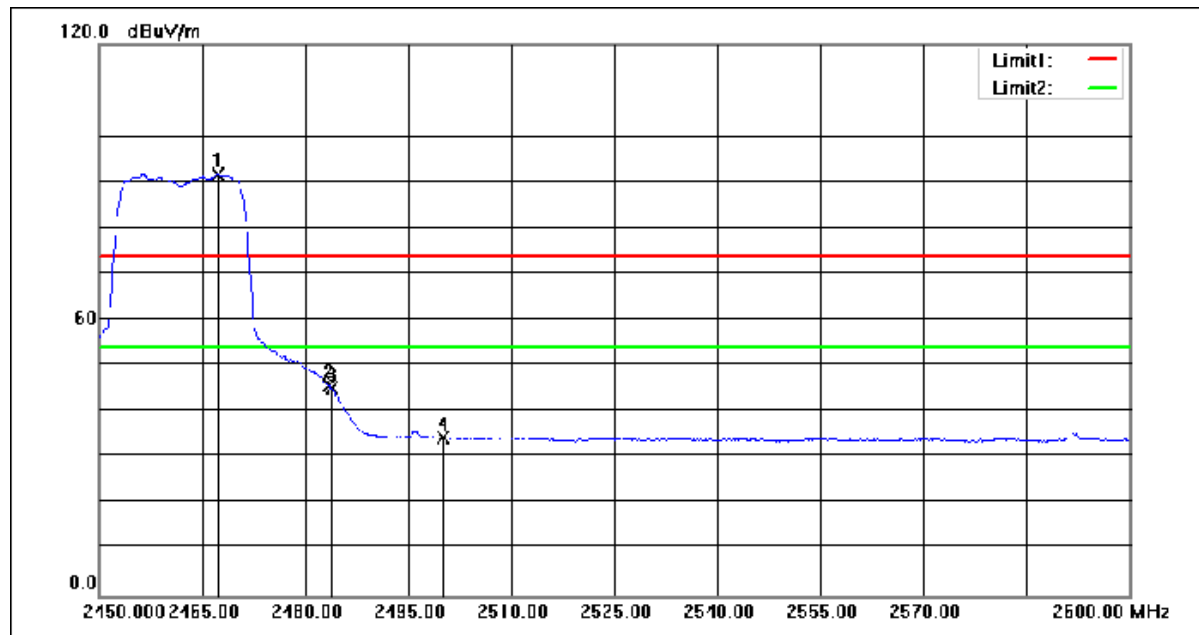
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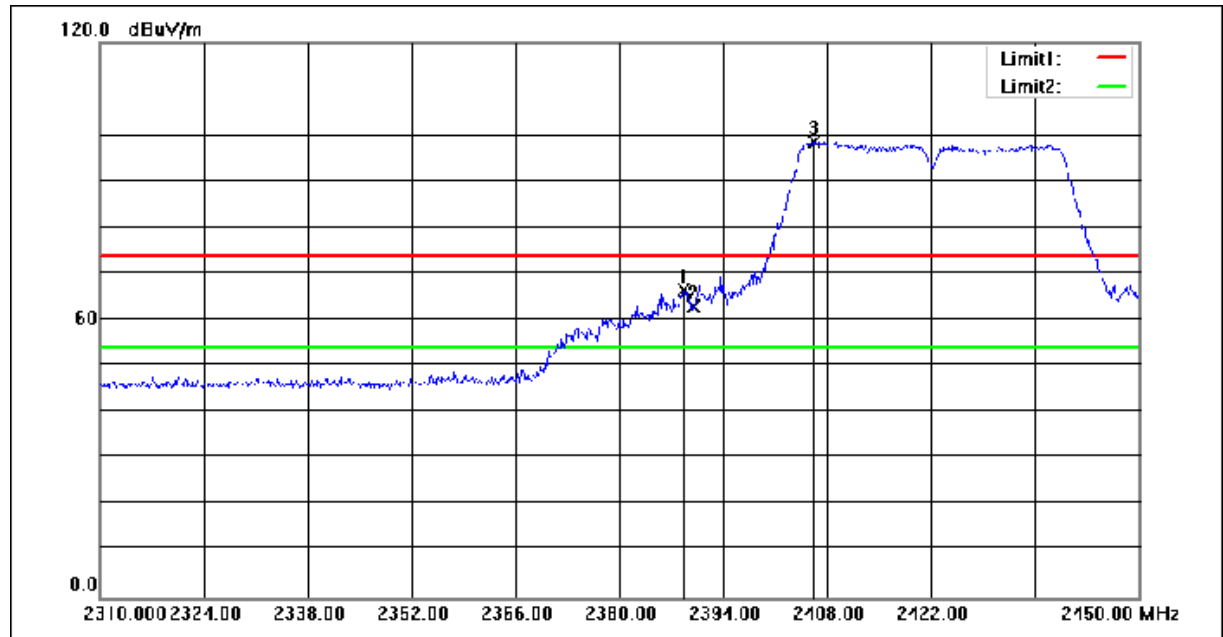
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Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2467.250	105.54	-13.76	91.78	54.00	37.78	AVG
2	2483.500	59.38	-13.71	45.67	54.00	-8.33	AVG
3	2483.900	58.77	-13.70	45.07	54.00	-8.93	AVG
4	2500.000	47.87	-13.64	34.23	54.00	-19.77	AVG

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.680	80.52	-14.01	66.51	74.00	-7.49	peak
2	2390.000	76.86	-14.01	62.85	74.00	-11.15	peak
3	2406.180	112.53	-13.95	98.58	74.00	24.58	peak



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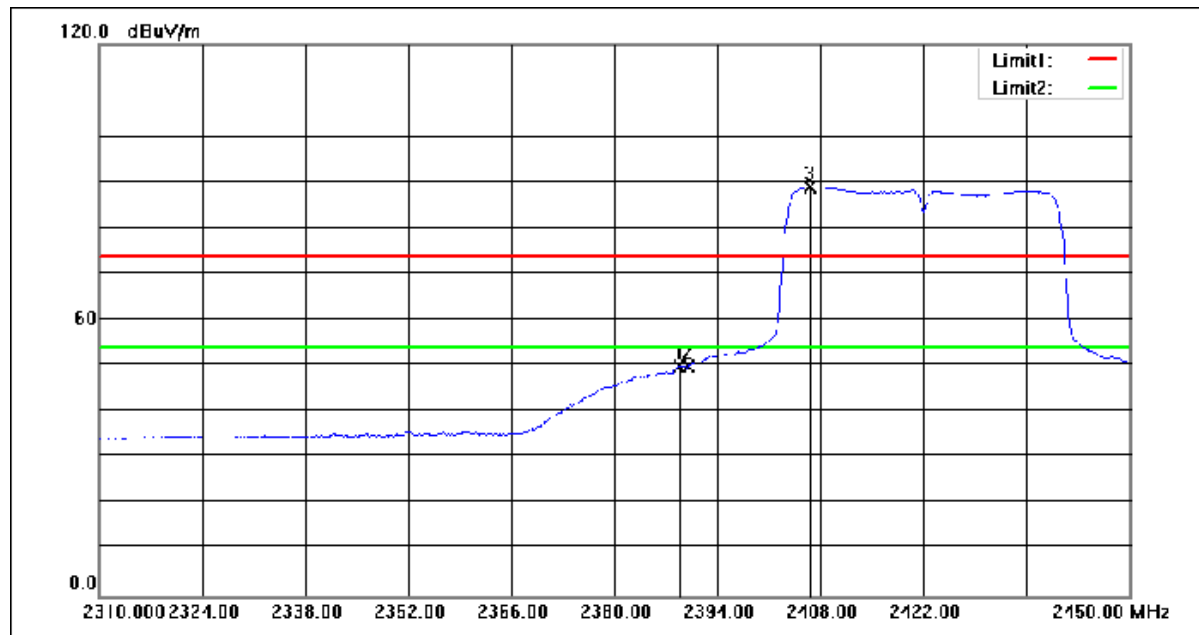
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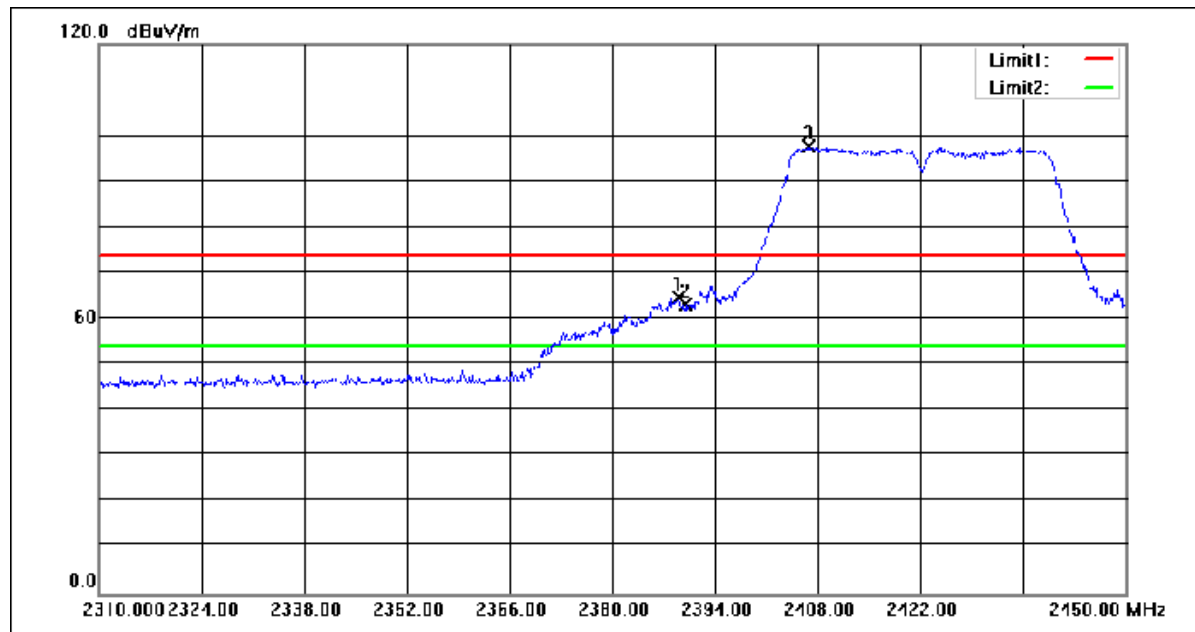
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Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low



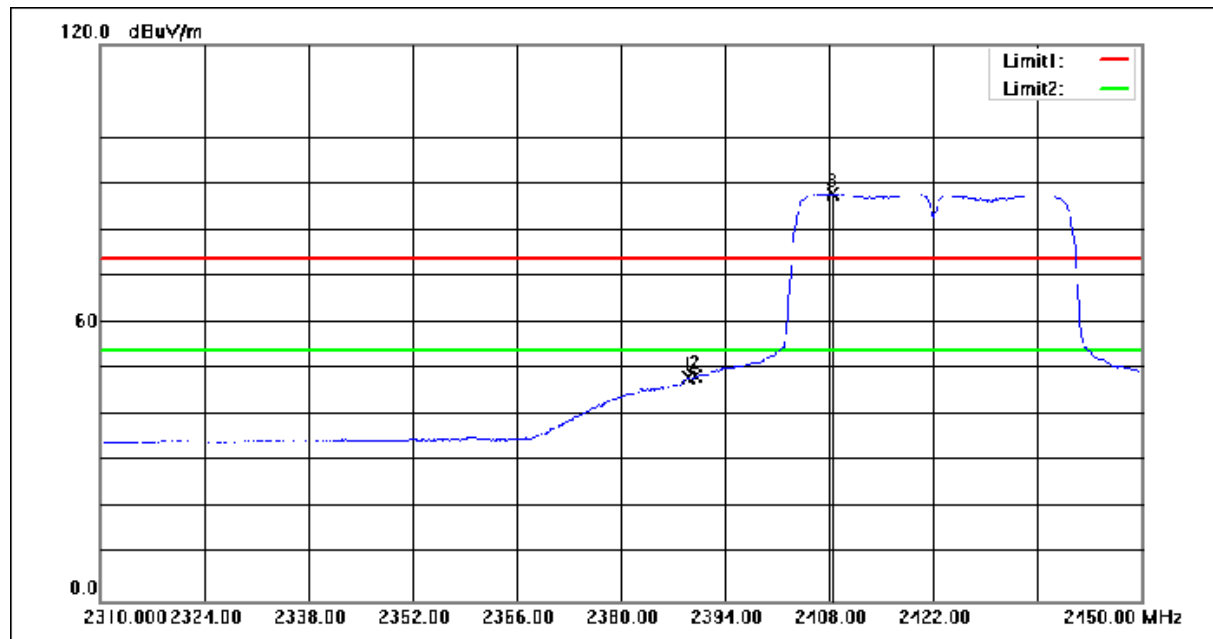
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2388.820	64.01	-14.01	50.00	54.00	-4.00	AVG
2	2390.000	64.09	-14.01	50.08	54.00	-3.92	AVG
3	2406.600	102.95	-13.95	89.00	54.00	35.00	AVG

