TEST REPORT

Application No.:	SHEM2003001567CR
FCC ID:	2AH25F4E00
Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant:	Room 605,Block 7,KIC Plaza,No.388 Song Hu Road Yang Pu District,Shanghai,China
Manufacturer:	Shanghai Sunmi Technology Co.,Ltd.
Address of Manufacturer:	Room 605,Block 7,KIC Plaza,No.388 Song Hu Road Yang Pu District,Shanghai,China
Factory:	BYD Precision Manufacture Co.,Ltd
Address of Factory:	No.3001,Bao He Road,Baolong Industry Zone,Longgang Sub-district,Longgang District,Shenzhen,Guangdong Province,China
Equipment Under Test (EUT):	
EUT Name:	Self-Checkout Kiosk
Model No.:	F4E00
Trade mark:	SUNMI
Standard(s) :	47 CFR Part 15, Subpart E 15.407
Date of Receipt:	2020-03-19
Date of Test:	2020-03-15 to 2020-05-14
Date of Issue:	2020-05-16
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan

Parlam Zhan
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2020-05-16	/

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

2 Test Summary

Radio Spectrum Technical Requirement

Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart E 15.407	N/A	47 CFR Part 15, Subpart C 15.203	Pass
Transmission in the Absence of Data	47 CFR Part 15, Subpart E 15.407	N/A	47 CFR Part 15, Subpart C 15.407 (c)	Pass

N/A: Not applicable

Radio Spectrum Matter Part

Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart E 15.407	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207 & 15.407 b(6)	Pass
99% Bandwidth	47 CFR Part 15, Subpart E 15.407	KDB 789033 II D	N/A	Pass
26dB Emission bandwidth	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II C 1	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Minimum 6 dB bandwidth (5.725-5.85 GHz band)	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II C 2	47 CFR Part 15, Subpart C 15.407 (e)	Pass
Maximum Conducted output power	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II E	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Peak Power spectrum density	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II F	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Radiated Emissions	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II G	47 CFR Part 15, Subpart C 15.209 & 15.407(b)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II G	47 CFR Part 15, Subpart C 15.209 & 15.407(b)	Pass
Frequency Stability	47 CFR Part 15, Subpart E 15.407	ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.407 (g)	Pass

N/A: Not applicable

Remark: The product has two kinds of scan header optional, EM20-80 and 3450Vsi. Both two scan headers have evaluated EMC and won’t affect RF characteristics.

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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 100~240V 50/60Hz
Test voltage:	AC 120V/60Hz

Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	Band 1	802.11a/n(HT20)/ac(HT20)	5180-5240	4
		802.11n(HT40)/ac(HT40)	5190-5230	2
		802.11ac(HT80)	5210	1
	Band 4	802.11a/n(HT20)/ac(HT20)	5745-5825	5
		802.11n(HT40)/ac(HT40)	5755-5795	2
		802.11ac(HT80)	5775	1
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)			
Channel Spacing:	802.11a/n(HT20)/ac(HT20): 20MHz 802.11n(HT40)/ac(HT40): 40MHz 802.11ac(HT80): 80MHz			
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0-7 802.11ac: MCS0-9			
Antenna Gain:	2 dBi			
Antenna Type:	PIFA Antenna			

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	ThinkPad X100e	/
Serial port adapter plate	/	Test Plate 3	/

4.3 Power level setting using in test

Channel	802.11a	802.11n(HT20)	802.11ac(VHT20)
5180	Default	Default	Default
5200	Default	Default	Default
5240	Default	Default	Default
5745	Default	Default	Default
5785	Default	Default	Default
5825	Default	Default	Default
Channel	802.11n(HT40)	802.11ac(VHT40)	
5190	Default	Default	
5230	Default	Default	
5755	Default	Default	
5795	Default	Default	

Channel	802.11ac(VHT80)
5210	Default
5775	Default

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	±8.4 x 10^{-8}
2	Timeout	±2s
3	Duty cycle	±0.37%
4	Occupied Bandwidth	±3%
5	RF conducted power	±0.6dB
6	RF power density	±2.84dB
7	Conducted Spurious emissions	±0.75dB
8	RF Radiated power	±4.6dB (Below 1GHz)
		±4.1dB (Above 1GHz)
9	Radiated Spurious emission test	±4.2dB (Below 30MHz)
		±4.4dB (30MHz-1GHz)
		±4.8dB (1GHz-18GHz)
		±5.2dB (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.

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 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.

CAB Identifier: CN0072.

- **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-1600, C-1707, T-1499, G-10216 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

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	02/24/2020	02/23/2021
2	LISN	R&S	ENV216	101604	10/24/2019	10/23/2020
3	LISN	Schwarzbeck	NNLK 8129	8129-143	10/24/2019	10/23/2020
4	Pulse Limiter	R&S	ESH3-Z2	100609	02/24/2020	02/23/2021
5	CE test Cable	Thermax	/	14	02/24/2020	02/23/2021
RF Conducted Test						
1	Spectrum Analyzer	Agilent	E4446A	MY44020154	07/03/2019	07/02/2020
2	Spectrum Analyzer	Keysight	N9020A	MY55370209	12/19/2019	12/18/2020
3	Signal Generator	Agilent	E8257C	MY43321570	10/24/2019	10/23/2020
4	Vector Signal Generator	R&S	SMU 200A	102744	02/24/2020	02/23/2021
5	Universal Radio Communication Tester	R&S	CMU200	109525	12/19/2019	12/18/2020
6	Universal Radio Communication Tester	R&S	CMW500	159275	12/19/2019	12/18/2020
7	Power Meter	Anritsu	ML2495A	1445010	04/21/2019	04/20/2020
8	Power Meter	Anritsu	ML2495A	1445010	04/21/2020	04/20/2021
9	Switcher	CCSRF	FY562	KS301219	12/20/2019	12/19/2020
10	AC Power Source	EXTECH	6605	1570106	N.C.R	N.C.R
11	DC Power Supply	Aglient	E3632A	MY50340053	N.C.R	N.C.R
12	6dB Attenuator	Mini-Circuits	NAT-6-2W	15542-1	N.C.R	N.C.R
13	Power Divider	AISI	IOWOPE2068	PE2068	N.C.R	N.C.R
14	Filter	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
15	Conducted test cable	/	RF01-RF04	/	04/21/2019	04/20/2020
16	Conducted test cable	/	RF01-RF04	/	04/21/2020	04/22/2021
17	Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	04/21/2019	04/20/2020
18	Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	04/21/2020	04/20/2021
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	101493	01/08/2020	01/07/2021
2	Signal Generator	Agilent	E8257C	MY43321570	10/24/2019	10/23/2020
3	Loop Antenna	Schwarzbeck	HXYZ9170	9170-108	02/24/2020	02/23/2021
4	Bilog Antenna	TESEQ	CBL 6112D	35403	06/22/2019	06/21/2020
5	Bilog Antenna	SCHWARZBECK	VULB9160	9160-3342	04/29/2019	04/28/2021
6	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	267	11/04/2018	11/03/2020
7	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/25/2019	02/24/2021
8	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	BBHA9170171	02/27/2018	02/26/2021
9	Pre-Amplifier(30MHz~18GHz)	CCSRF	AMP1277	1	12/19/2019	12/18/2020
10	Pre-Amplifier(0.1~26.5GHz)	EMCI	EMC012645	980060	07/03/2019	07/02/2020
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
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	/	04/21/2019	04/20/2020
24	RE test cable	/	RE01-RE04	/	04/21/2020	04/22/2021

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

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 antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is PIFA and no consideration of replacement. The best case gain of the antenna is 2dBi.

Antenna location: Refer to Appendix (Internal Photos)

6.2 Transmission in the Absence of Data

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.407 (c)

6.2.2 Conclusion

Standard Requirement:

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Applicants shall include in their application for equipment authorization a description of how this requirement is met.

EUT Details:

WIFI chip (AP6255) support automatically discontinue transmission in case of either absence of information to transmit or operational failure, if the chip detect absence of information to transmit or operational failure, it will be automatically shut off.

EUT Antenna:

The antenna is PIFA antenna which integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.

Antenna location: Refer to Appendix (Internal Photos)

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 & 15.407 b(6)
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.		

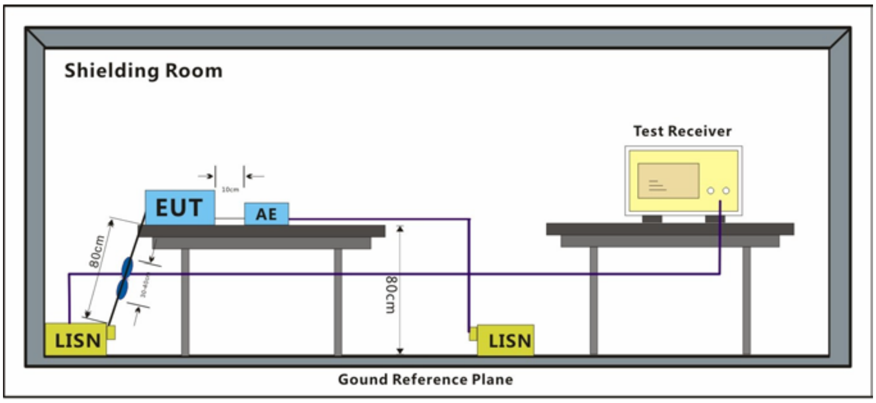
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 45 % RH Atmospheric Pressure: 1001 mbar

Pretest these modes to find the worst case:	d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report. e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

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 50ohm/50μH + 5ohm 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.

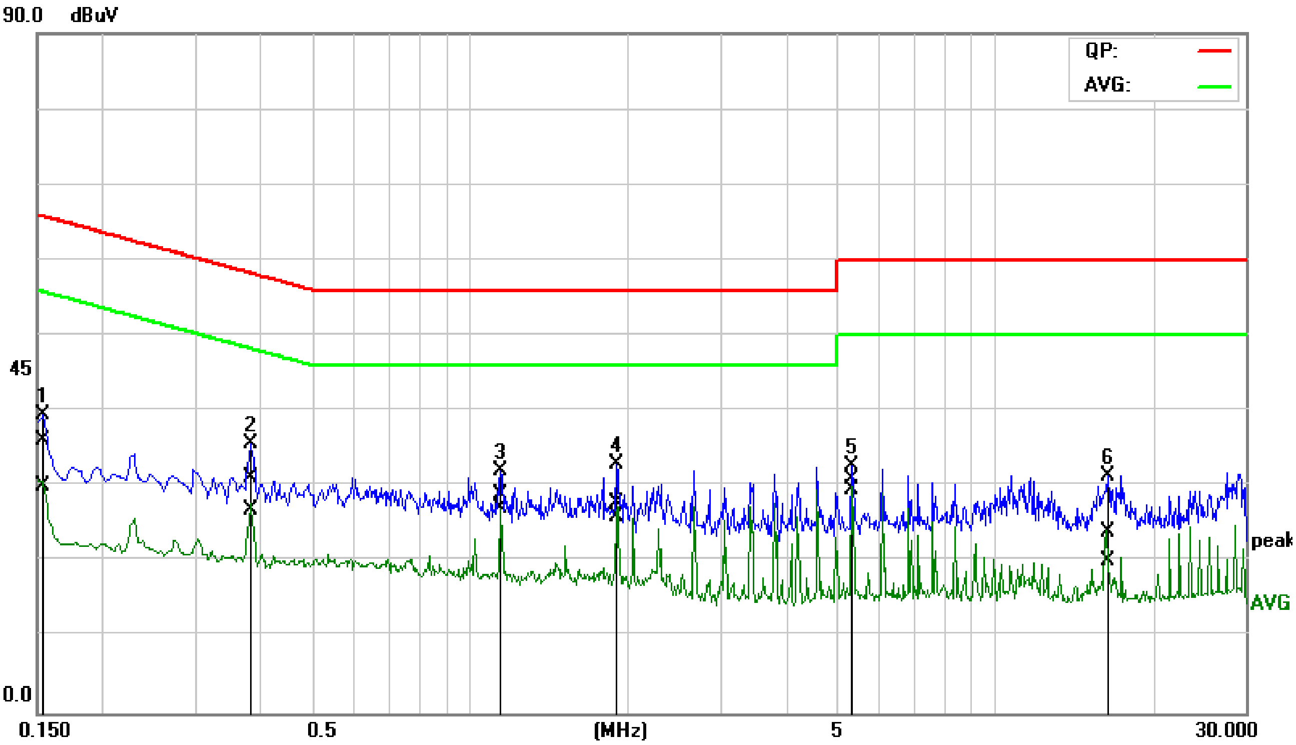
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

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.

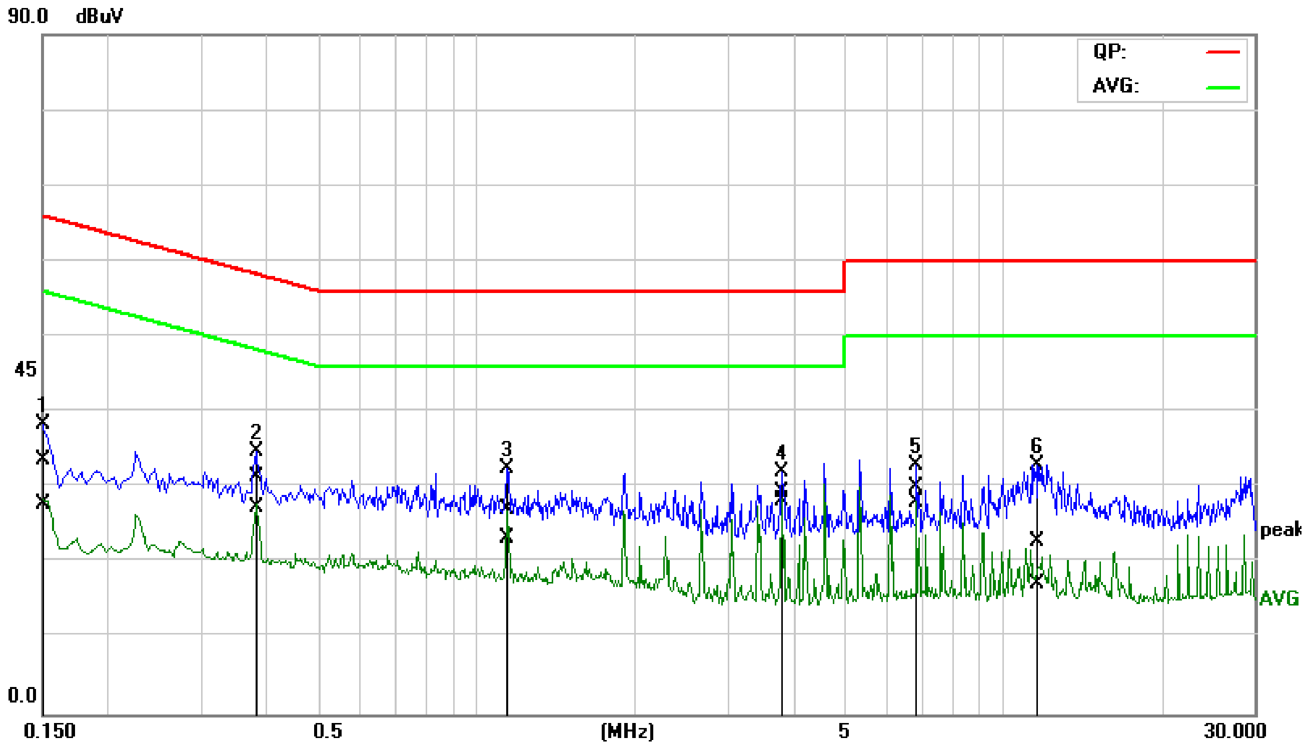
Remark: LISN=Read Level+ Cable Loss+ LISN Factor

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	0.1538	16.50	10.45	19.52	36.02	29.97	65.79	55.79	-29.77	-25.82	Pass
2	0.3839	11.56	7.42	19.51	31.07	26.93	58.19	48.19	-27.12	-21.26	Pass
3*	1.1460	9.22	7.52	19.69	28.91	27.21	56.00	46.00	-27.09	-18.79	Pass
4	1.9057	8.04	6.29	19.76	27.80	26.05	56.00	46.00	-28.20	-19.95	Pass
5	5.3420	10.90	9.60	19.97	30.87	29.57	60.00	50.00	-29.13	-20.43	Pass
6	16.4735	3.77	-0.09	20.26	24.03	20.17	60.00	50.00	-35.97	-29.83	Pass

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	14.18	8.24	19.47	33.65	27.71	66.00	56.00	-32.35	-28.29	Pass
2	0.3827	11.89	7.90	19.48	31.37	27.38	58.22	48.22	-26.85	-20.84	Pass
3	1.1518	7.37	3.64	19.67	27.04	23.31	56.00	46.00	-28.96	-22.69	Pass
4*	3.8137	9.57	8.29	19.85	29.42	28.14	56.00	46.00	-26.58	-17.86	Pass
5	6.8686	10.07	8.10	19.94	30.01	28.04	60.00	50.00	-29.99	-21.96	Pass
6	11.5872	2.83	-2.81	20.03	22.86	17.22	60.00	50.00	-37.14	-32.78	Pass

7.2 99% Bandwidth

Test Requirement	N/A
Test Method:	KDB 789033 II D

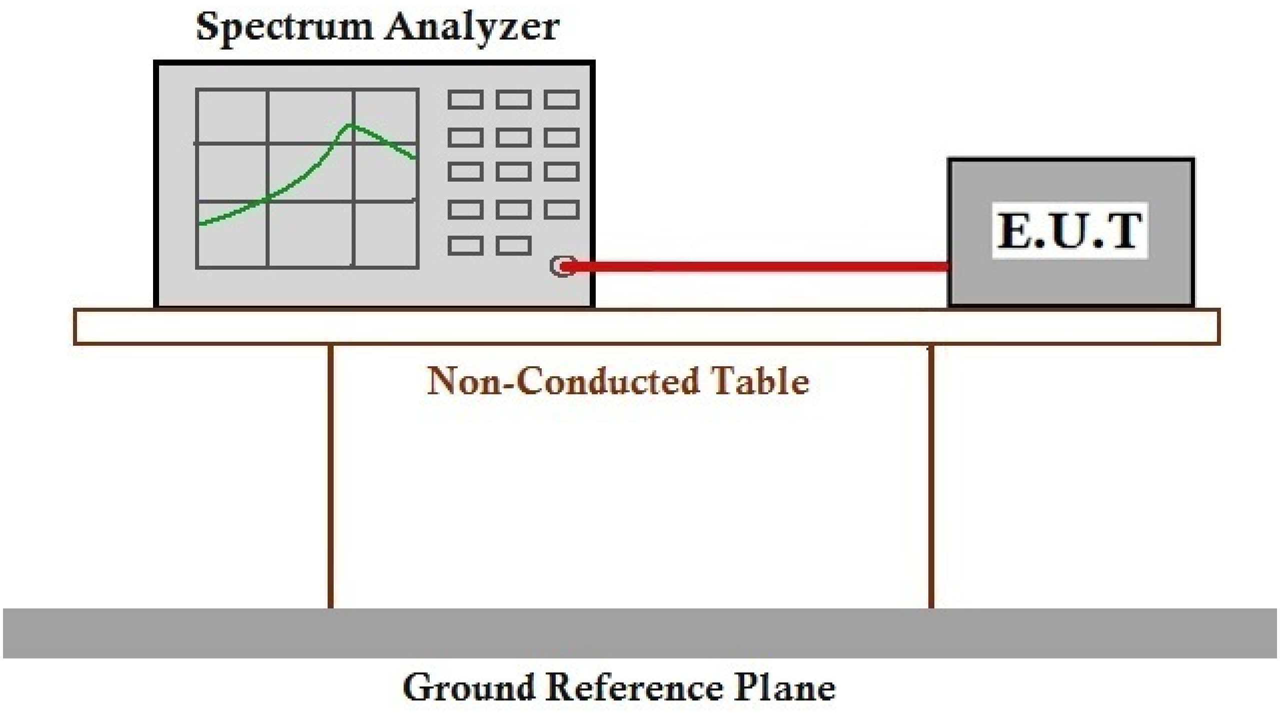
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Pretest these modes to find the worst case:	d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report. e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). 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 D for SHEM200300156704

7.3 26dB Emission bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.407 (a)
Test Method:	KDB 789033 D02 II C 1

7.3.1 E.U.T. Operation

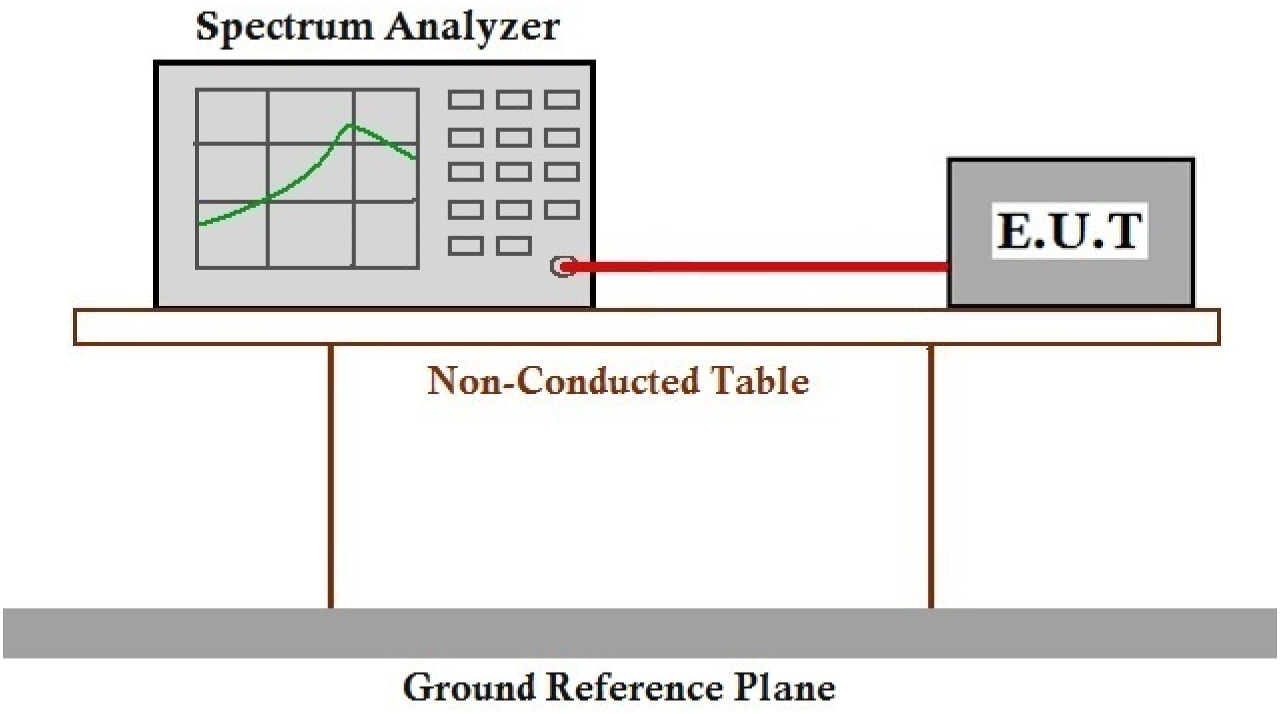
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). 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 D for SHEM200300156704

7.4 Minimum 6 dB bandwidth (5.725-5.85 GHz band)

Test Requirement	47 CFR Part 15, Subpart C 15.407 (e)
Test Method:	KDB 789033 D02 II C 2
Limit:	≥500 kHz

7.4.1 E.U.T. Operation

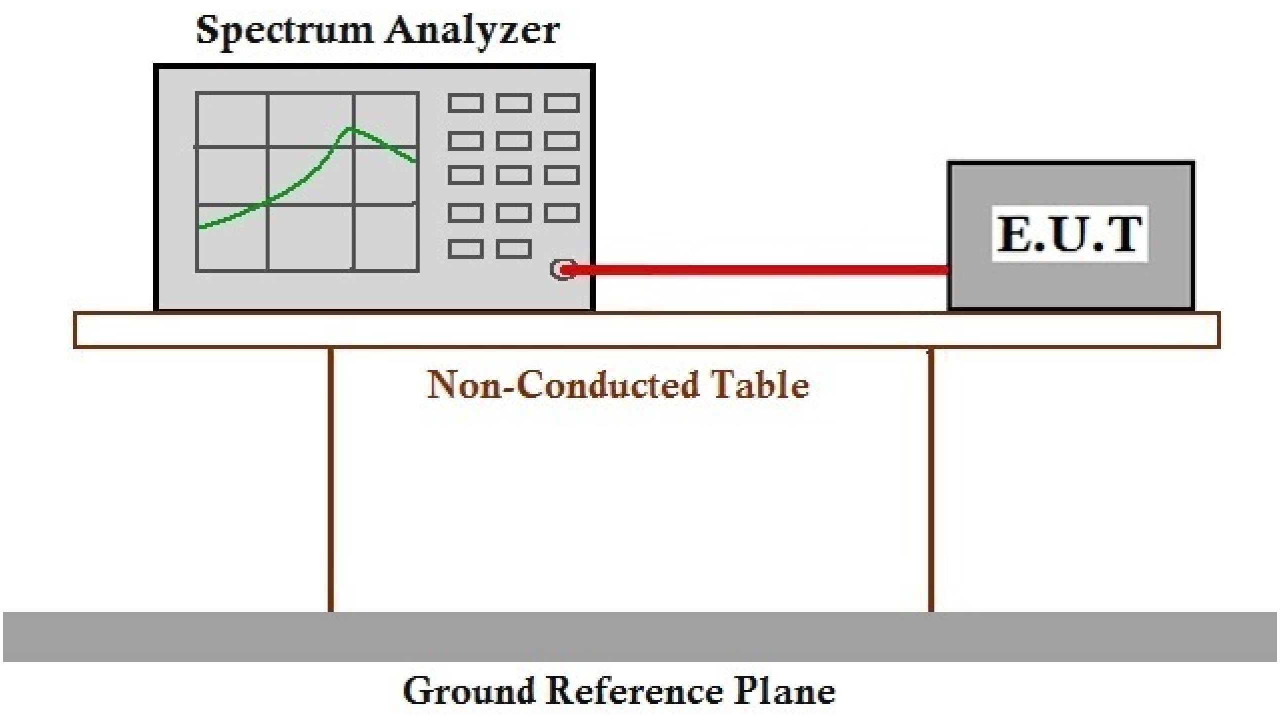
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). 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 D for SHEM200300156704

7.5 Maximum Conducted output power

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II E

Limit:

Frequency band(MHz)	**Limit**
5150-5250	≤1W(30dBm) for master device
	≤250mW(24dBm) for client device
5250-5350	≤250mW(24dBm) for client device or 11dBm+10logB*
5470-5725	≤250mW(24dBm) for client device or 11dBm+10logB*
5725-5850	≤1W(30dBm)
Remark:	* Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

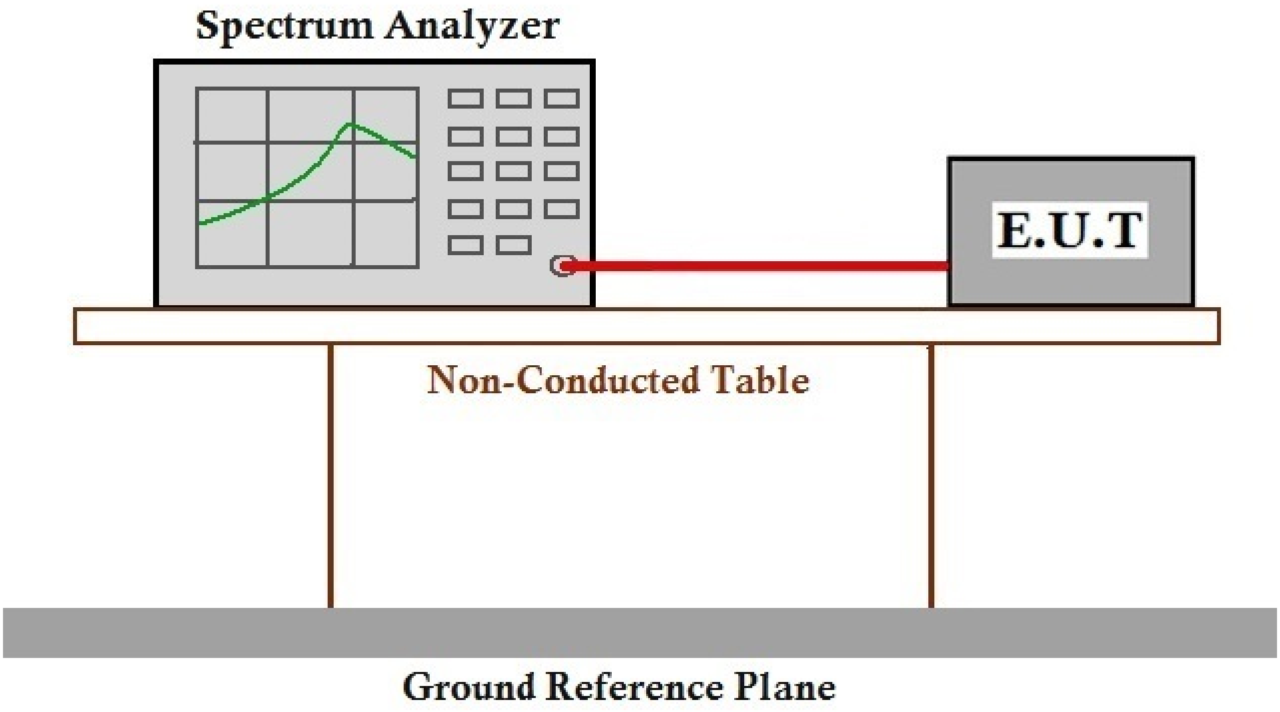
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Pretest these modes to find the worst case:	d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report. e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix D for SHEM200300156704

7.6 Peak Power spectrum density

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II F

Limit:

Frequency band(MHz)	Limit
5150-5250	≤17dBm in 1MHz for master device
	≤11dBm in 1MHz for client device
5250-5350	≤11dBm in 1MHz for client device
5470-5725	≤11dBm in 1MHz for client device
5725-5850	≤30dBm in 500 kHz
Remark:	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.