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low



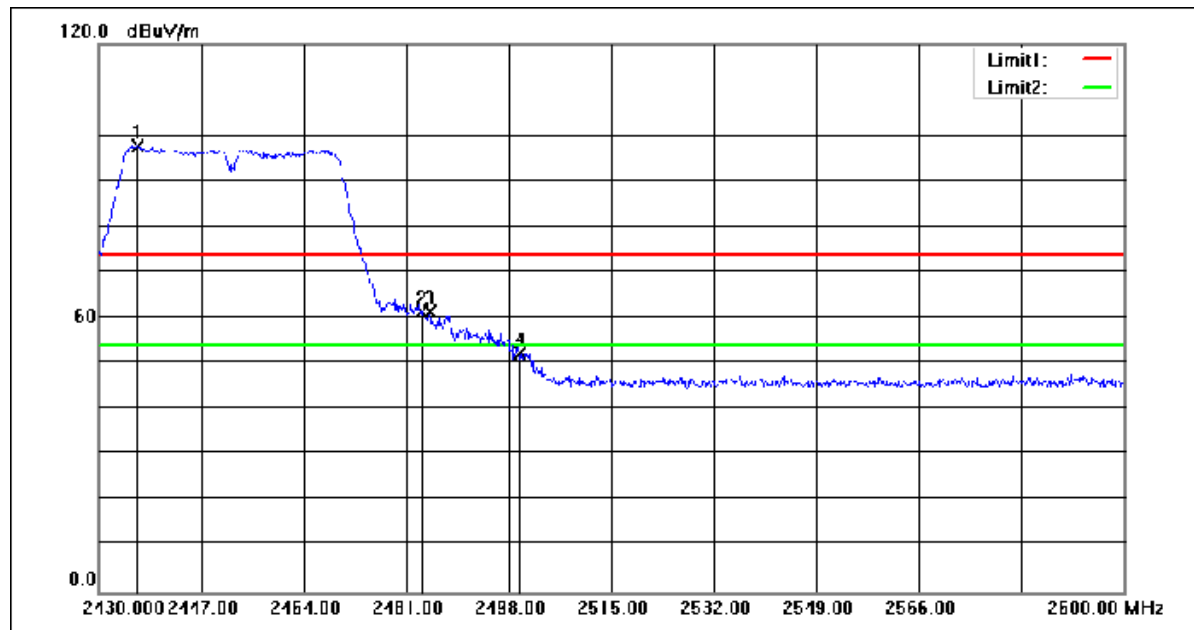
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.100	78.73	-14.01	64.72	74.00	-9.28	peak
2	2390.000	77.30	-14.01	63.29	74.00	-10.71	peak
3	2406.740	111.56	-13.95	97.61	74.00	23.61	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2389.100	62.28	-14.01	48.27	54.00	-5.73	AVG
2	2390.000	62.44	-14.01	48.43	54.00	-5.57	AVG
3	2408.420	101.80	-13.95	87.85	54.00	33.85	AVG

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2436.460	111.56	-13.86	97.70	74.00	23.70	peak
2	2483.500	74.91	-13.71	61.20	74.00	-12.80	peak
3	2484.910	74.98	-13.70	61.28	74.00	-12.72	peak
4	2500.000	65.92	-13.64	52.28	74.00	-21.72	peak



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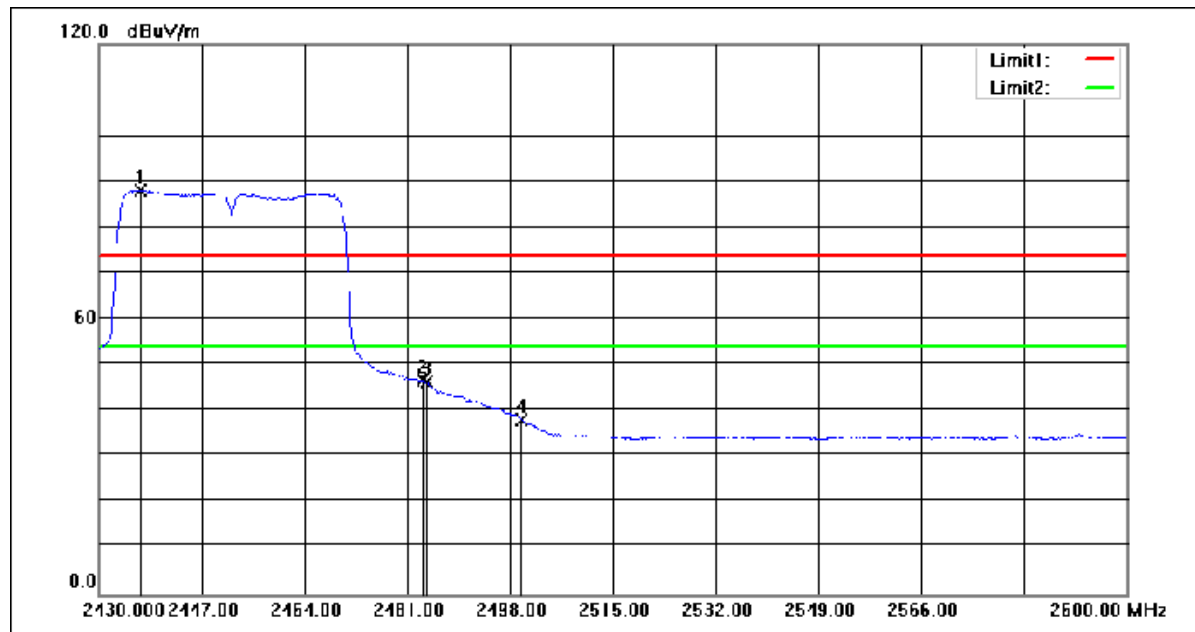
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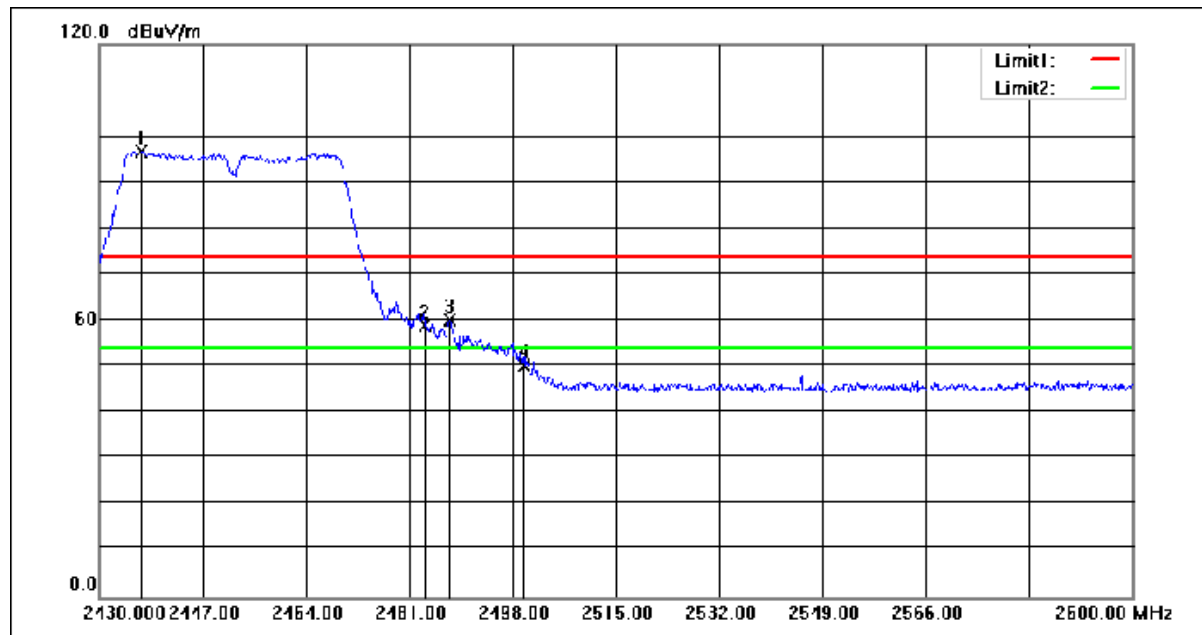
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Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High



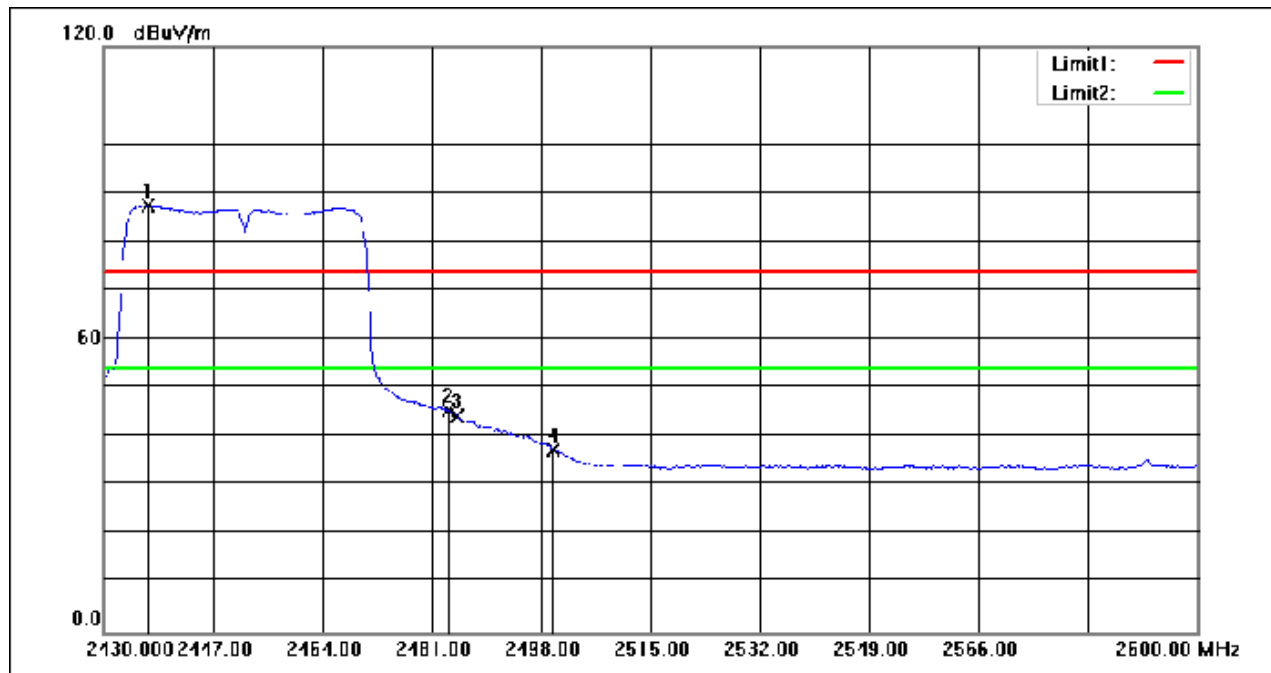
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2436.800	101.96	-13.86	88.10	54.00	34.10	AVG
2	2483.500	60.31	-13.71	46.60	54.00	-7.40	AVG
3	2484.230	59.90	-13.70	46.20	54.00	-7.80	AVG
4	2500.000	51.73	-13.64	38.09	54.00	-15.91	AVG

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2436.800	110.70	-13.86	96.84	74.00	22.84	peak
2	2483.500	72.78	-13.71	59.07	74.00	-14.93	peak
3	2487.630	73.73	-13.70	60.03	74.00	-13.97	peak
4	2500.000	63.98	-13.64	50.34	74.00	-23.66	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2436.970	101.32	-13.86	87.46	54.00	33.46	AVG
2	2483.500	59.14	-13.71	45.43	54.00	-8.57	AVG
3	2484.910	58.04	-13.70	44.34	54.00	-9.66	AVG
4	2500.000	50.97	-13.64	37.33	54.00	-16.67	AVG



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7.8 Radiated Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.247(d)

Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6

Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
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: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.



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7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

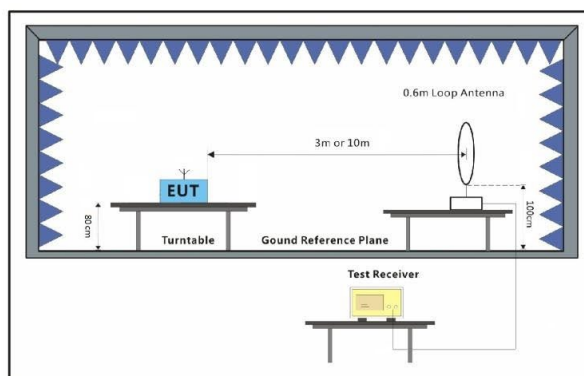
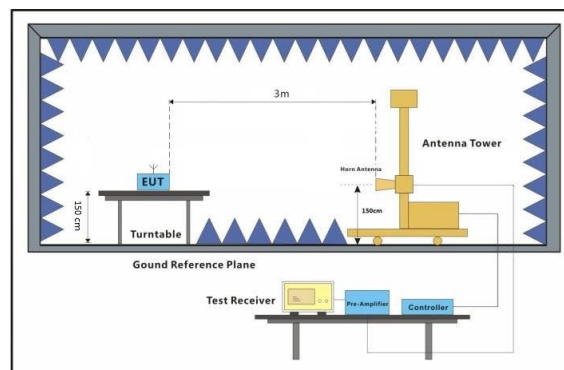
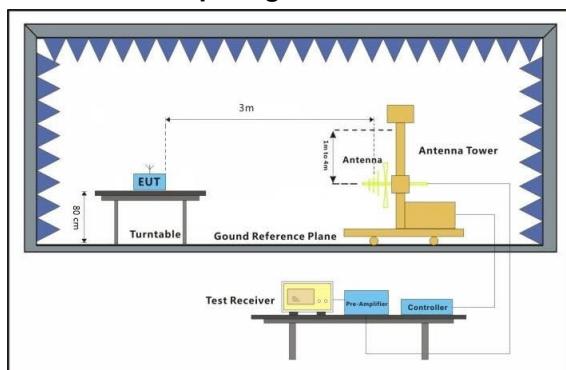
Pretest these modes to find the worst case: a:TX mode_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

The worst case for final test:

b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

7.8.2 Test Setup Diagram



7.8.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.
- 5) This test item was investigated while operating in SISO and MIMO mode, however, it was determined that SISO antenna 1 operation for b/g modulation and MIMO antenna operation for n modulation produced the worst emissions. So the emissions produced from other operation are not recorded in report.