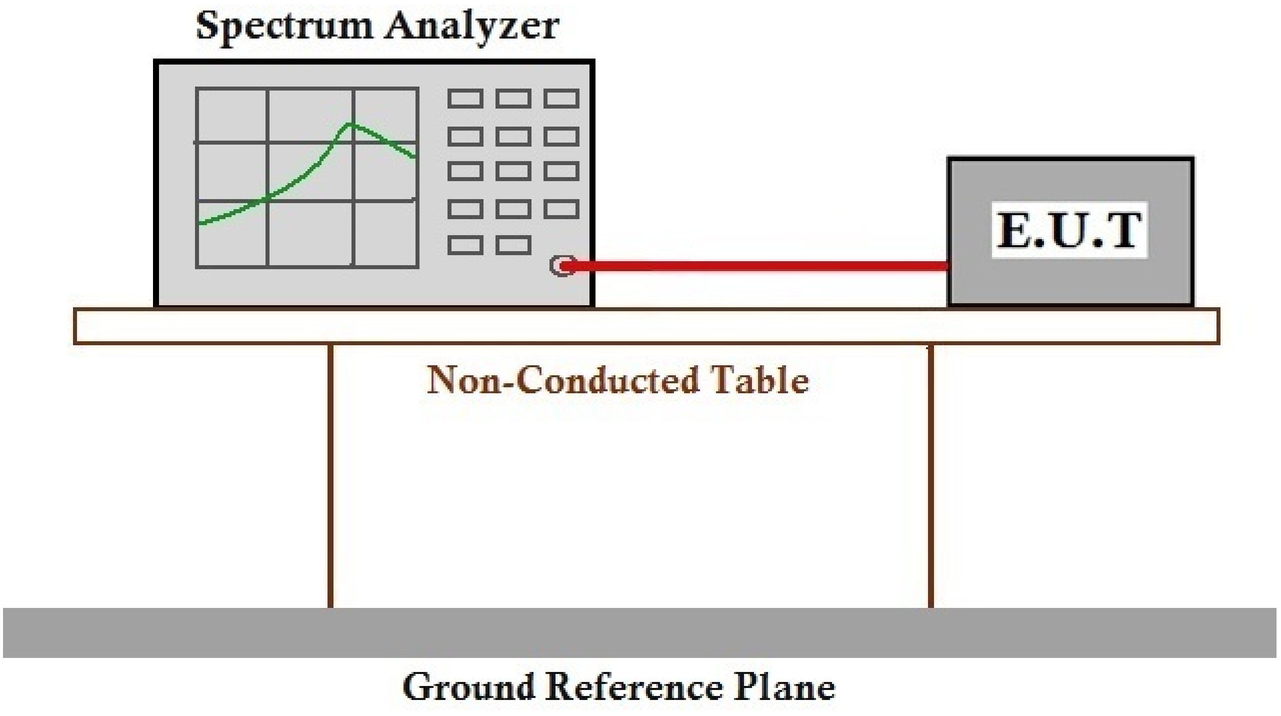
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Pretest these modes to find the worst case:	d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.
	e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix D for SHEM200300156704

7.7 Radiated Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.209 & 15.407(b)
Test Method:	KDB 789033 D02 II G
Limit:	

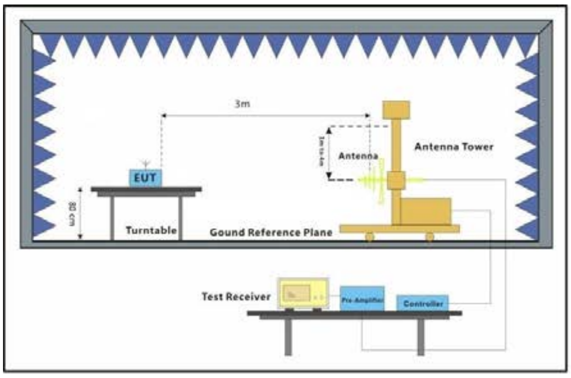
7.7.1 E.U.T. Operation

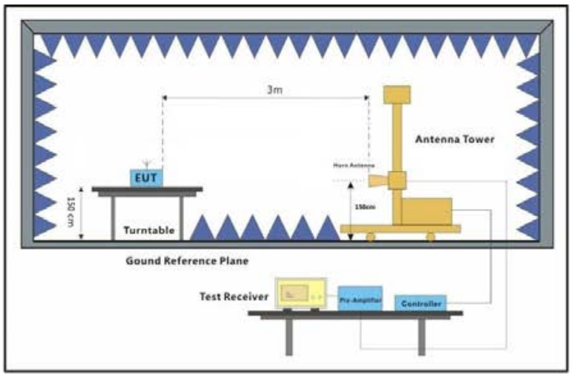
Operating Environment:

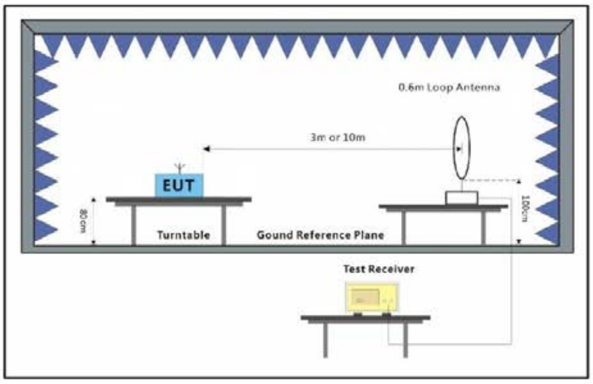
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Pretest these modes to find the worst case:	d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.
	e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.7.2 Test Setup Diagram


3m
1m to 4m
Antenna
Antenna Tower
EUT
80 cm
Turntable
Gound Reference Plane
Test Receiver
Pre-Amplifier
Controller


3m
Antenna Tower
Horn Antenna
EUT
150 cm
150cm
Turntable
Gound Reference Plane
Test Receiver
Pre-Amplifier
Controller


0.6m Loop Antenna
3m or 10m
EUT
80cm
100cm
Turntable
Gound Reference Plane
Test Receiver

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:

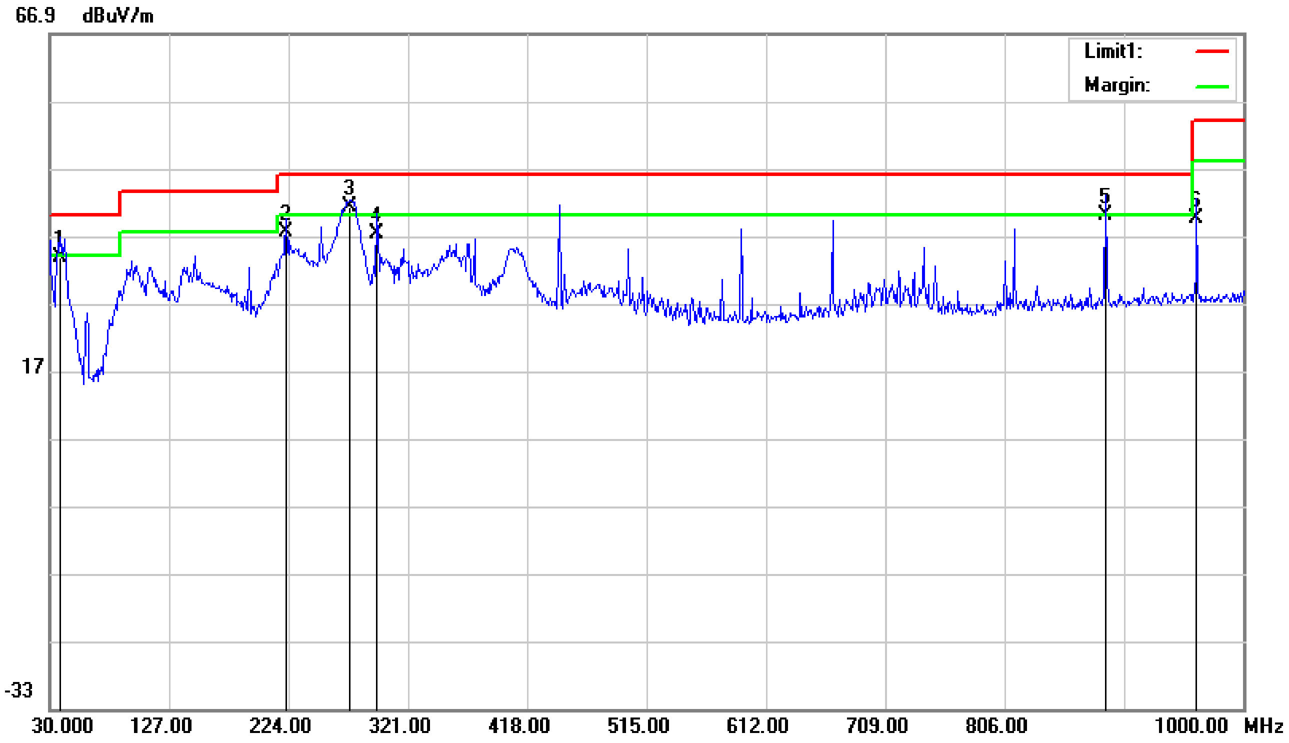
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. For emission below 1GHz, through the pre-scan found the worst case is the lowest channel of 802.11a. Only the worst case is recorded in the report.

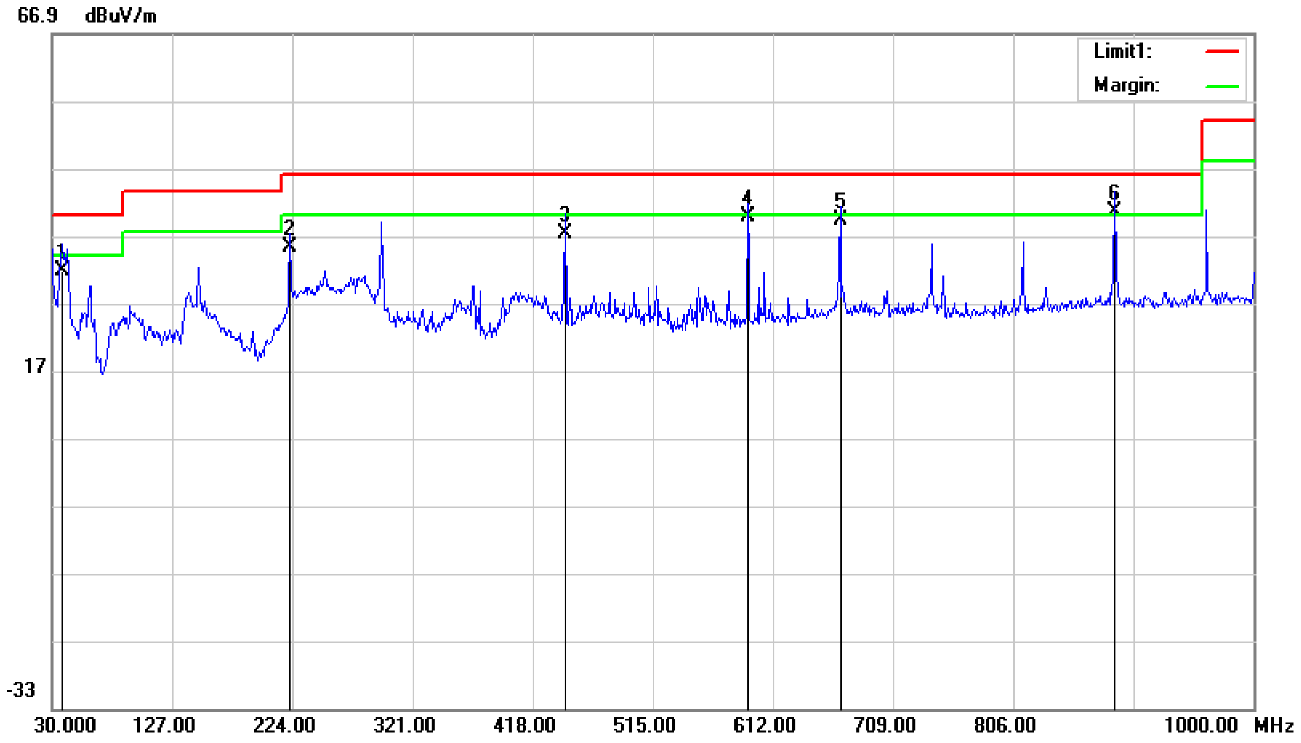
3. Scan from 9kHz to 40GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4. As shown in this section, 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.

Below 1GHz:

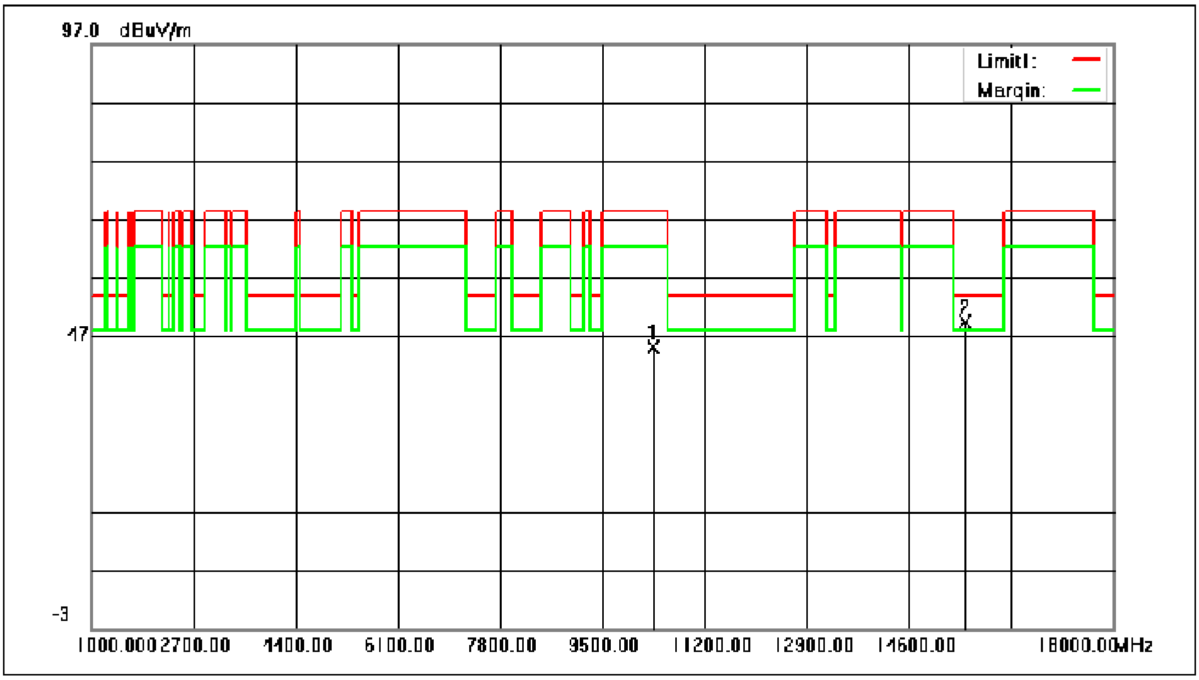


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	38.7300	11.88	21.91	33.79	40.00	-6.21	372	360	QP
2	222.0600	22.06	15.49	37.55	46.00	-8.45	100	103	QP
3	273.4700	23.72	17.64	41.36	46.00	-4.64	100	328	QP
4	295.7800	19.23	17.97	37.20	46.00	-8.80	100	360	QP
5	888.4500	14.45	25.62	40.07	46.00	-5.93	100	153	QP
6	962.1700	13.57	26.06	39.63	54.00	-14.37	100	76	QP



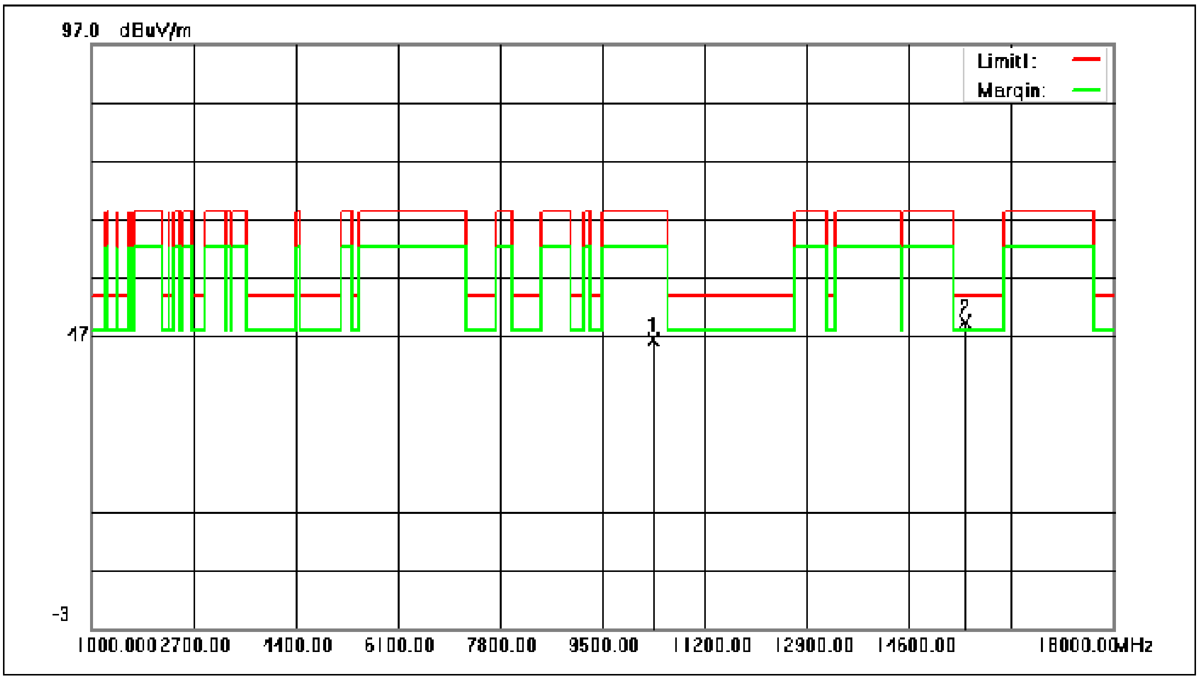
No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	37.7600	9.52	22.31	31.83	40.00	-8.17	226	0	QP
2	222.0600	19.76	15.49	35.25	46.00	-10.75	100	76	QP
3	444.1900	16.32	20.92	37.24	46.00	-8.76	100	284	QP
4	591.6300	16.43	23.42	39.85	46.00	-6.15	100	124	QP
5	666.3200	15.04	24.35	39.39	46.00	-6.61	100	291	QP
6	888.4500	14.82	25.62	40.44	46.00	-5.56	100	230	QP