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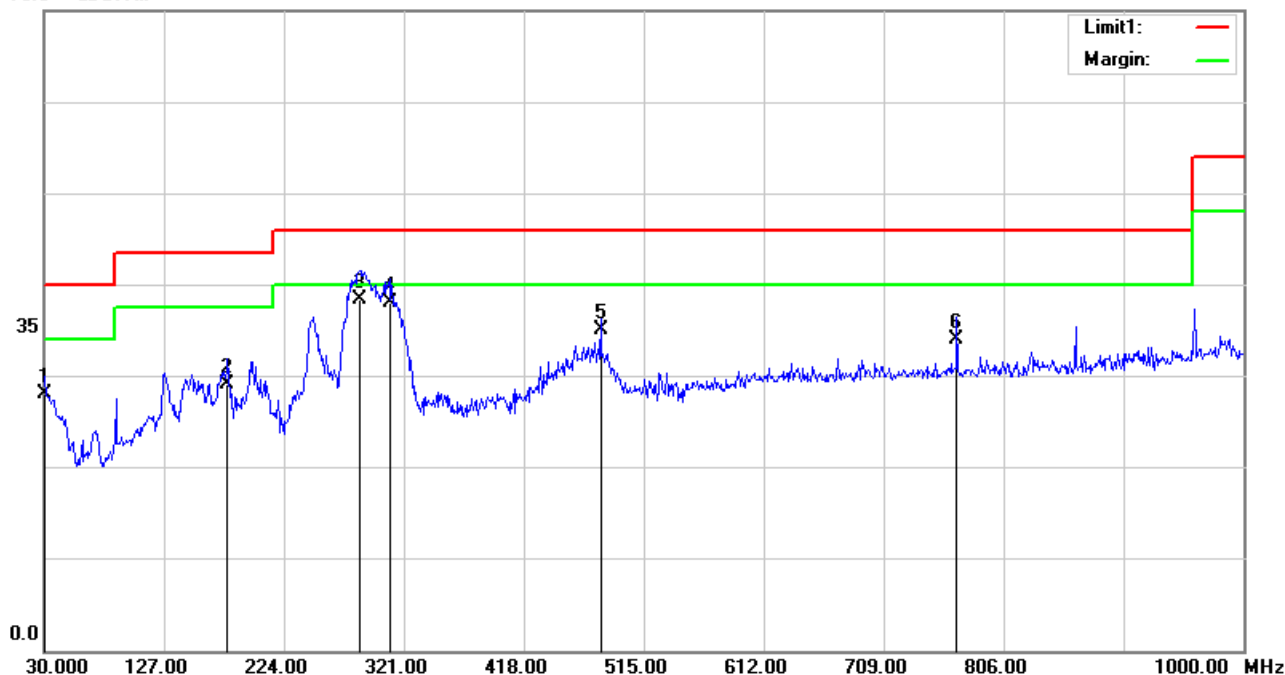
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30MHz-1GHz

Horizontal

70.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	30.9700	2.65	25.38	28.03	40.00	-11.97	100	360	QP
2	178.4100	11.22	17.93	29.15	43.50	-14.35	200	253	QP
3	285.1100	18.18	20.23	38.41	46.00	-7.59	100	260	QP
4	309.3600	17.08	20.95	38.03	46.00	-7.97	100	152	QP
5	480.0800	10.14	24.87	35.01	46.00	-10.99	150	11	QP
6	768.1700	6.51	27.61	34.12	46.00	-11.88	100	25	QP



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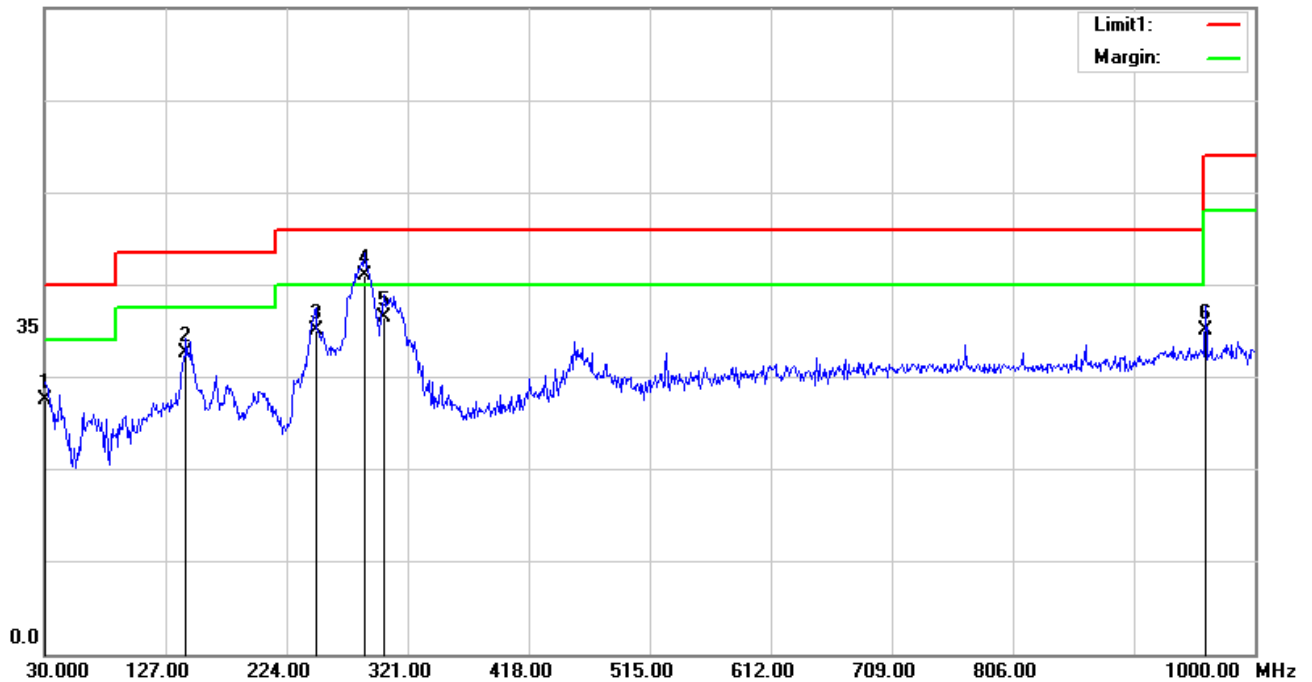
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Vertical

70.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (deg.)	Remark
1	30.0000	1.69	25.93	27.62	40.00	-12.38	100	262	QP
2	143.4900	12.69	19.93	32.62	43.50	-10.88	100	236	QP
3	247.2800	15.95	19.15	35.10	46.00	-10.90	150	111	QP
4	287.0500	20.74	20.28	41.02	46.00	-4.98	200	152	QP
5	302.5700	15.81	20.71	36.52	46.00	-9.48	150	230	QP
6	960.2300	5.86	29.28	35.14	54.00	-18.86	100	25	QP



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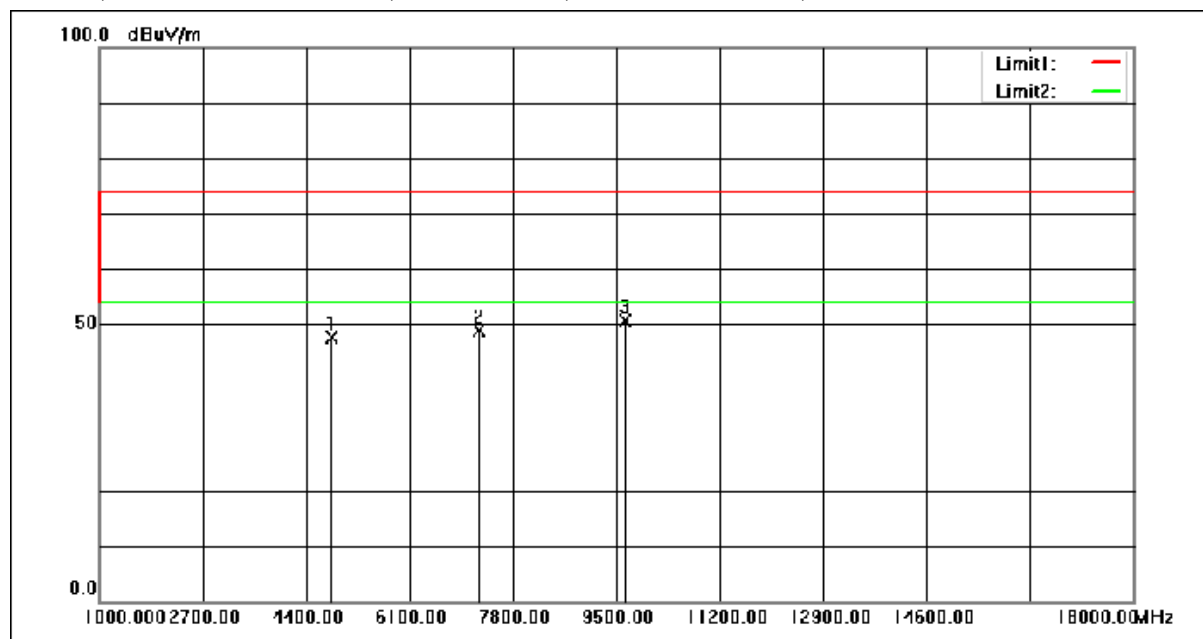
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Above 1GHz

Mode:b; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4824.000	56.36	-8.78	47.58	74.00	-26.42	peak
2	7236.000	54.81	-5.86	48.95	74.00	-25.05	peak
3	9648.000	52.05	-1.31	50.74	74.00	-23.26	peak



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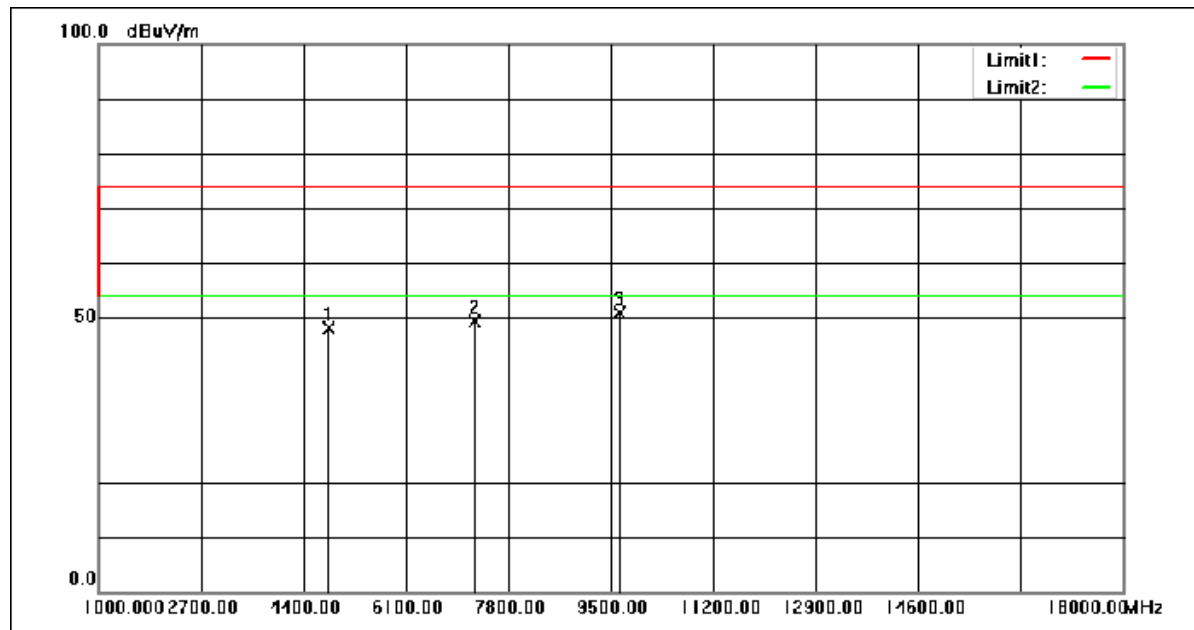
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Mode:b; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4824.000	57.00	-8.78	48.22	74.00	-25.78	peak
2	7236.000	55.21	-5.86	49.35	74.00	-24.65	peak
3	9648.000	52.25	-1.31	50.94	74.00	-23.06	peak



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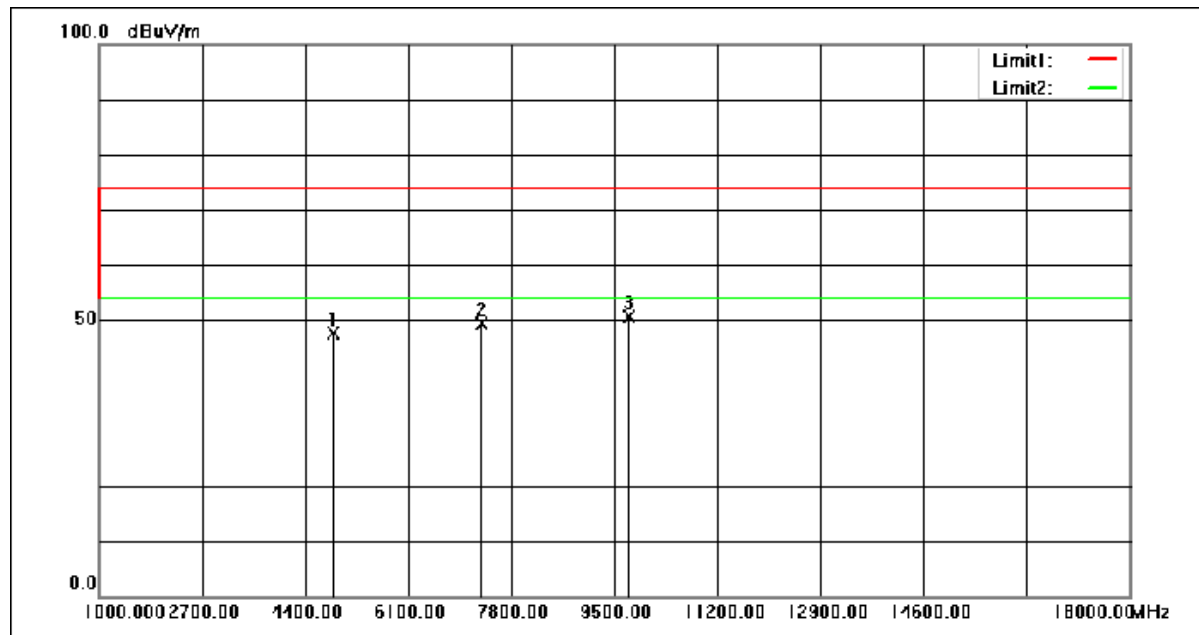
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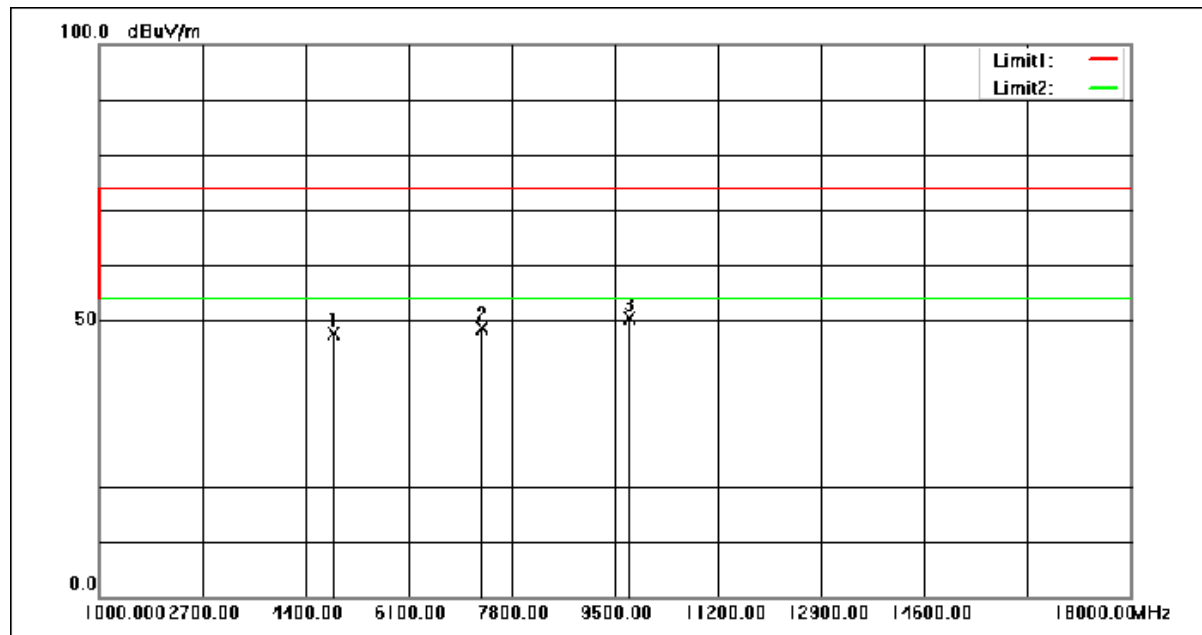
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Mode:b; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:middle



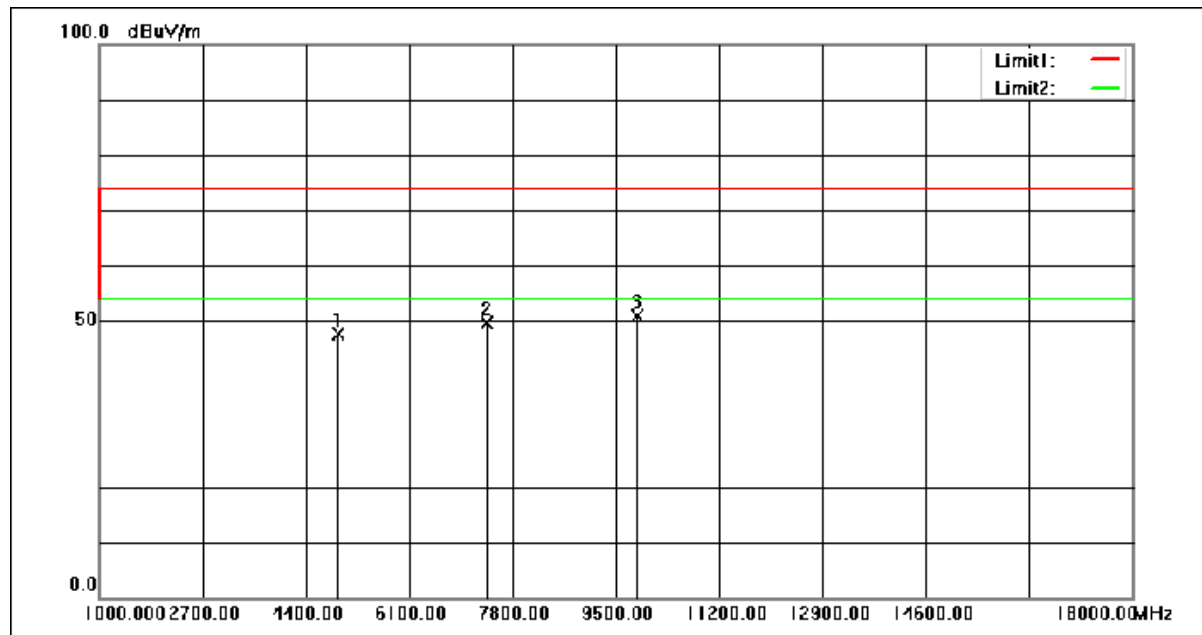
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1	4874.000	56.26	-8.61	47.65	74.00	-26.35	peak
2	7311.000	55.13	-5.78	49.35	74.00	-24.65	peak
3	9748.000	52.15	-1.43	50.72	74.00	-23.28	peak

Mode:b; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:middle



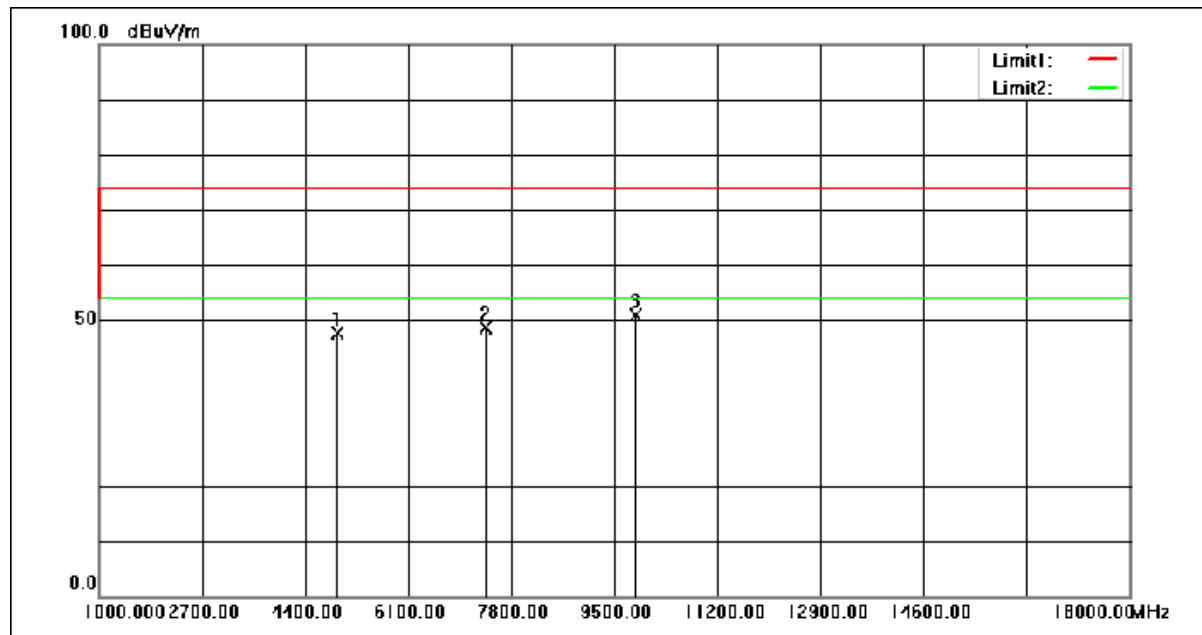
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1	4874.000	56.16	-8.61	47.55	74.00	-26.45	peak
2	7311.000	54.40	-5.78	48.62	74.00	-25.38	peak
3	9748.000	51.77	-1.43	50.34	74.00	-23.66	peak

Mode:b; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4924.000	56.10	-8.44	47.66	74.00	-26.34	peak
2	7386.000	55.30	-5.69	49.61	74.00	-24.39	peak
3	9848.000	52.06	-1.27	50.79	74.00	-23.21	peak

Mode:b; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4924.000	56.12	-8.44	47.68	74.00	-26.32	peak
2	7386.000	54.34	-5.69	48.65	74.00	-25.35	peak
3	9848.000	52.04	-1.27	50.77	74.00	-23.23	peak