Mode:d; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:Low



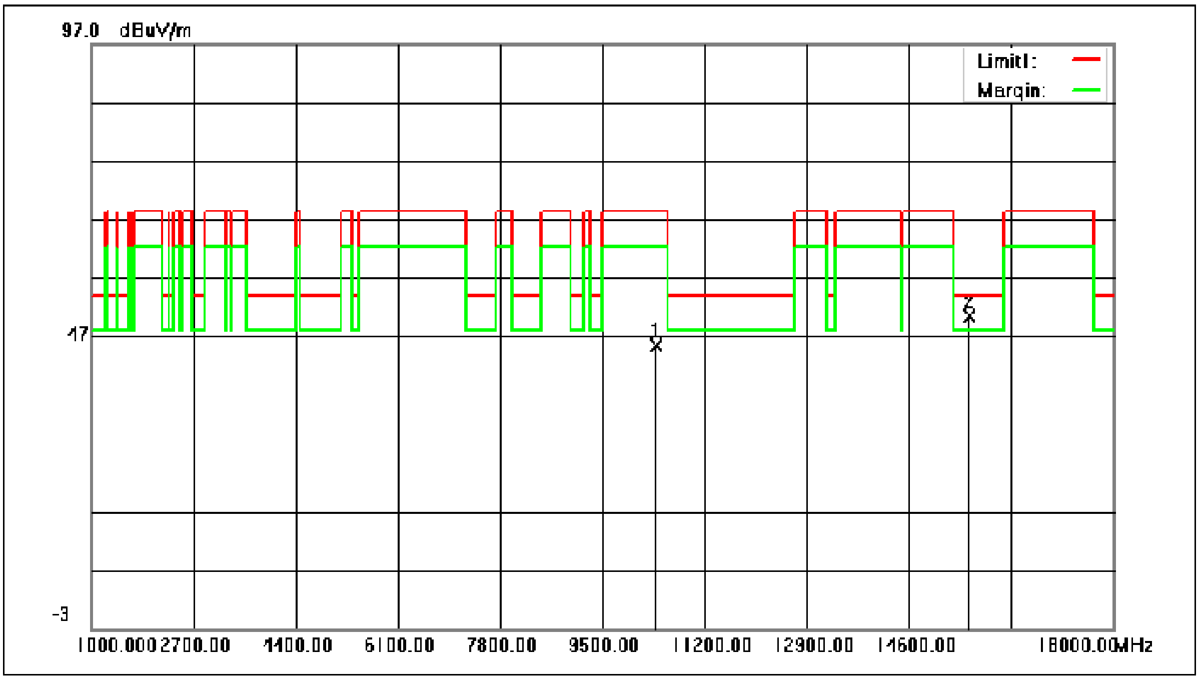
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10360.000	47.66	-2.59	45.07	68.30	-23.23	peak
2	15540.000	49.61	-0.30	49.31	54.00	-4.69	peak

Mode:d; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:Low



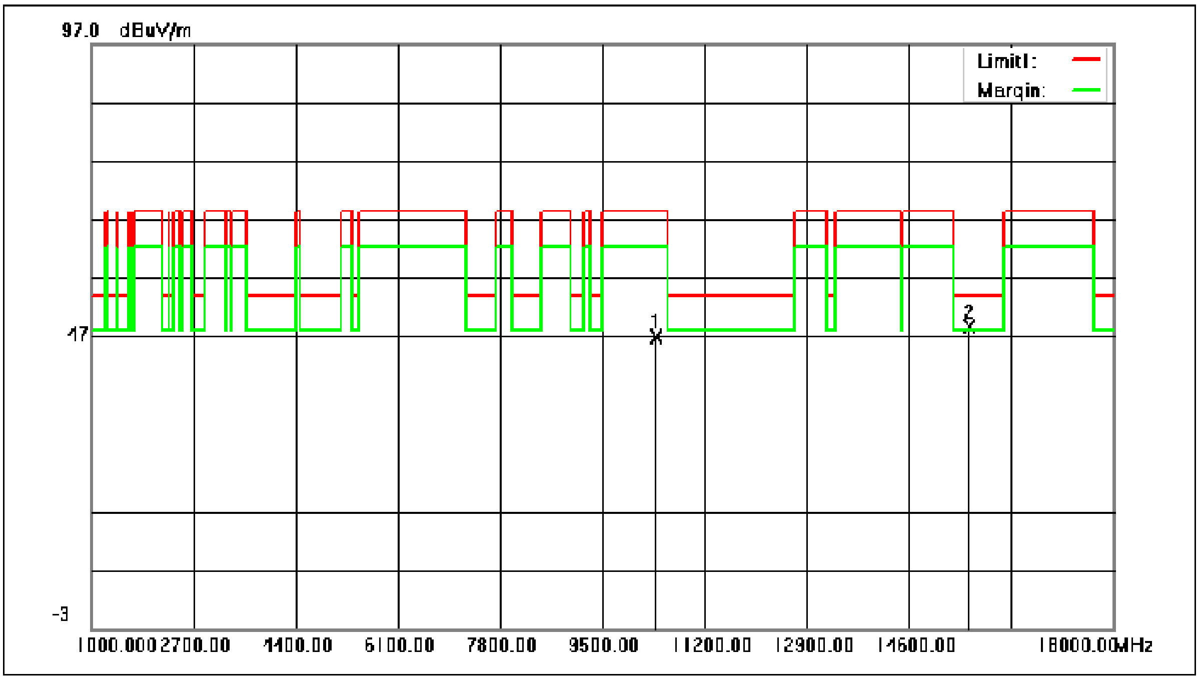
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10360.000	49.00	-2.59	46.41	68.30	-21.89	peak
2	15540.000	49.68	-0.30	49.38	54.00	-4.62	peak

Mode:d; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:middle



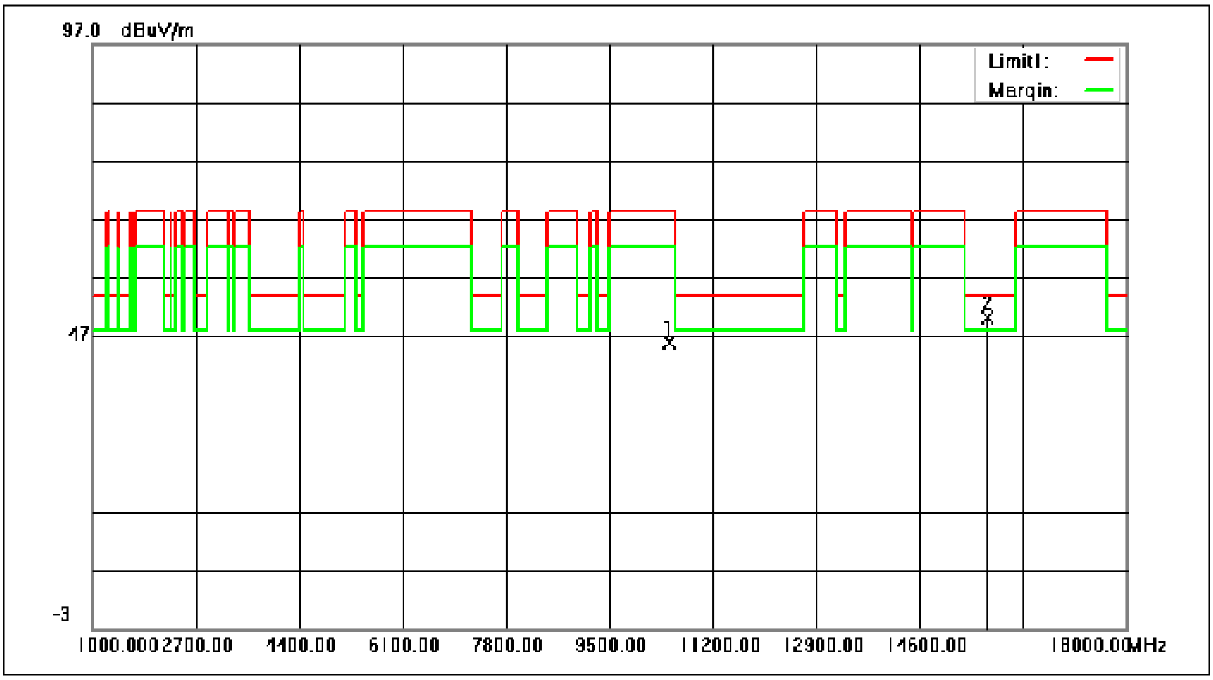
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10400.000	47.99	-2.53	45.46	68.30	-22.84	peak
2	15600.000	50.62	-0.35	50.27	54.00	-3.73	peak

Mode:d; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:middle



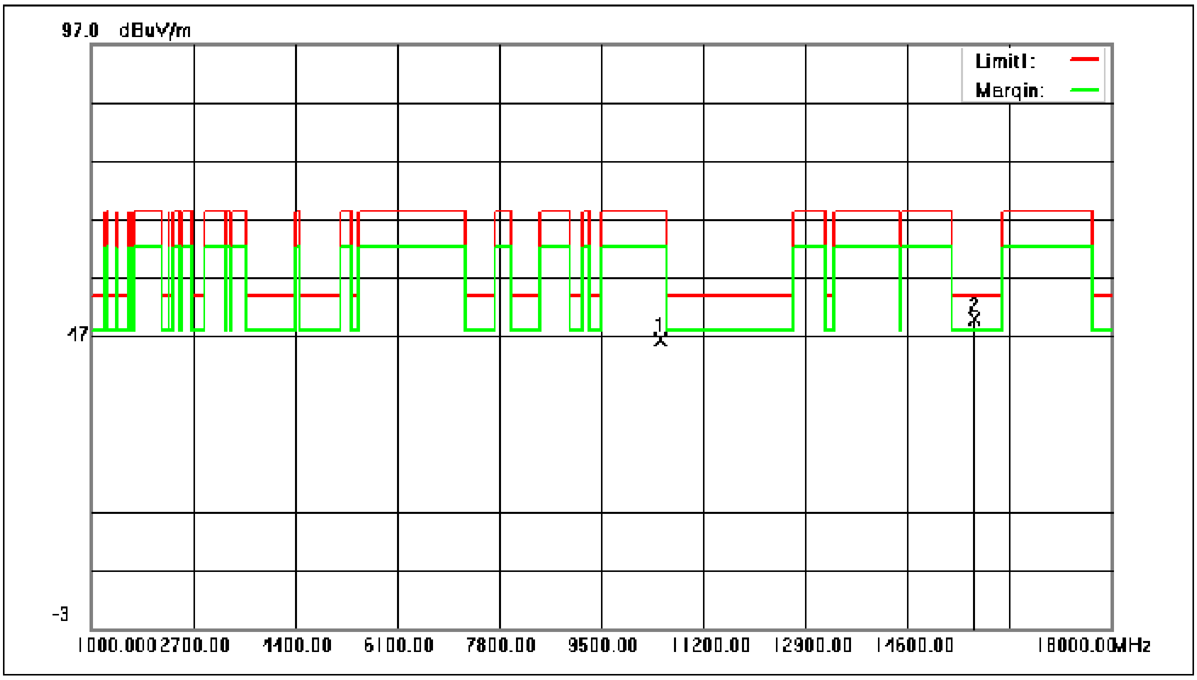
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10400.000	49.35	-2.53	46.82	68.30	-21.48	peak
2	15600.000	49.04	-0.35	48.69	54.00	-5.31	peak

Mode:d; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:High



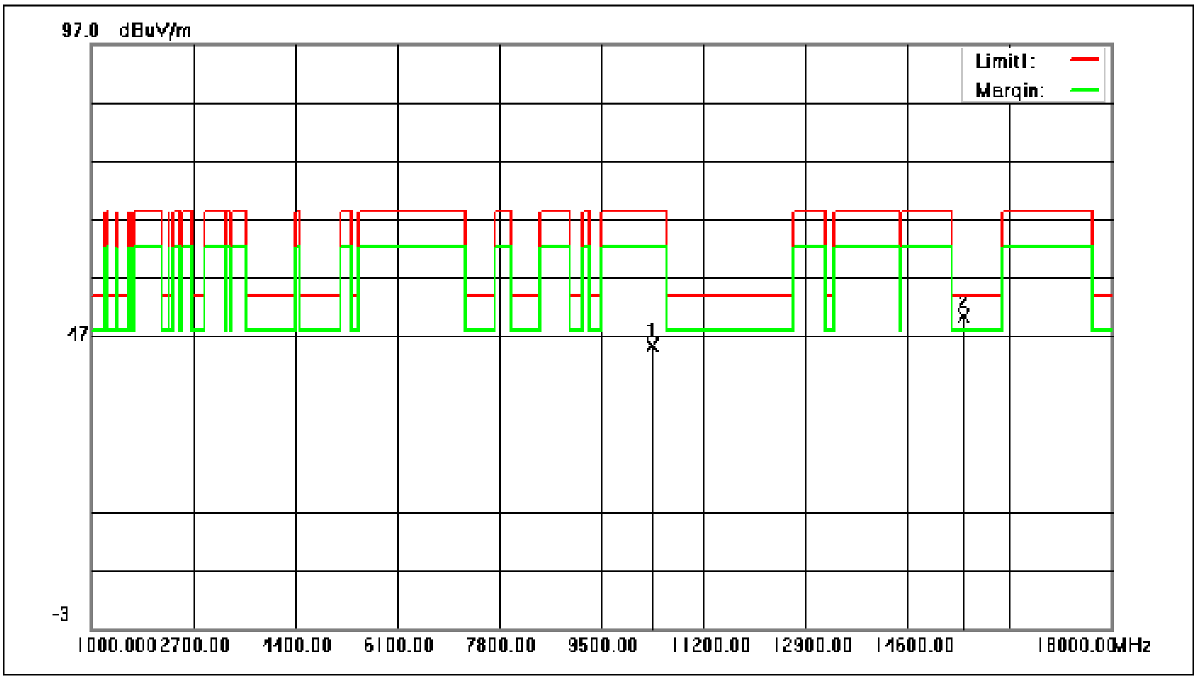
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10480.000	48.34	-2.41	45.93	68.30	-22.37	peak
2	15720.000	50.61	-0.44	50.17	54.00	-3.83	peak

Mode:d; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:High



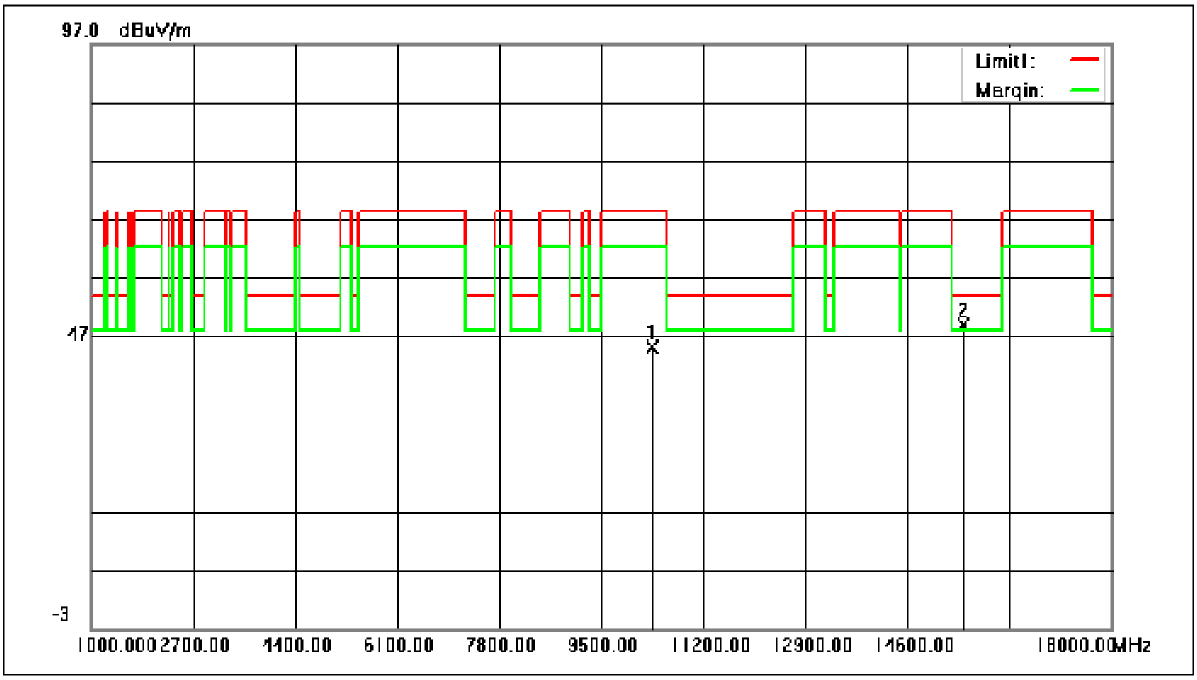
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10480.000	48.80	-2.41	46.39	68.30	-21.91	peak
2	15720.000	50.40	-0.44	49.96	54.00	-4.04	peak