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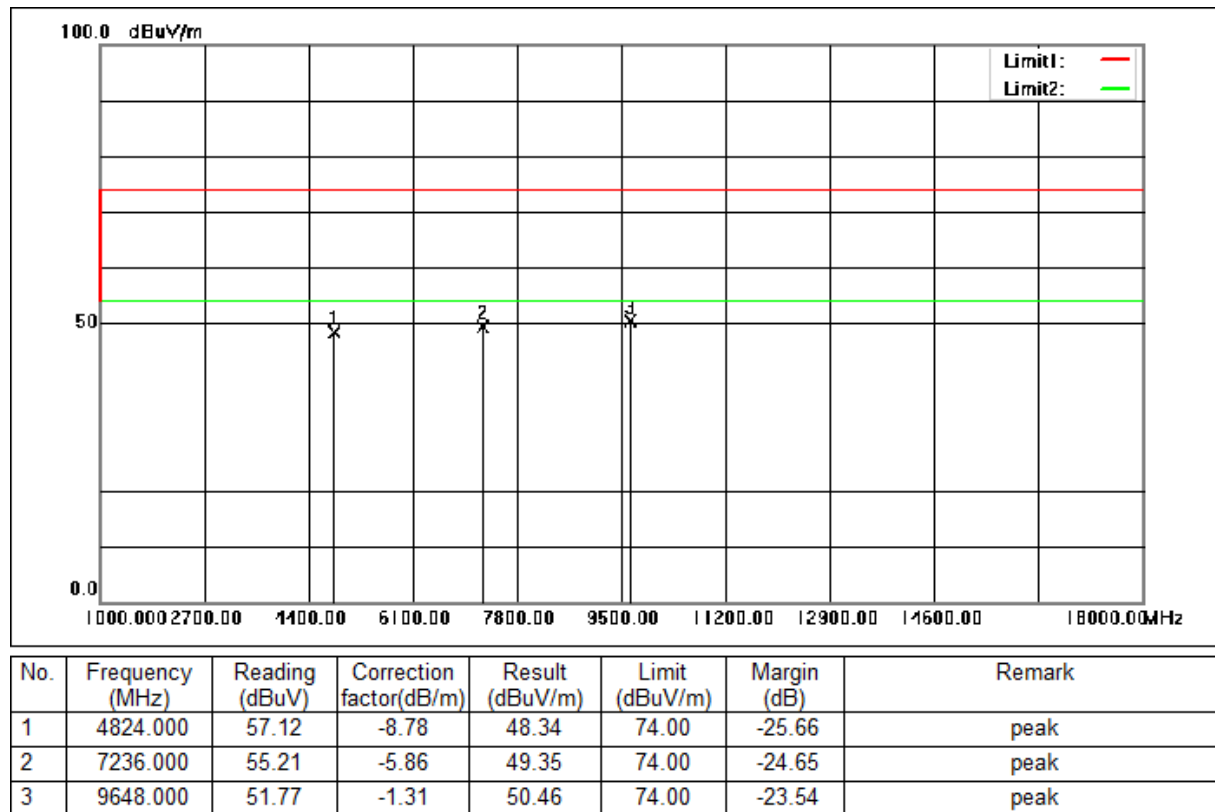
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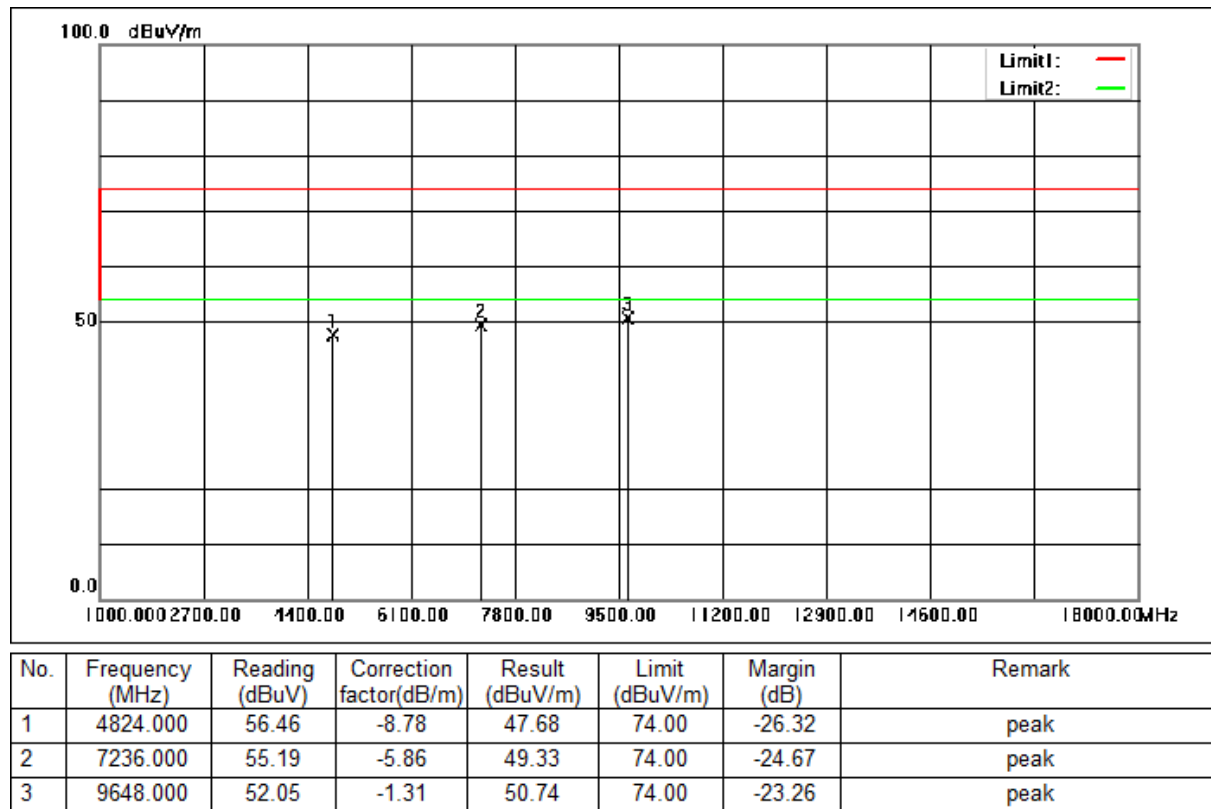
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Mode:b; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:Low



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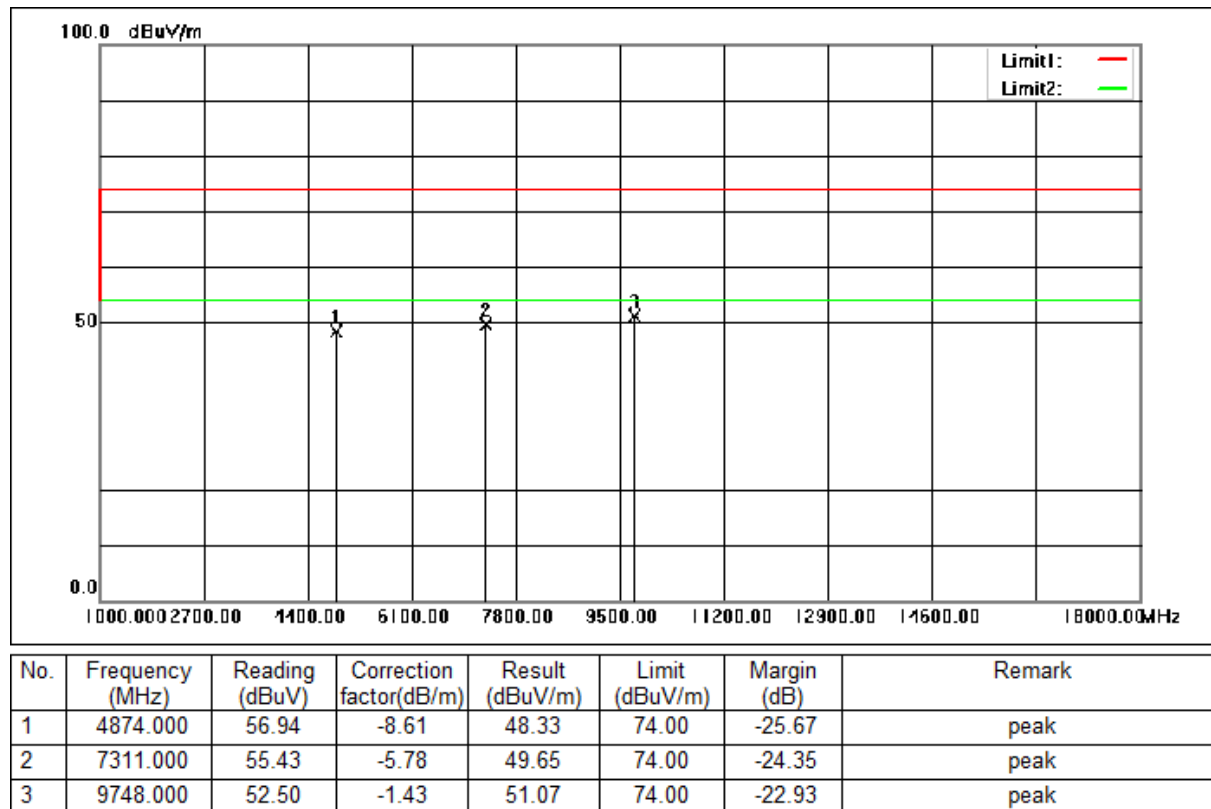
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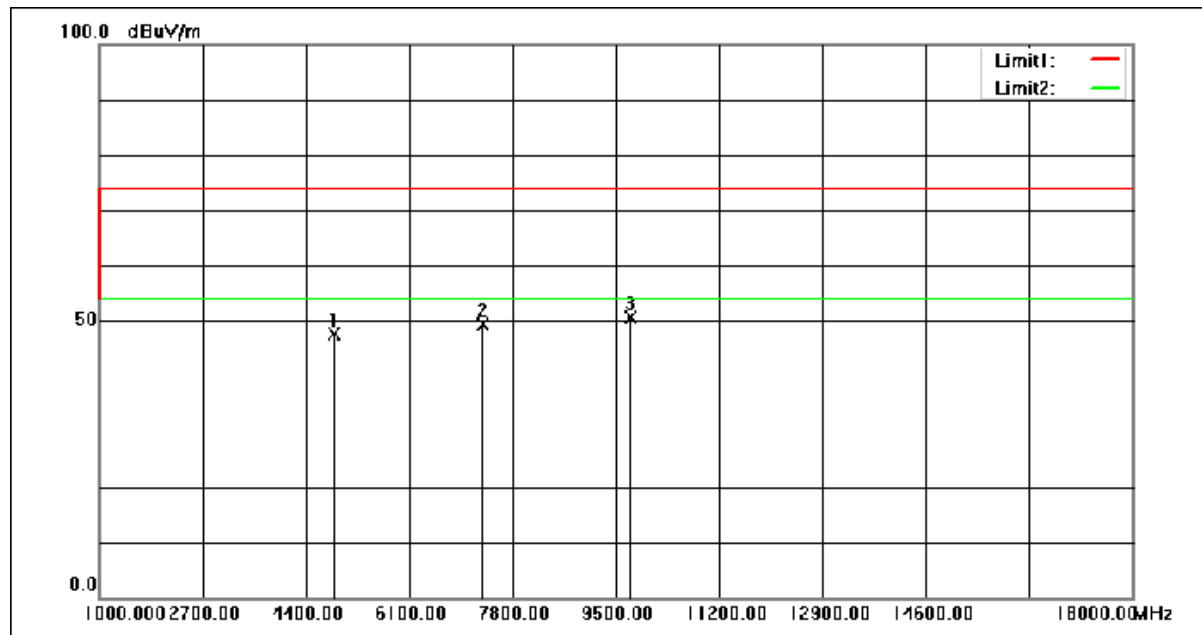
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Mode:b; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:middle



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4874.000	56.29	-8.61	47.68	74.00	-26.32	peak
2	7311.000	55.13	-5.78	49.35	74.00	-24.65	peak
3	9748.000	52.14	-1.43	50.71	74.00	-23.29	peak



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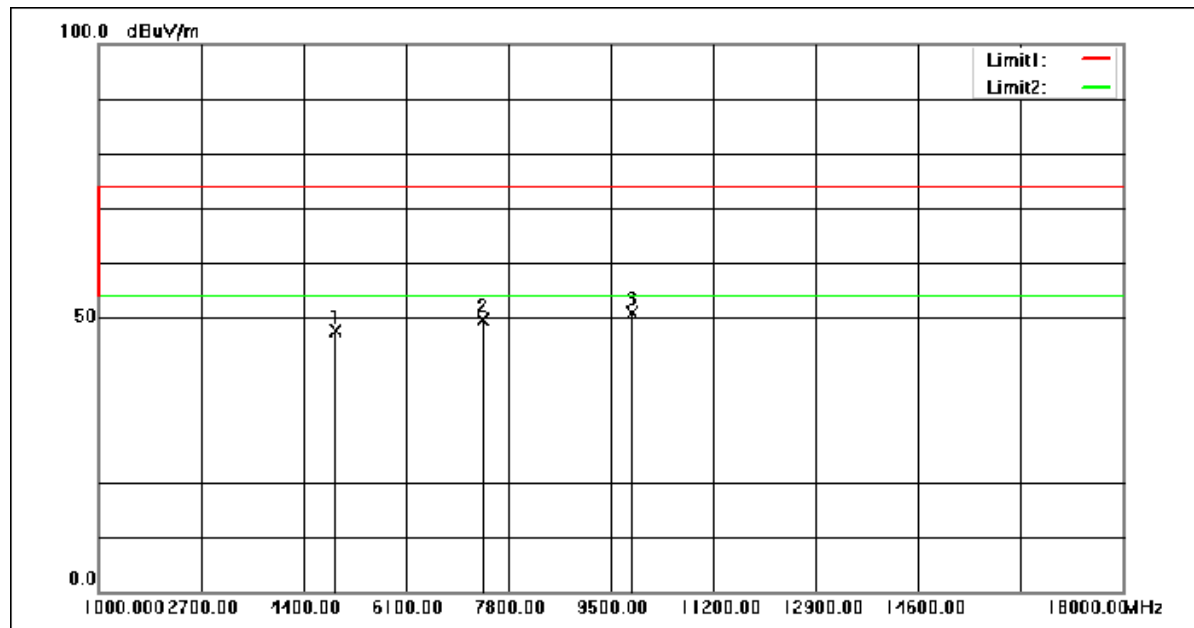
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No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4924.000	56.16	-8.44	47.72	74.00	-26.28	peak
2	7386.000	55.37	-5.69	49.68	74.00	-24.32	peak
3	9848.000	52.03	-1.27	50.76	74.00	-23.24	peak



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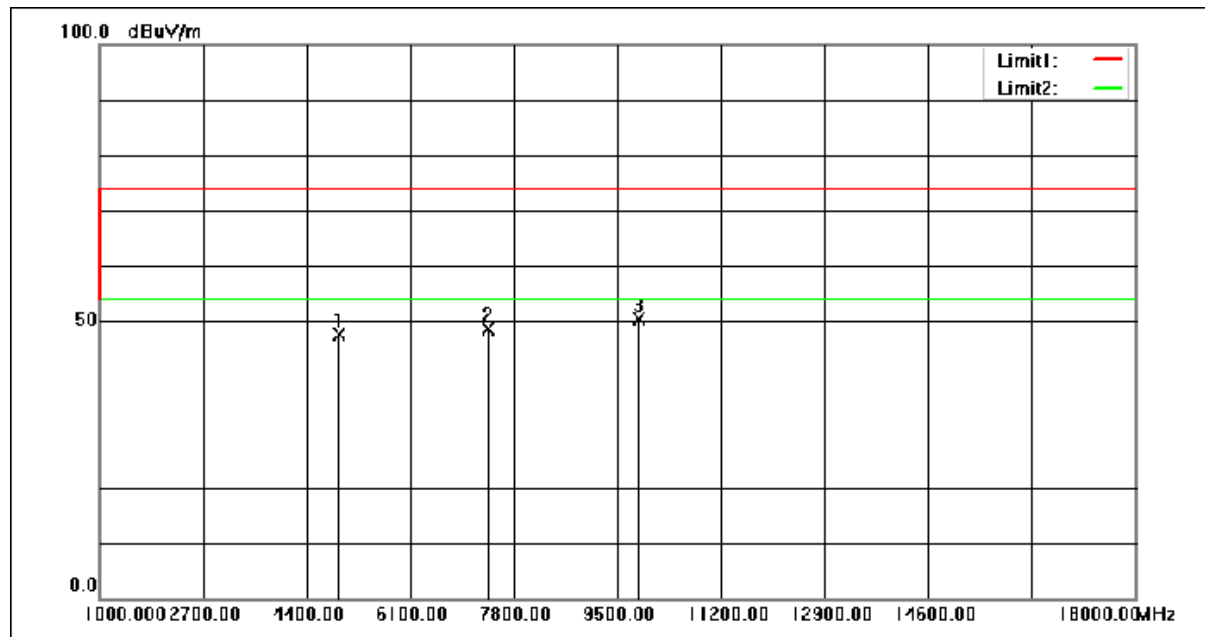
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Mode:b; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4924.000	56.12	-8.44	47.68	74.00	-26.32	peak
2	7386.000	54.39	-5.69	48.70	74.00	-25.30	peak
3	9848.000	51.61	-1.27	50.34	74.00	-23.66	peak



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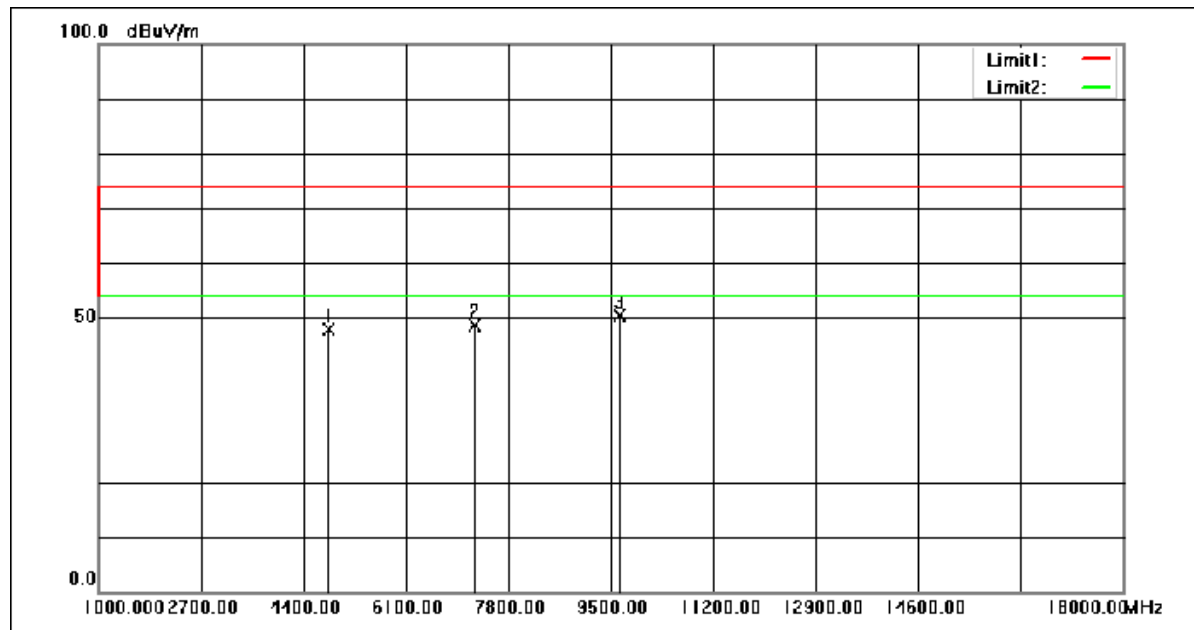
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No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4824.000	56.63	-8.78	47.85	74.00	-26.15	peak
2	7236.000	54.53	-5.86	48.67	74.00	-25.33	peak
3	9648.000	51.79	-1.31	50.48	74.00	-23.52	peak



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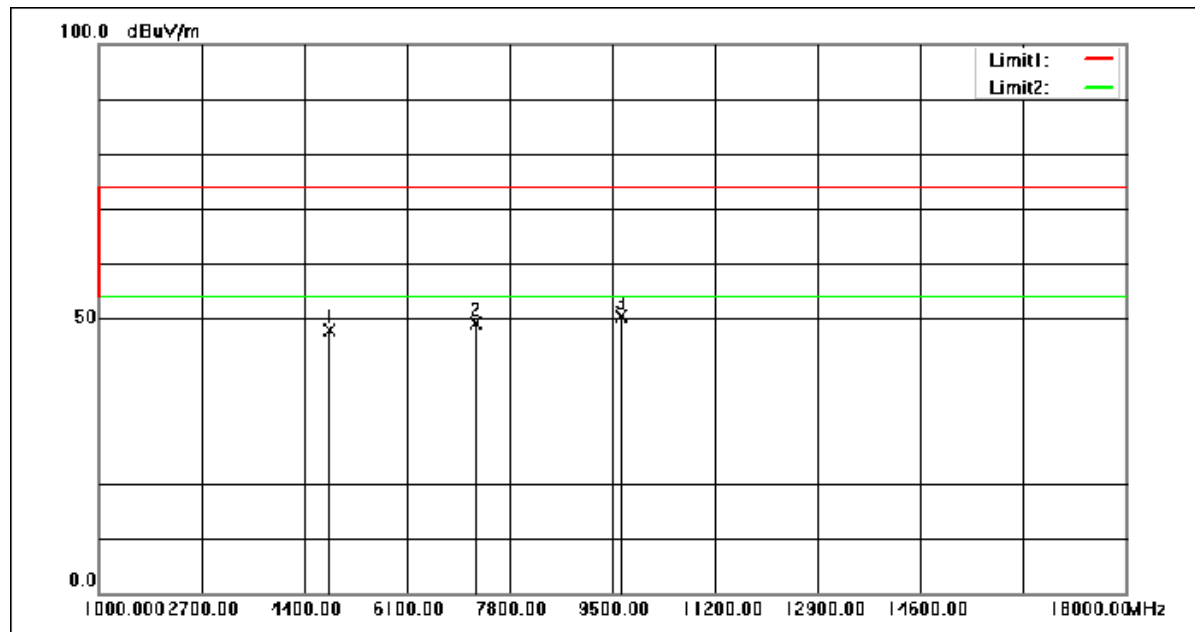
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Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4824.000	56.63	-8.78	47.85	74.00	-26.15	peak
2	7236.000	55.11	-5.86	49.25	74.00	-24.75	peak
3	9648.000	51.78	-1.31	50.47	74.00	-23.53	peak



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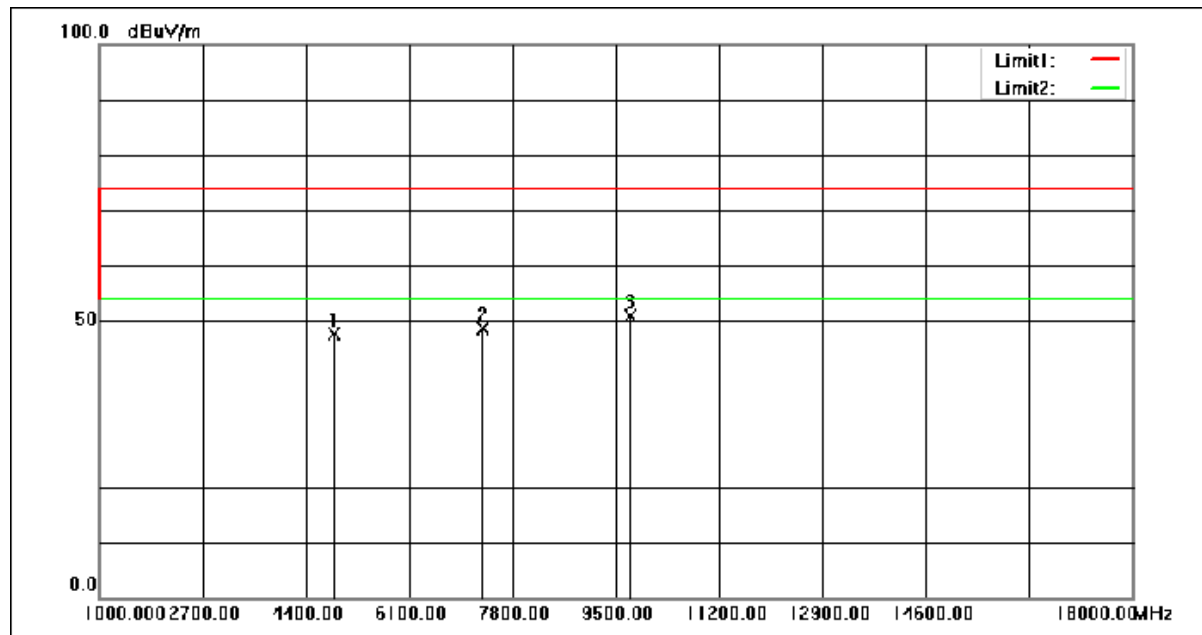
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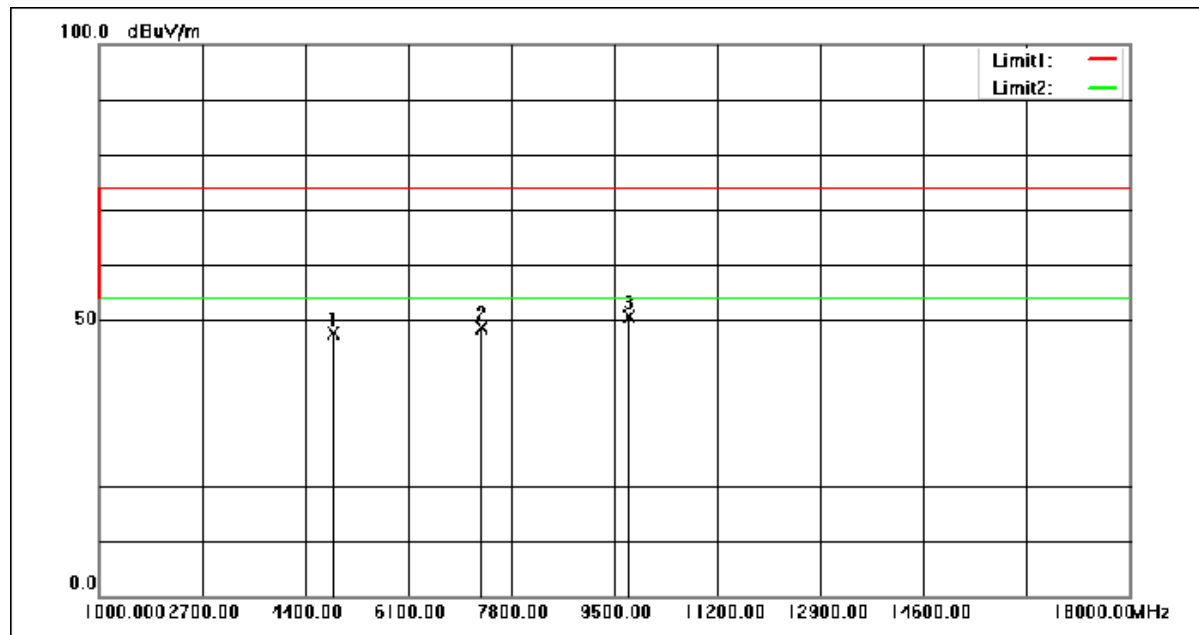
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Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:middle



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4874.000	56.29	-8.61	47.68	74.00	-26.32	peak
2	7311.000	54.45	-5.78	48.67	74.00	-25.33	peak
3	9748.000	52.21	-1.43	50.78	74.00	-23.22	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:middle



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4874.000	56.19	-8.61	47.58	74.00	-26.42	peak
2	7311.000	54.40	-5.78	48.62	74.00	-25.38	peak
3	9748.000	52.16	-1.43	50.73	74.00	-23.27	peak