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



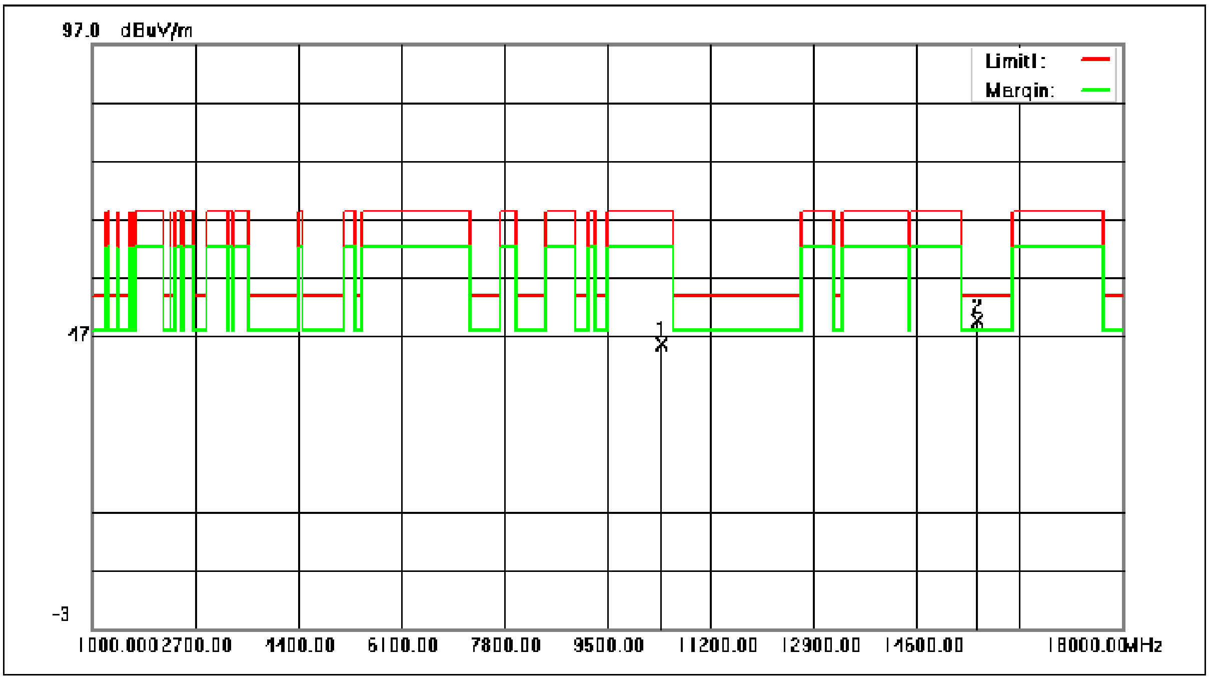
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10360.000	47.91	-2.59	45.32	68.30	-22.98	peak
2	15540.000	50.65	-0.30	50.35	54.00	-3.65	peak

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



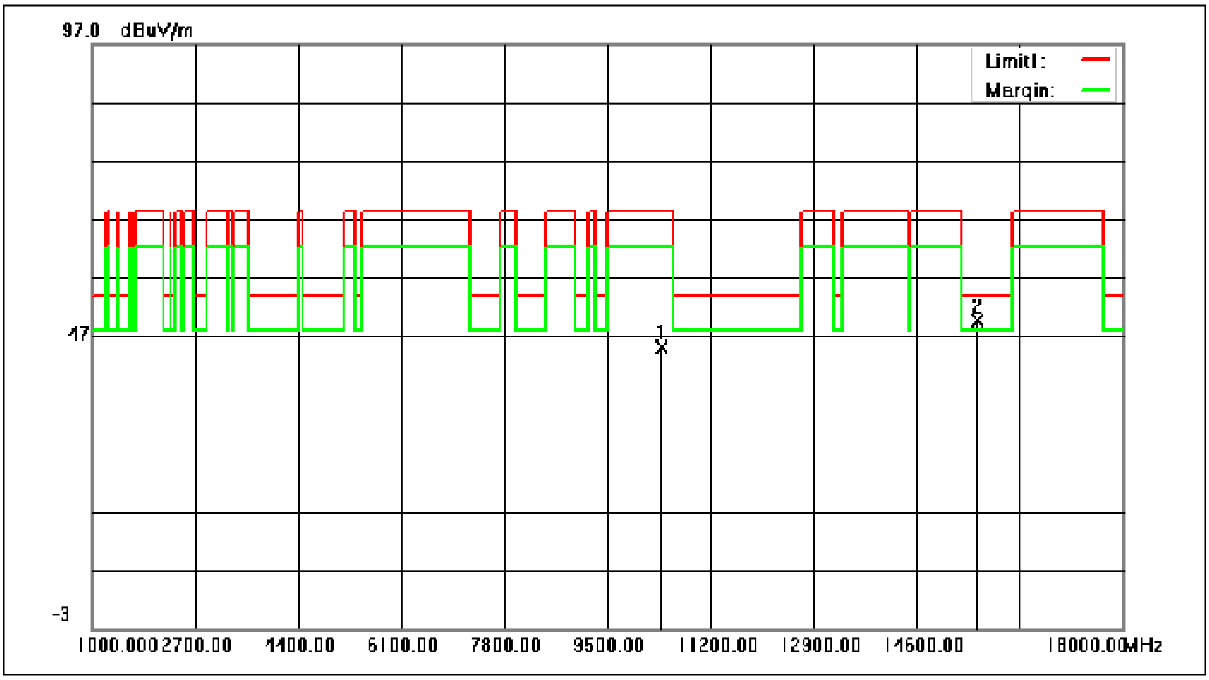
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10360.000	47.82	-2.59	45.23	68.30	-23.07	peak
2	15540.000	49.09	-0.30	48.79	54.00	-5.21	peak

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



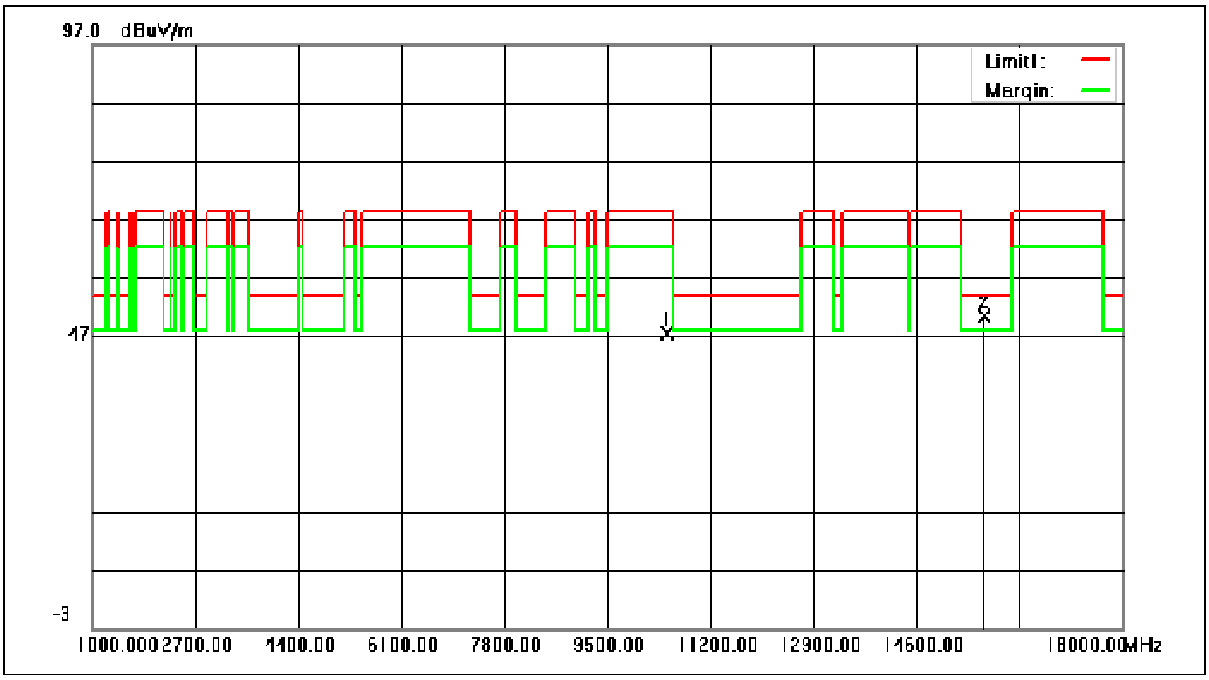
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10400.000	48.17	-2.53	45.64	68.30	-22.66	peak
2	15600.000	50.10	-0.35	49.75	54.00	-4.25	peak

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



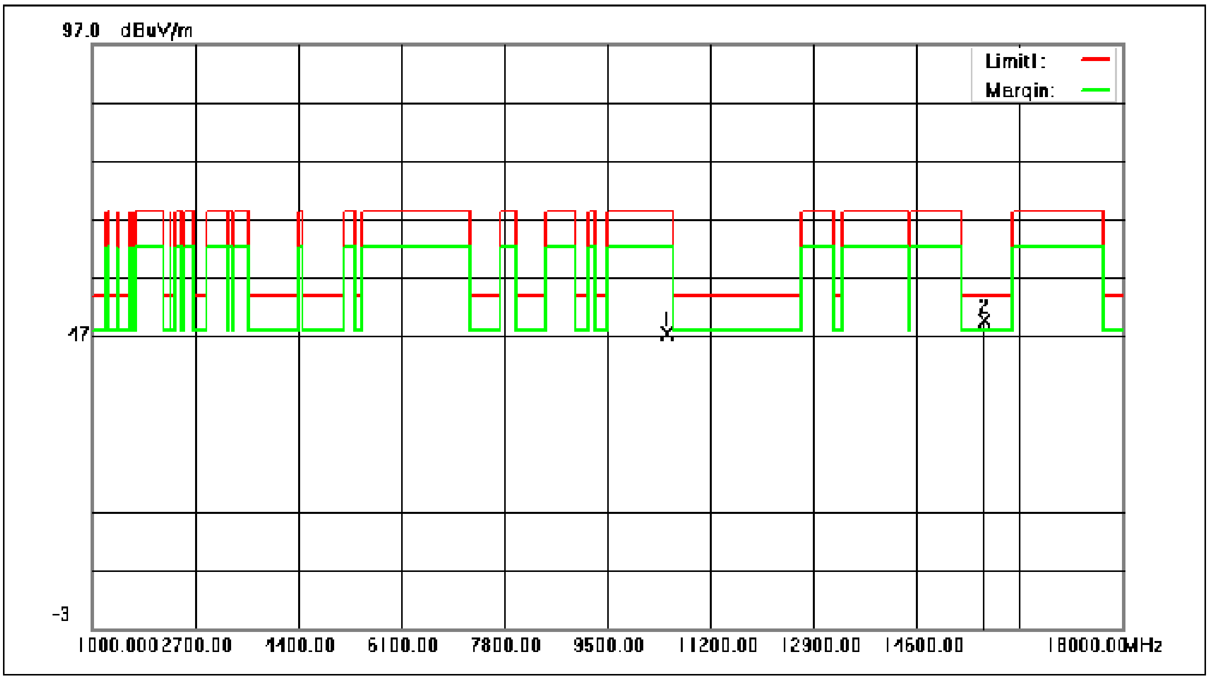
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10400.000	47.58	-2.53	45.05	68.30	-23.25	peak
2	15600.000	49.91	-0.35	49.56	54.00	-4.44	peak

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



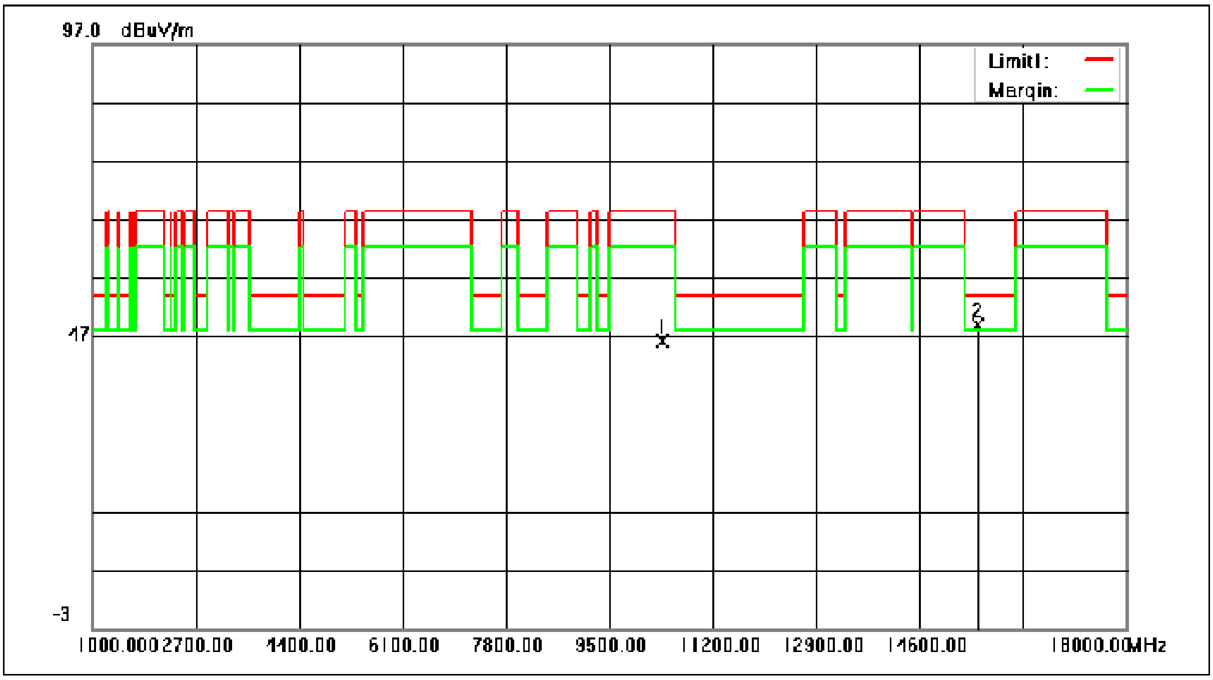
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10480.000	49.86	-2.41	47.45	68.30	-20.85	peak
2	15720.000	50.71	-0.44	50.27	54.00	-3.73	peak

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



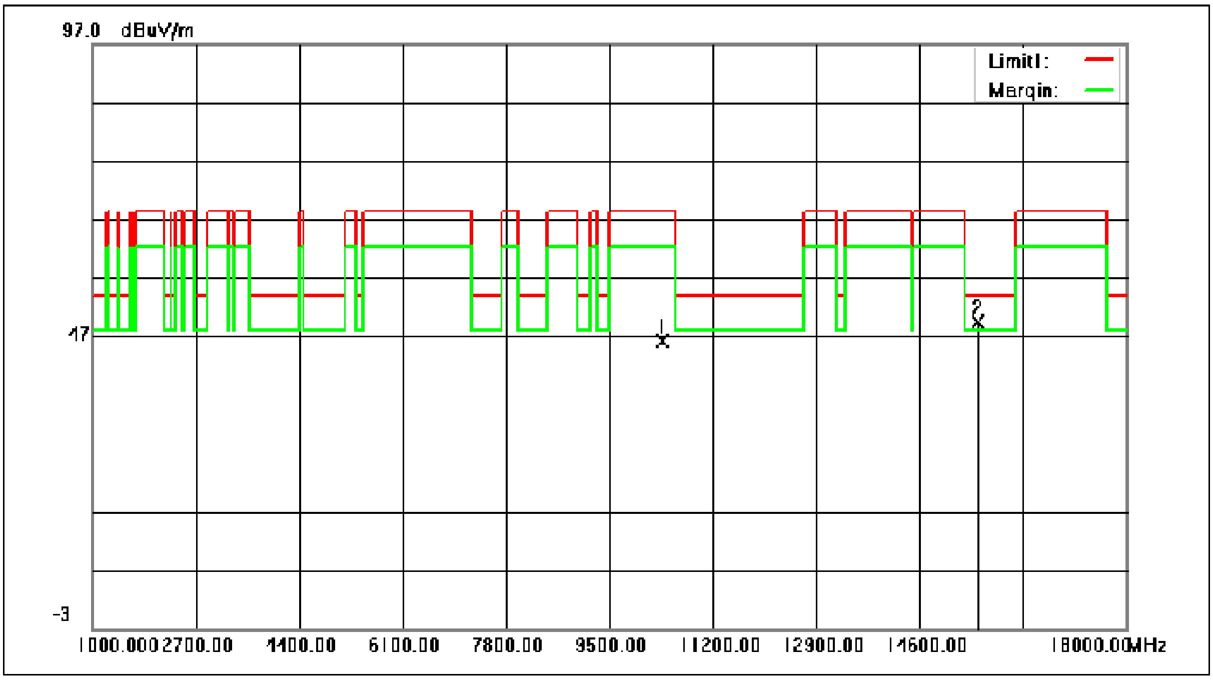
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10480.000	49.75	-2.41	47.34	68.30	-20.96	peak
2	15720.000	50.10	-0.44	49.66	54.00	-4.34	peak