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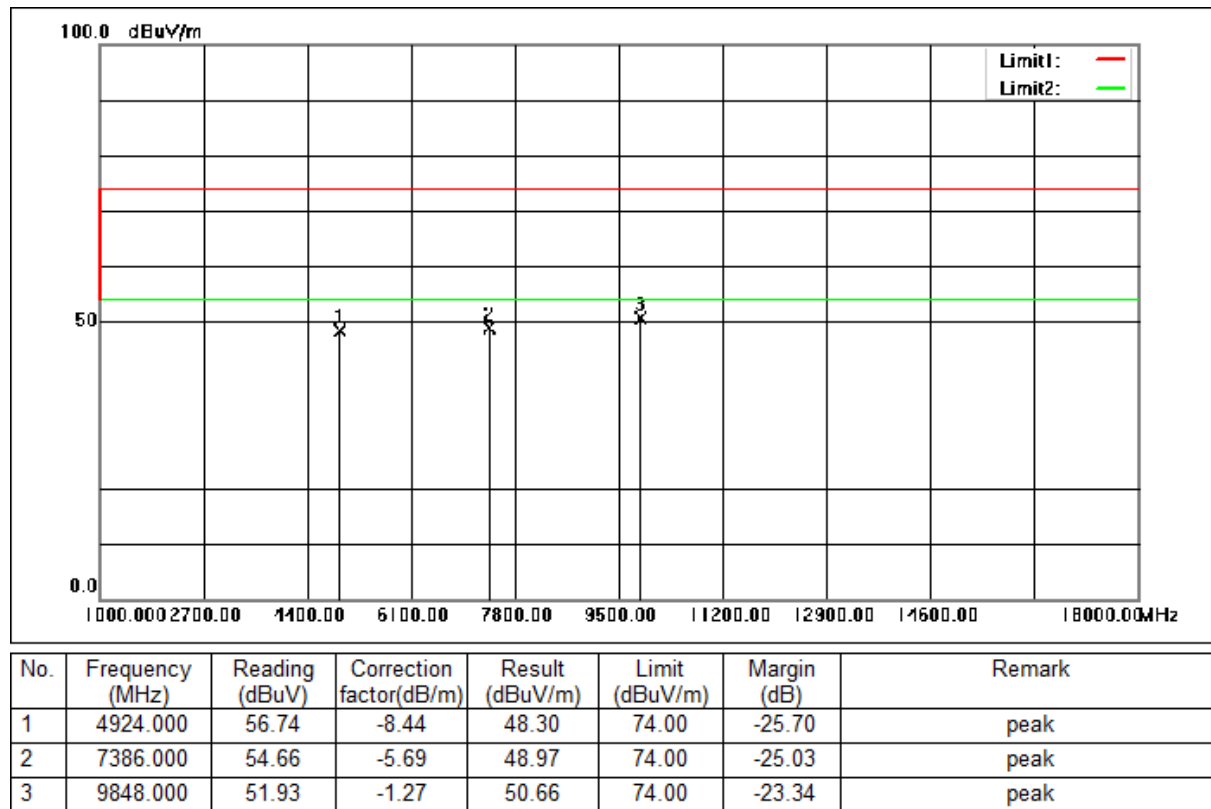
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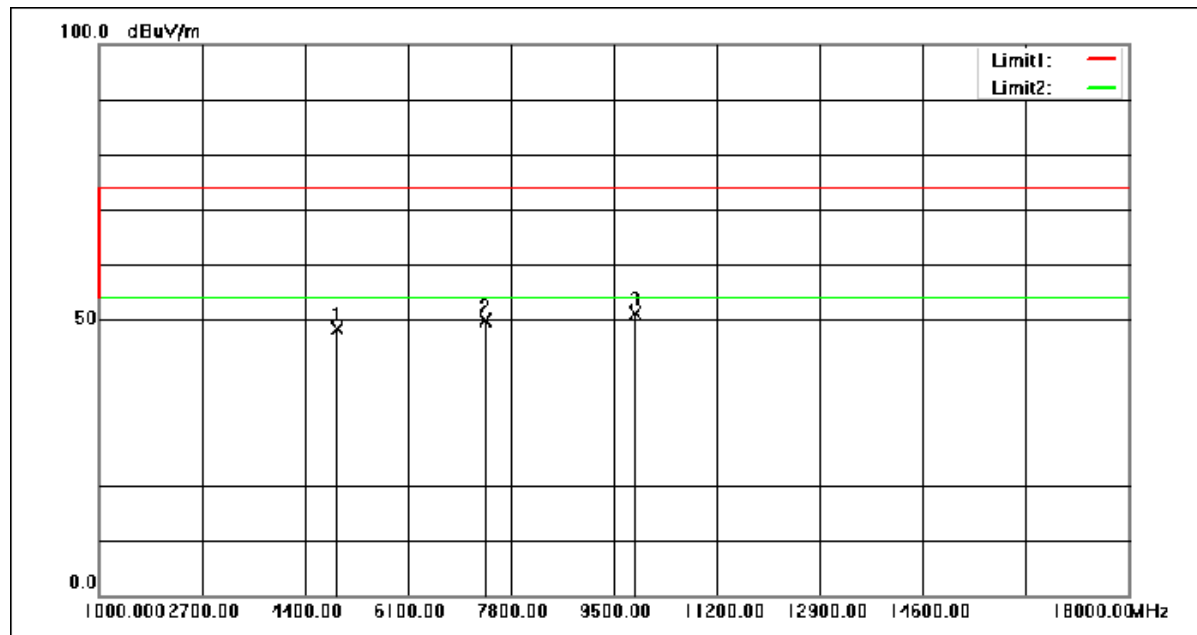
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Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High



Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4924.000	56.81	-8.44	48.37	74.00	-25.63	peak
2	7386.000	55.55	-5.69	49.86	74.00	-24.14	peak
3	9848.000	52.31	-1.27	51.04	74.00	-22.96	peak



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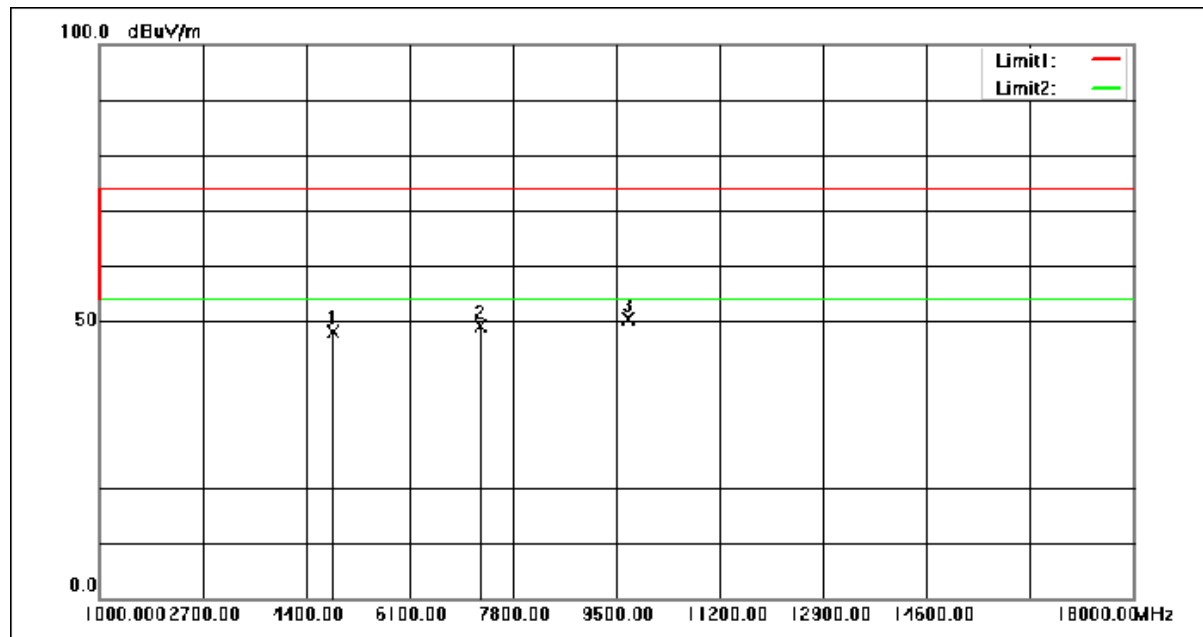
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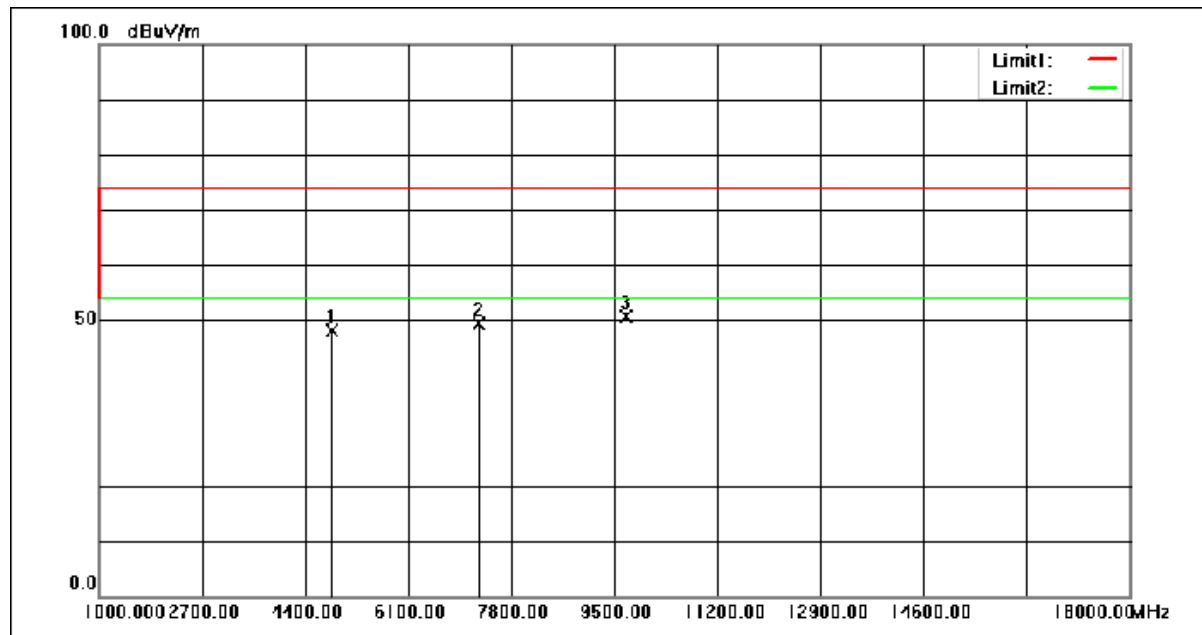
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Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low



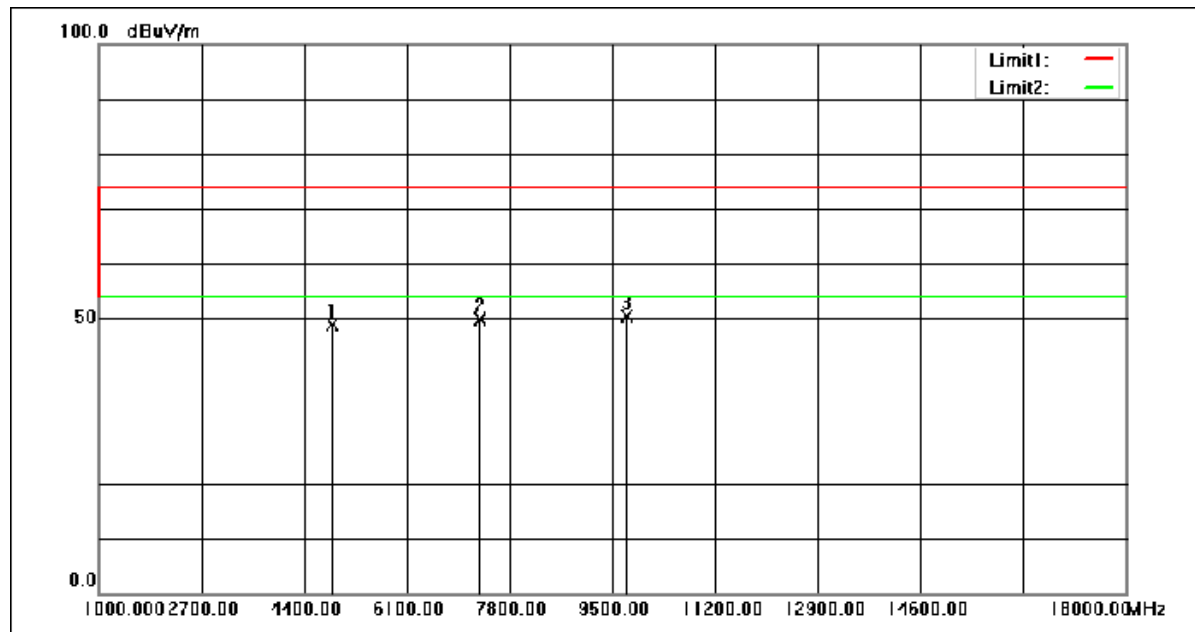
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4844.000	56.96	-8.71	48.25	74.00	-25.75	peak
2	7266.000	54.93	-5.83	49.10	74.00	-24.90	peak
3	9688.000	51.74	-1.36	50.38	74.00	-23.62	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low