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



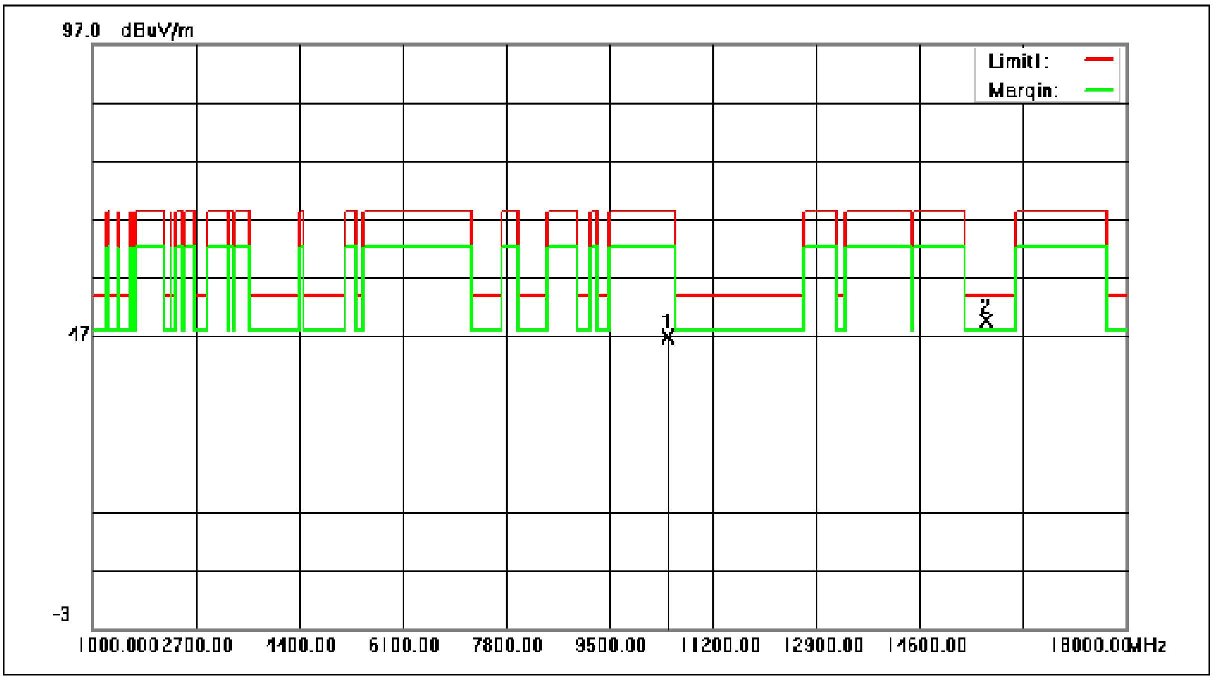
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10380.000	48.77	-2.56	46.21	68.30	-22.09	peak
2	15570.000	49.14	-0.32	48.82	54.00	-5.18	peak

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



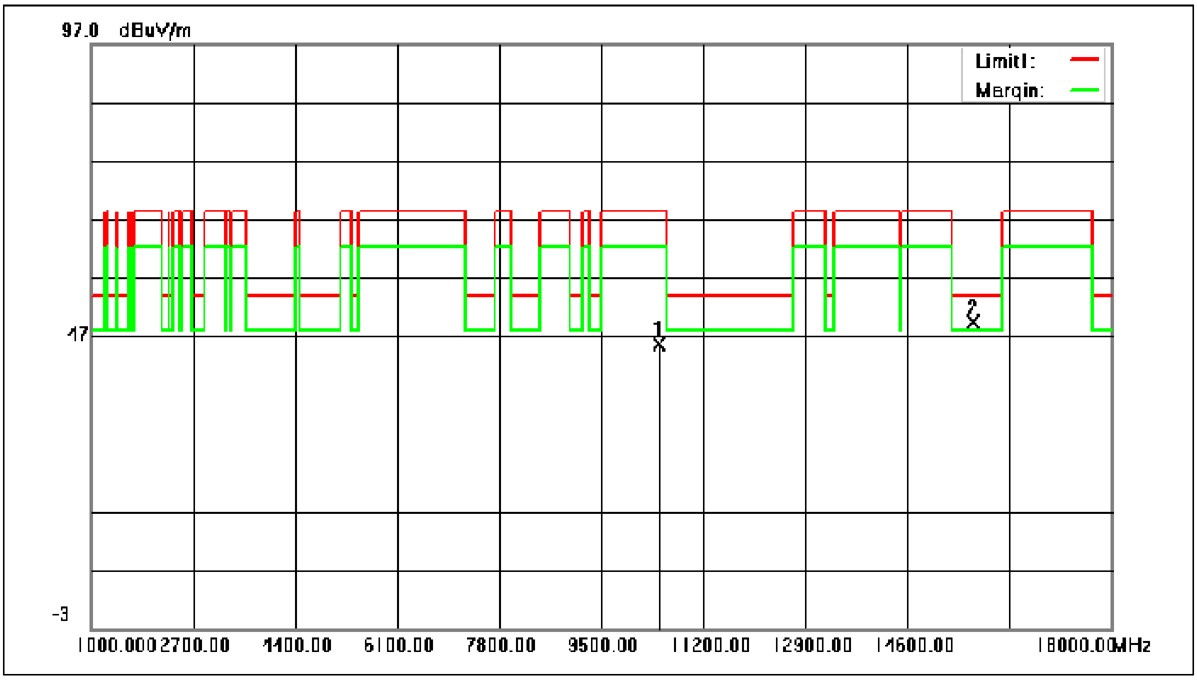
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10380.000	48.57	-2.56	46.01	68.30	-22.29	peak
2	15570.000	49.65	-0.32	49.33	54.00	-4.67	peak

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



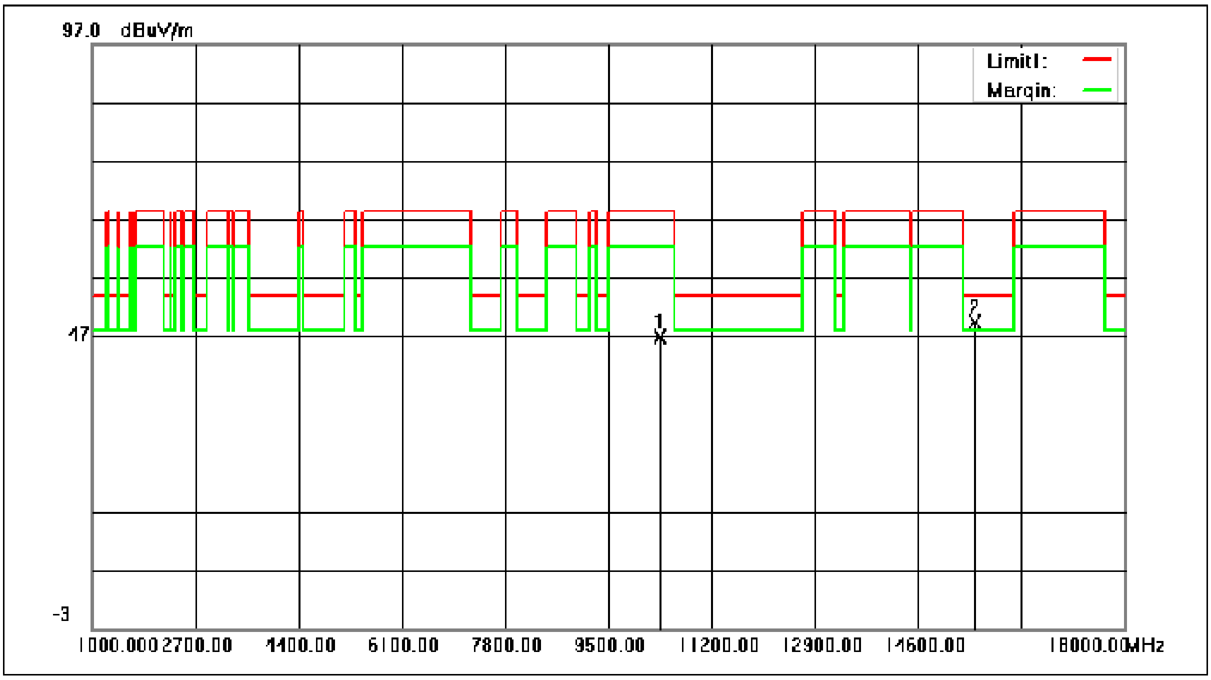
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10460.000	49.31	-2.44	46.87	68.30	-21.43	peak
2	15690.000	49.95	-0.42	49.53	54.00	-4.47	peak

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



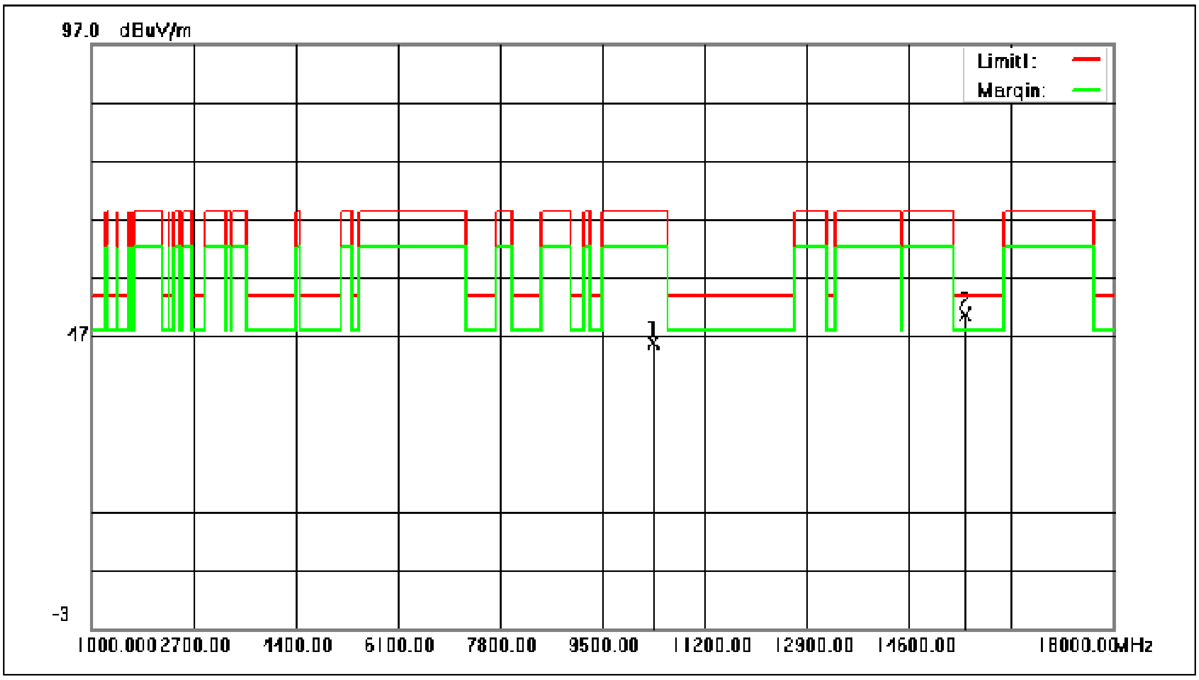
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10460.000	48.09	-2.44	45.65	68.30	-22.65	peak
2	15690.000	49.73	-0.42	49.31	54.00	-4.69	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:Low



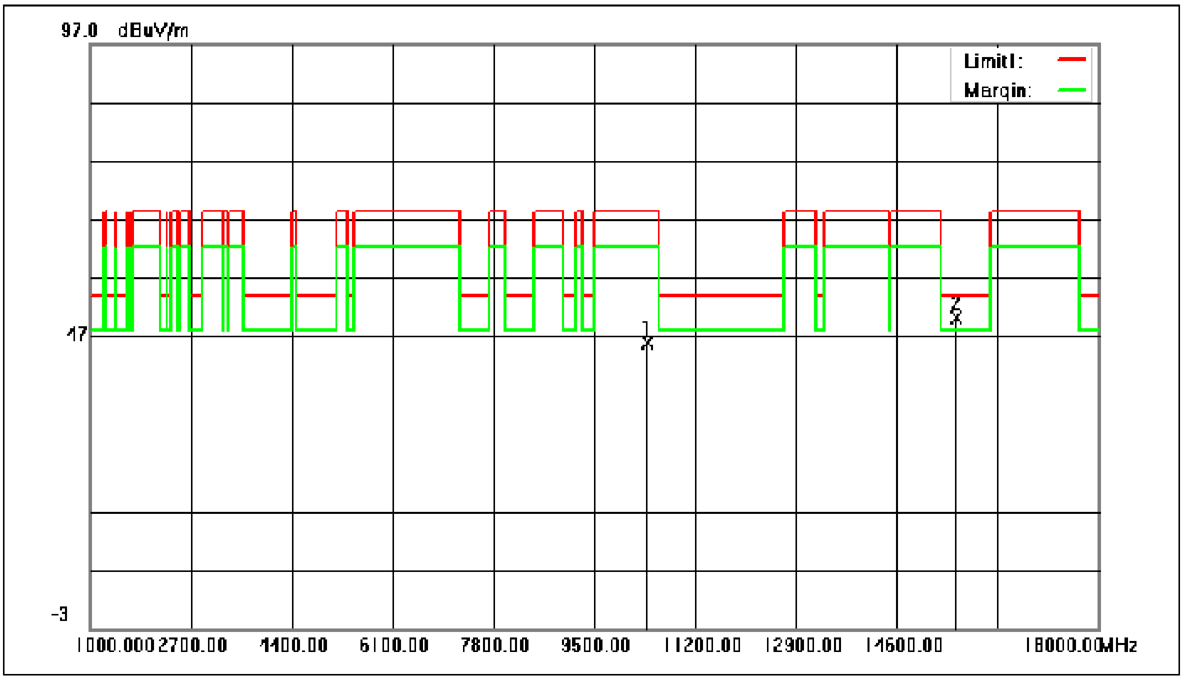
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10360.000	49.43	-2.59	46.84	68.30	-21.46	peak
2	15540.000	49.62	-0.30	49.32	54.00	-4.68	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:Low



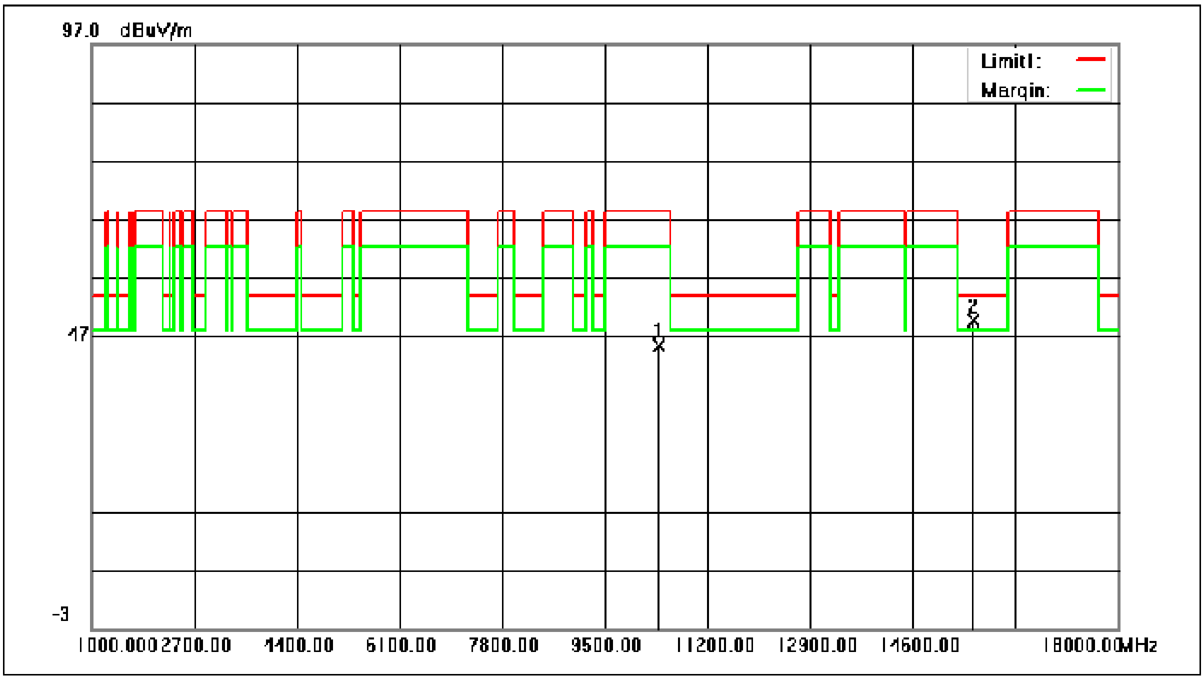
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10360.000	48.51	-2.59	45.92	68.30	-22.38	peak
2	15540.000	50.90	-0.30	50.60	54.00	-3.40	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:middle



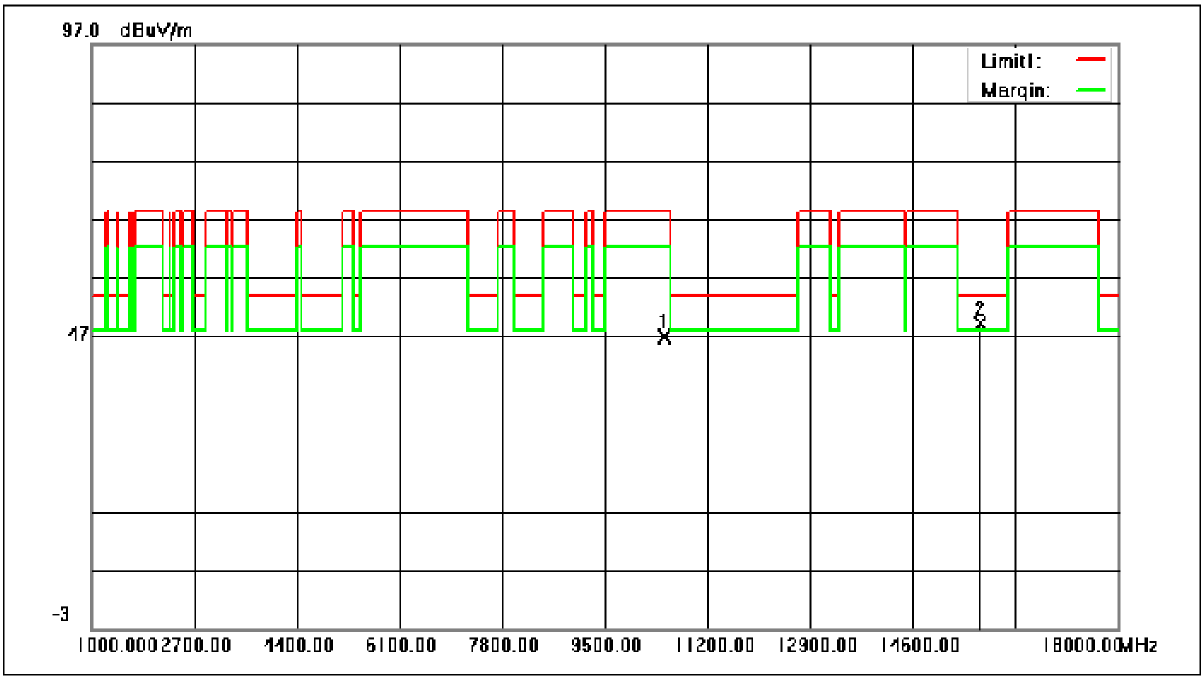
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10400.000	48.47	-2.53	45.94	68.30	-22.36	peak
2	15600.000	50.49	-0.35	50.14	54.00	-3.86	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:middle



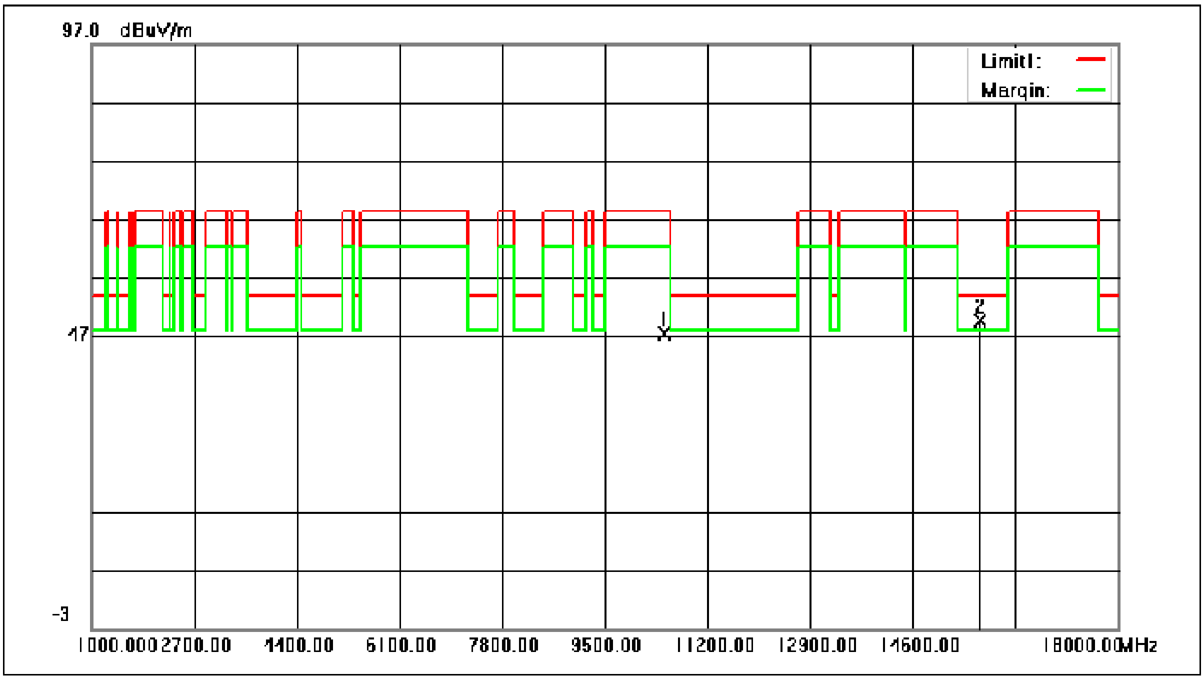
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10400.000	47.91	-2.53	45.38	68.30	-22.92	peak
2	15600.000	50.02	-0.35	49.67	54.00	-4.33	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:High



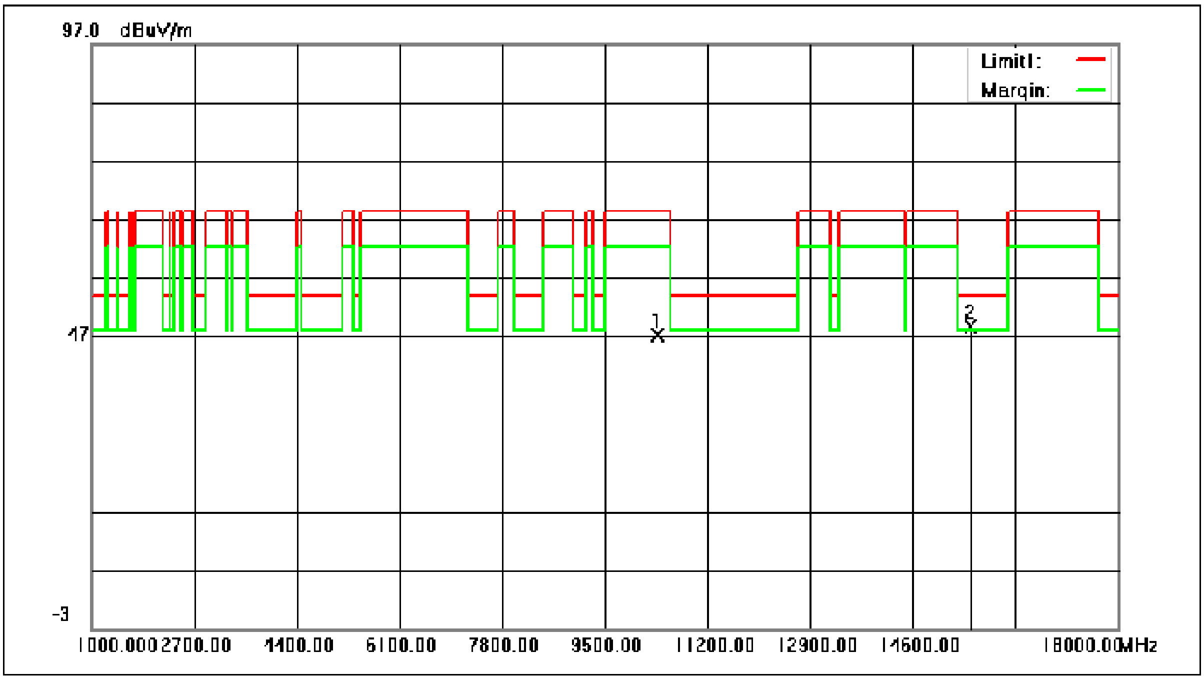
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10480.000	49.27	-2.41	46.86	68.30	-21.44	peak
2	15720.000	49.48	-0.44	49.04	54.00	-4.96	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:High



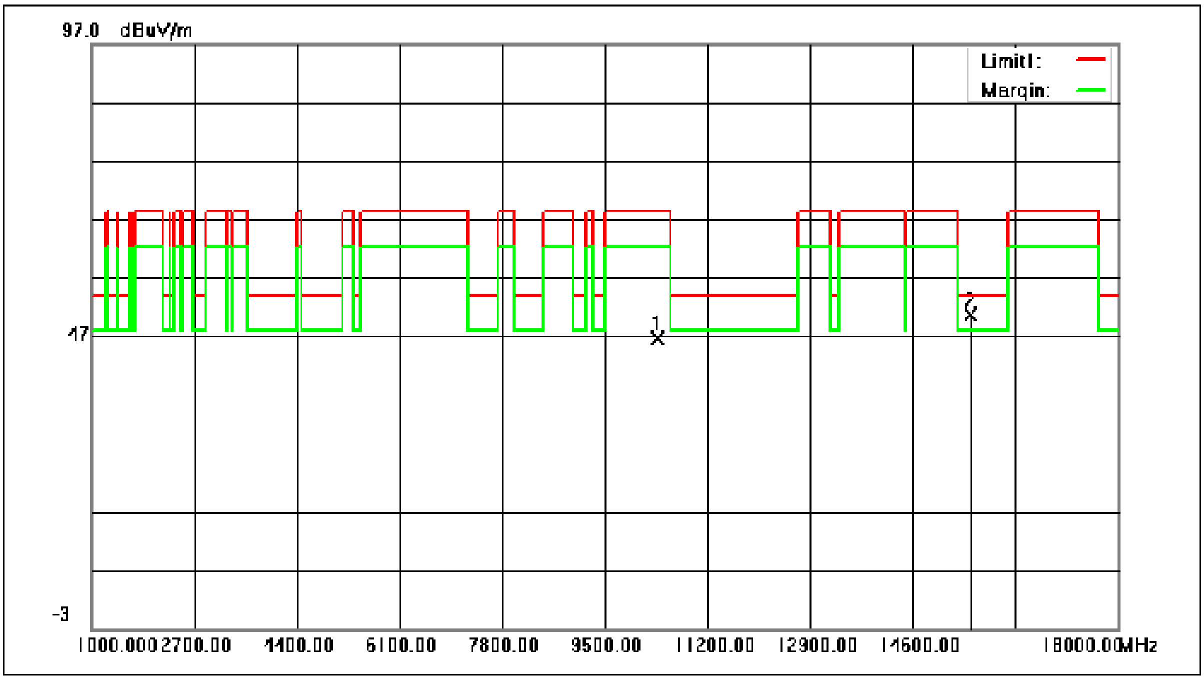
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10480.000	49.73	-2.41	47.32	68.30	-20.98	peak
2	15720.000	50.01	-0.44	49.57	54.00	-4.43	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:Low



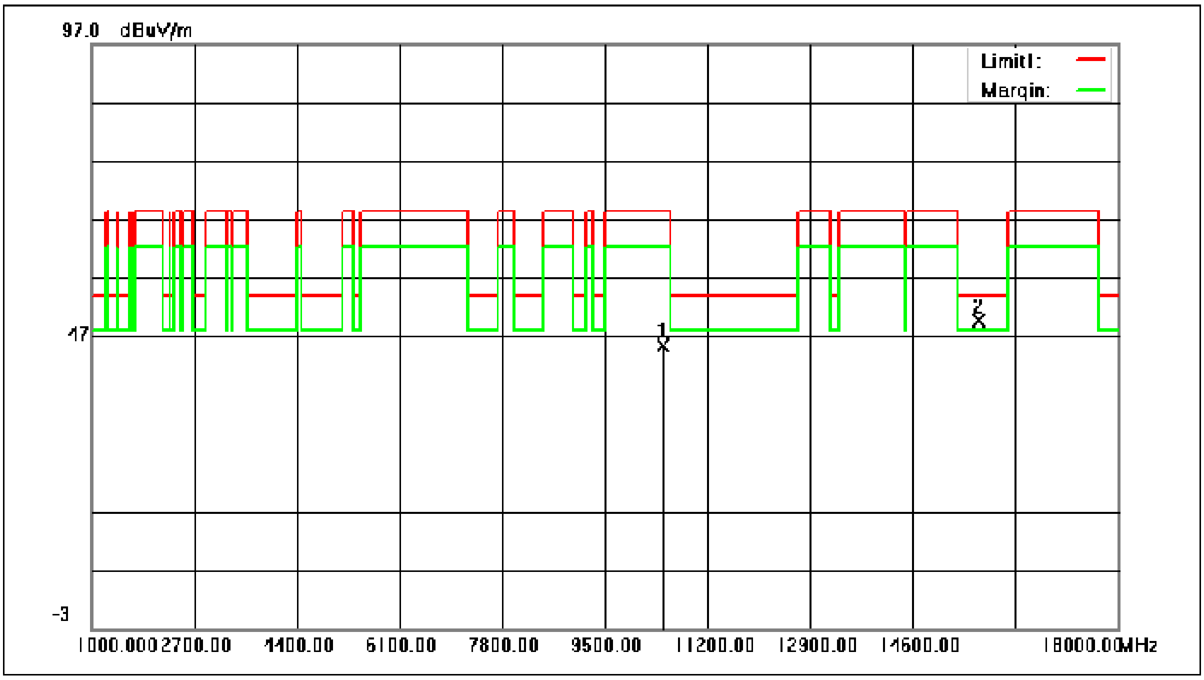
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10380.000	49.66	-2.56	47.10	68.30	-21.20	peak
2	15570.000	49.01	-0.32	48.69	54.00	-5.31	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:Low