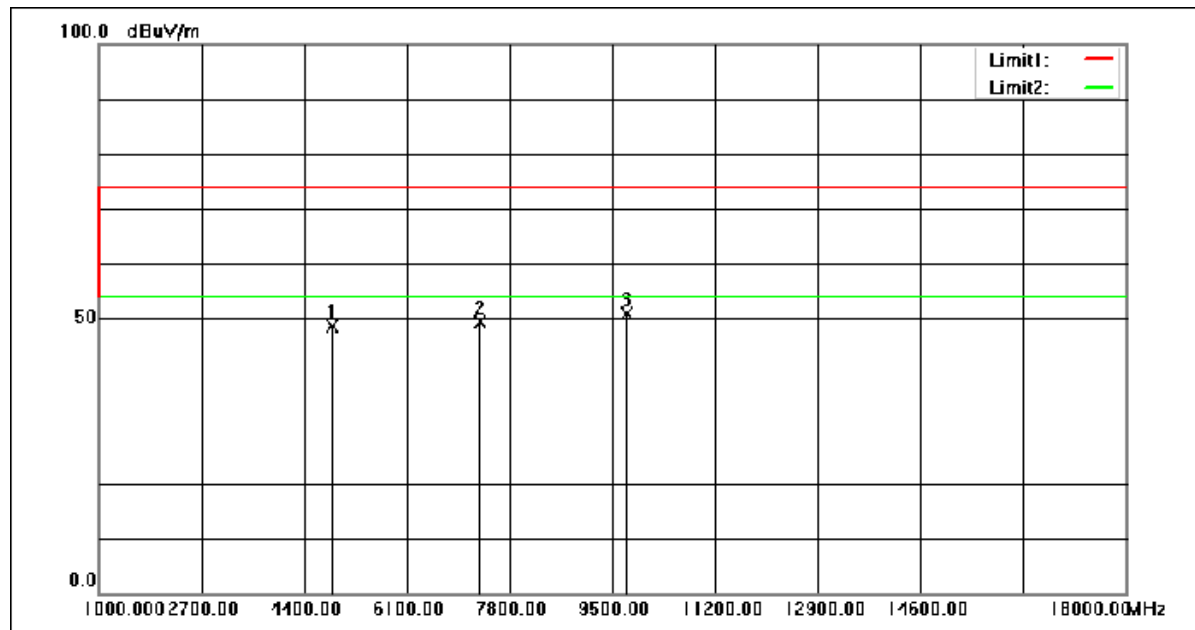
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4844.000	56.72	-8.71	48.01	74.00	-25.99	peak
2	7266.000	55.12	-5.83	49.29	74.00	-24.71	peak
3	9688.000	51.89	-1.36	50.53	74.00	-23.47	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:middle



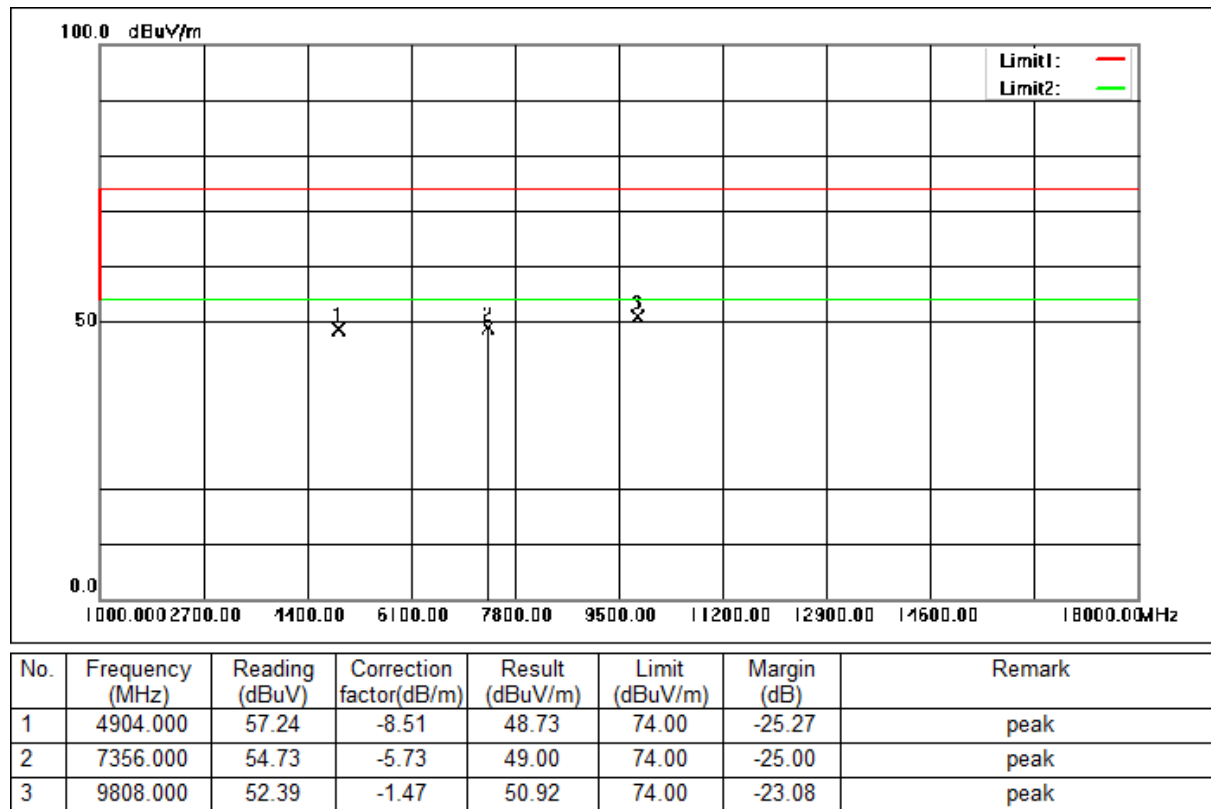
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4874.000	57.46	-8.61	48.85	74.00	-25.15	peak
2	7311.000	55.57	-5.78	49.79	74.00	-24.21	peak
3	9748.000	51.79	-1.43	50.36	74.00	-23.64	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:middle

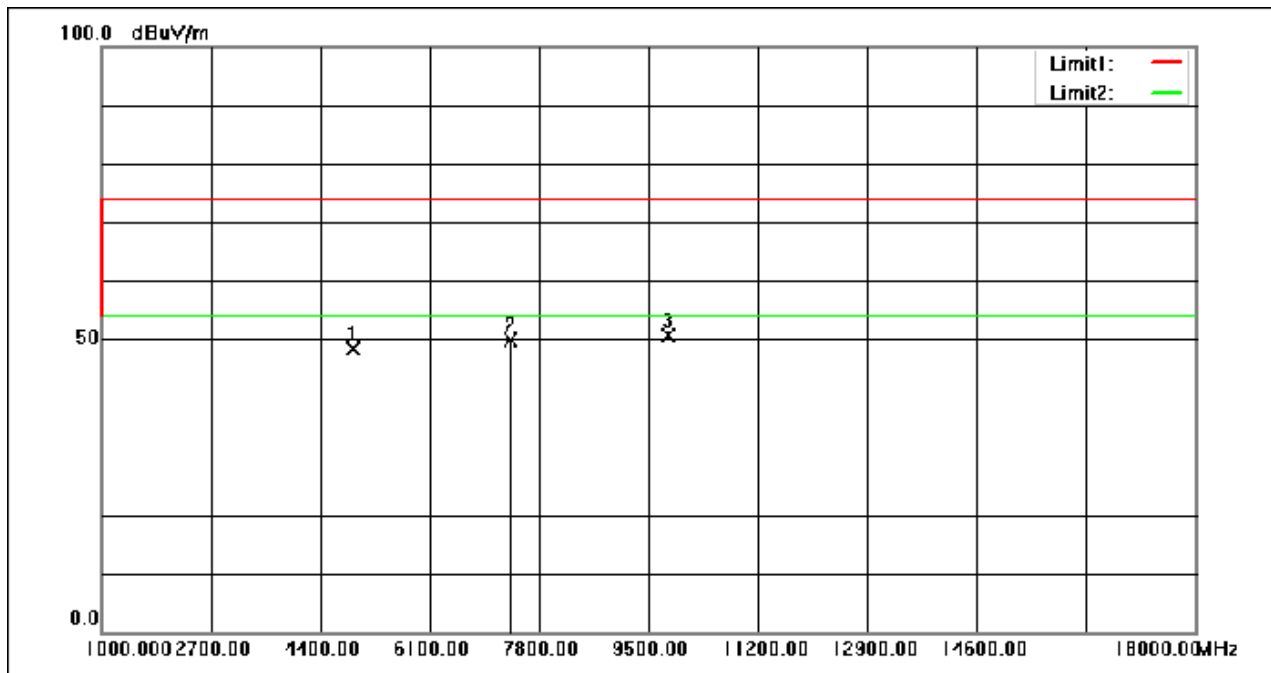


No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4874.000	57.26	-8.61	48.65	74.00	-25.35	peak
2	7311.000	55.09	-5.78	49.31	74.00	-24.69	peak
3	9748.000	52.27	-1.43	50.84	74.00	-23.16	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High



Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4904.000	56.84	-8.51	48.33	74.00	-25.67	peak
2	7356.000	55.60	-5.73	49.87	74.00	-24.13	peak
3	9808.000	52.09	-1.47	50.62	74.00	-23.38	peak

7.9 99% Bandwidth

Test Requirement RSS-Gen Section 6.7

Test Method: ANSI C63.10 Section 6.9.3

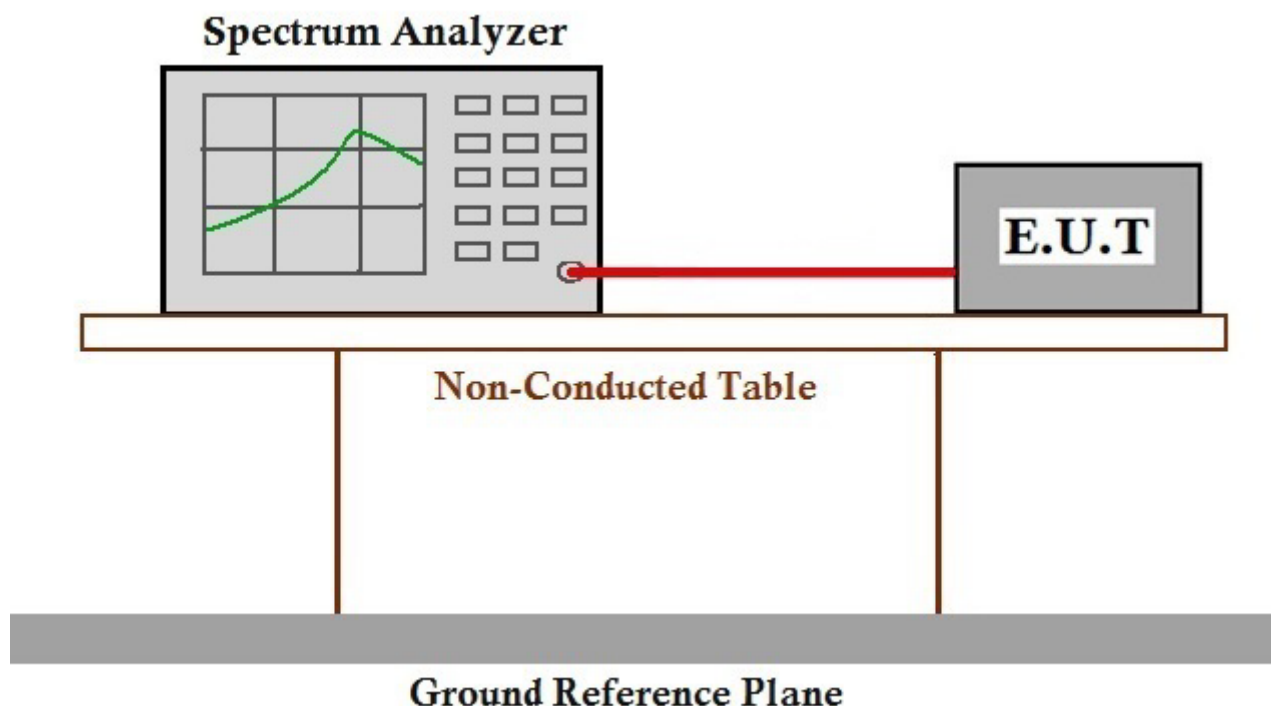
7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:Charge + TX mode_Keep the EUT in charging and continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 1Mbps is the worst case of IEEE 802.11b; data rate @ 6Mbps is the worst case of IEEE 802.11g; data rate @ 6.5Mbps is the worst case of IEEE 802.11n(HT20); data rate @ 13.5Mbps is the worst case of IEEE 802.11n(HT40). Only the data of worst case is recorded in the report.

7.9.2 Test Setup Diagram



7.9.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHCR220100008201



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8 Test Setup Photographs

Refer to the < Test Setup photos >.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

- End of the Report -



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