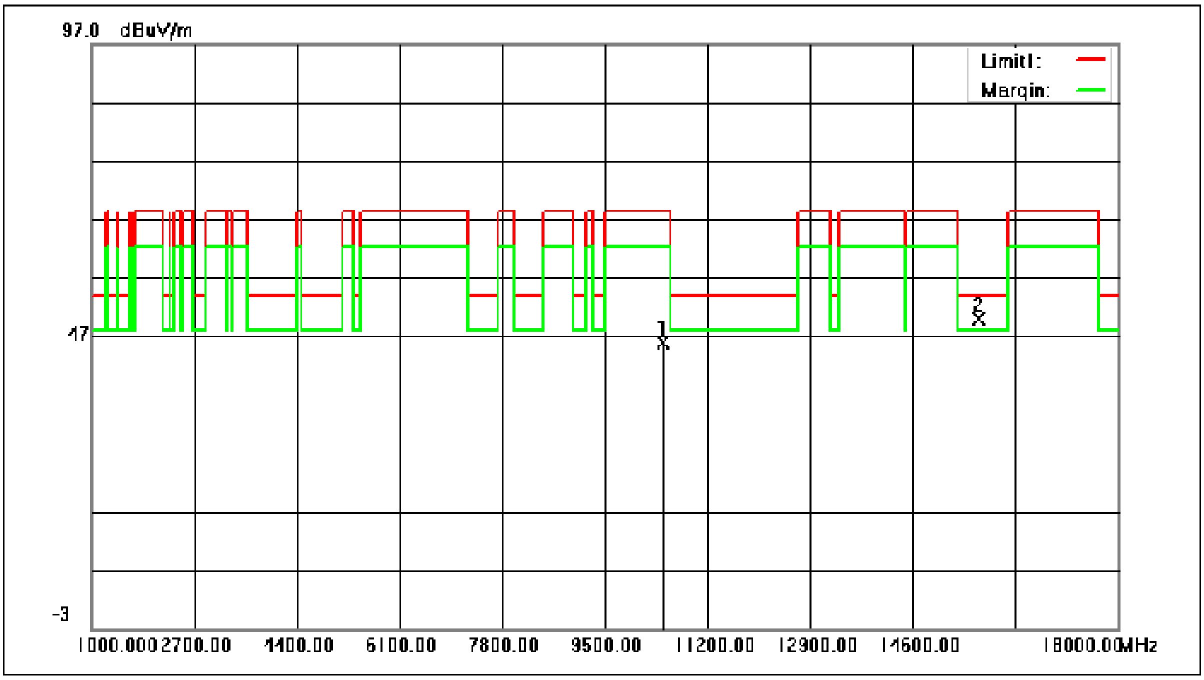
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10380.000	49.07	-2.56	46.51	68.30	-21.79	peak
2	15570.000	50.87	-0.32	50.55	54.00	-3.45	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:High



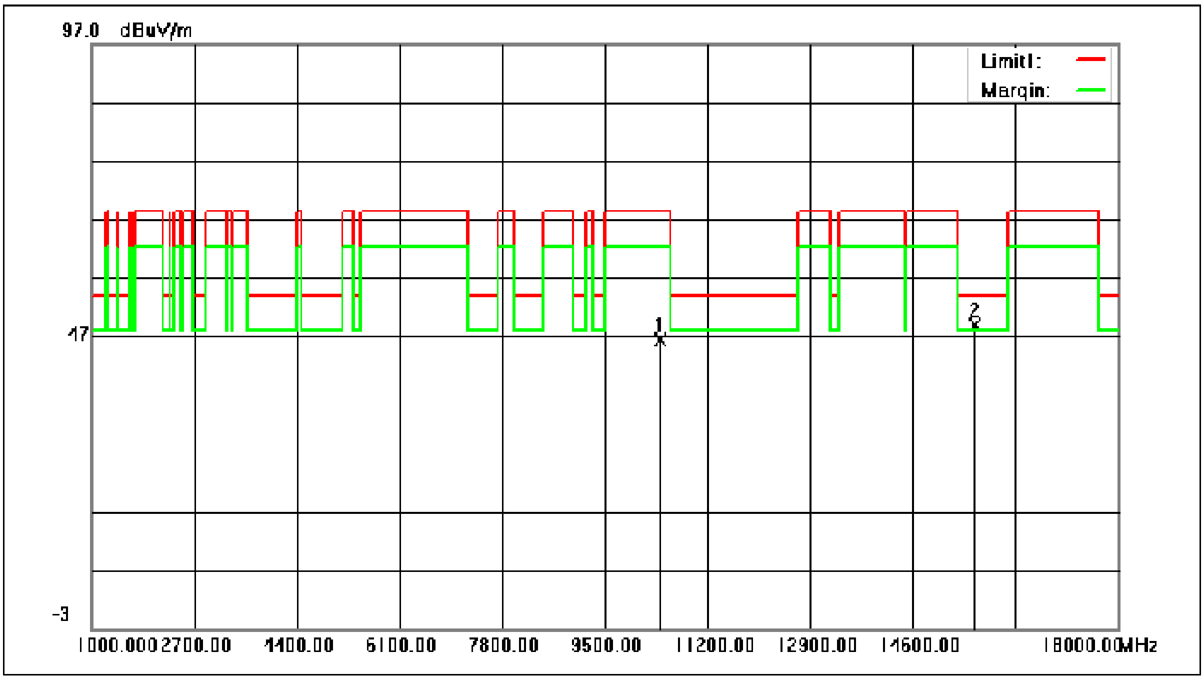
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10460.000	47.86	-2.44	45.42	68.30	-22.88	peak
2	15690.000	49.98	-0.42	49.56	54.00	-4.44	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:High



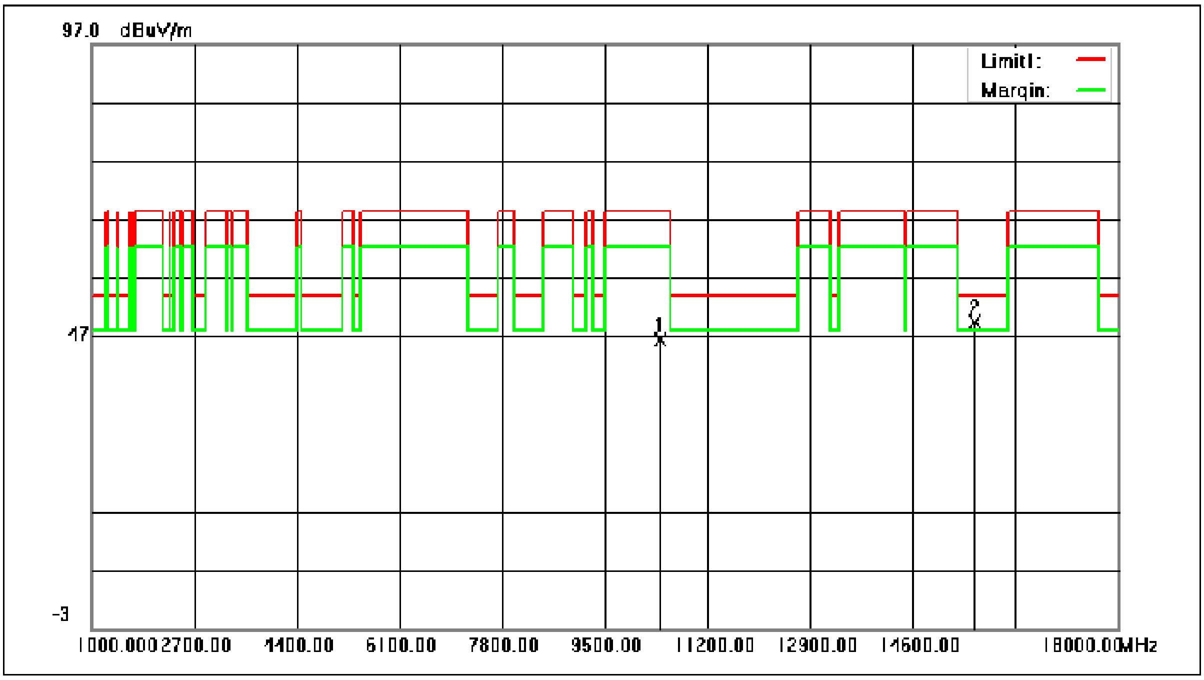
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10460.000	48.44	-2.44	46.00	68.30	-22.30	peak
2	15690.000	50.42	-0.42	50.00	54.00	-4.00	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:80MHz; Channel:Low



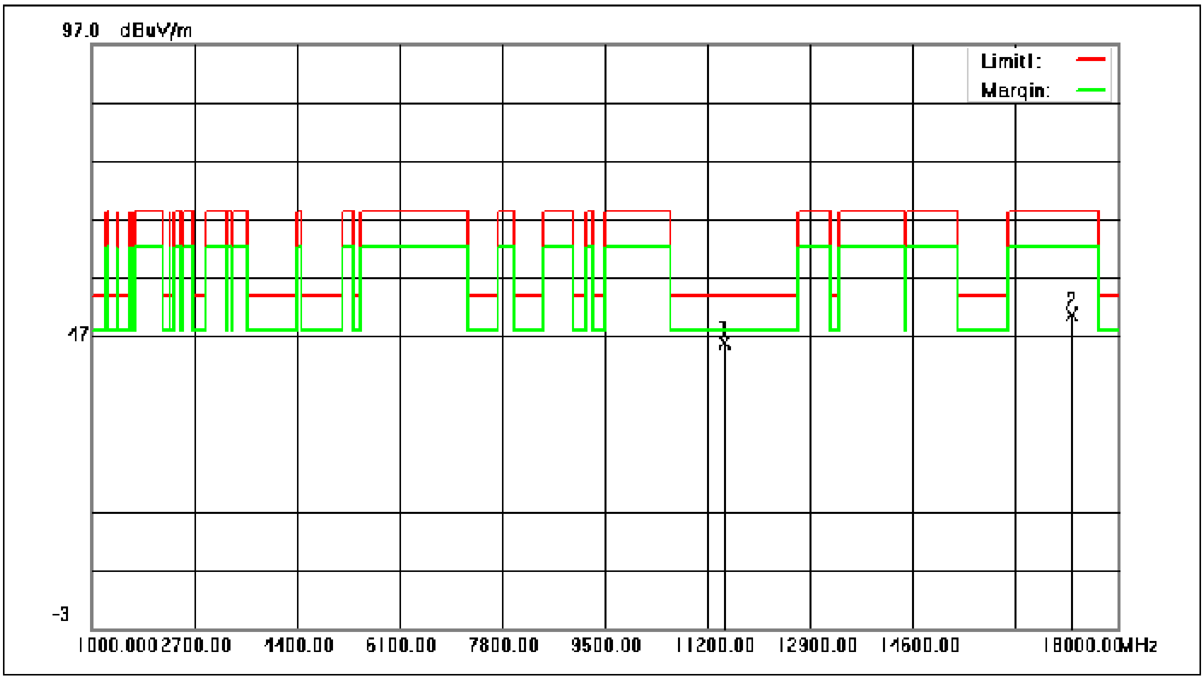
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10420.000	48.91	-2.50	46.41	68.30	-21.89	peak
2	15630.000	49.32	-0.37	48.95	54.00	-5.05	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:80MHz; Channel:Low



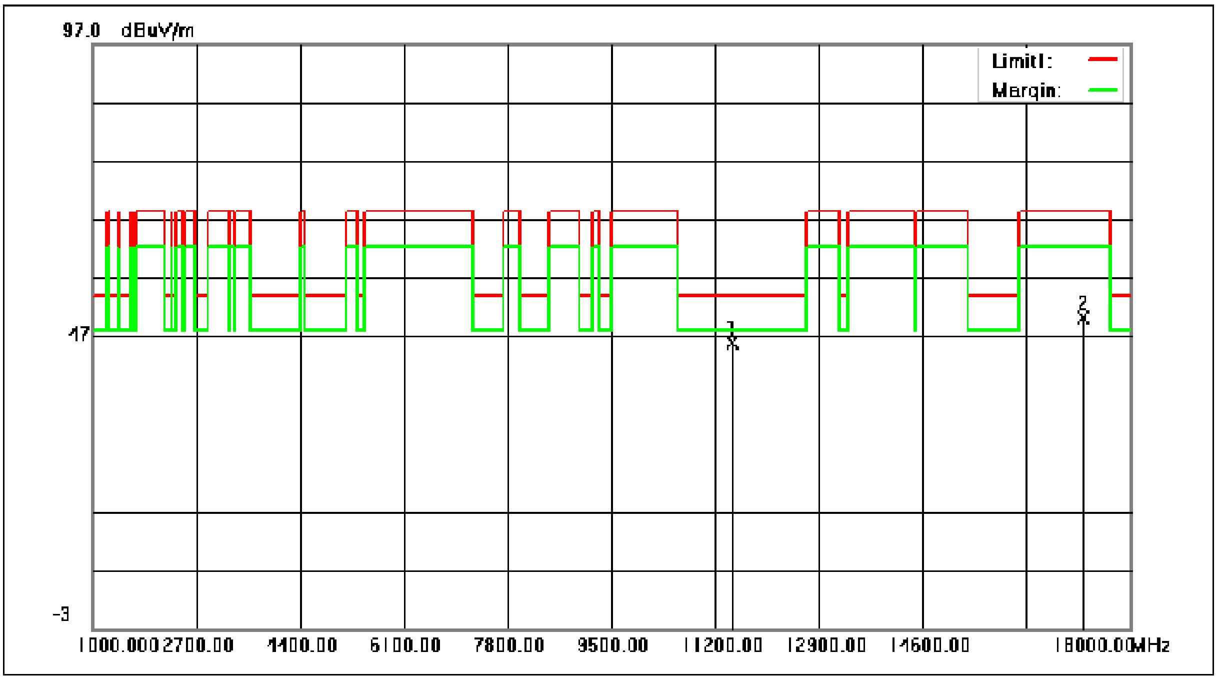
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	10420.000	48.83	-2.50	46.33	68.30	-21.97	peak
2	15630.000	49.85	-0.37	49.48	54.00	-4.52	peak

Mode:e; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:Low



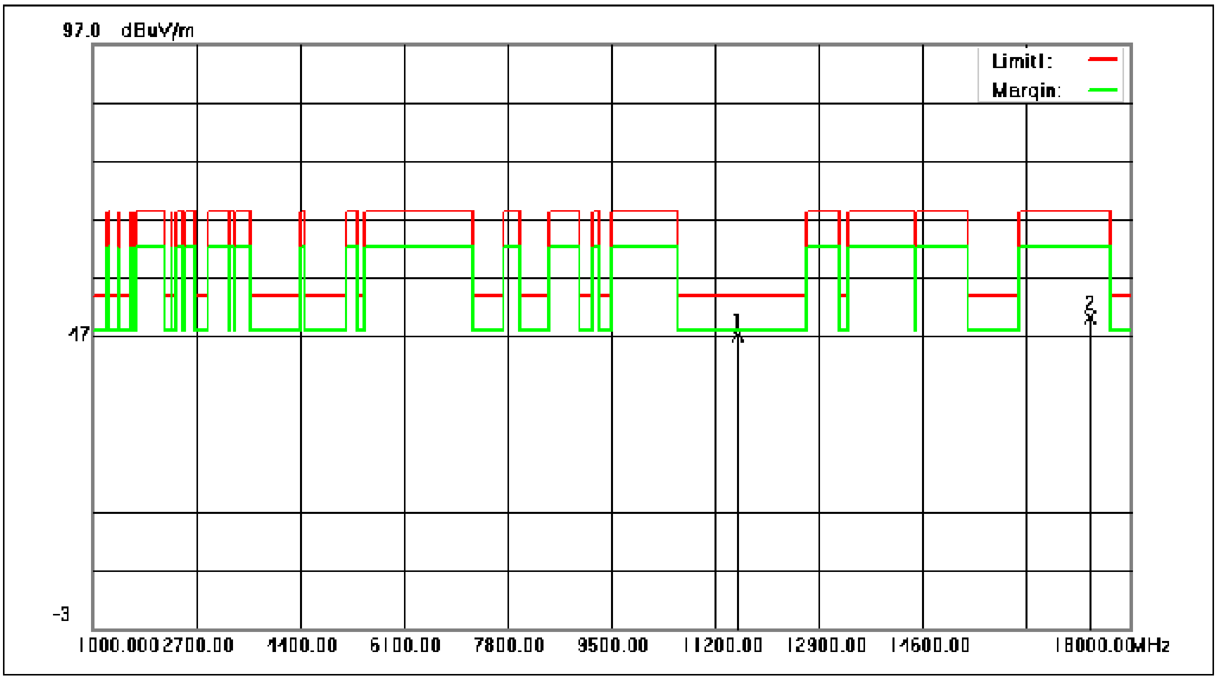
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11490.000	48.23	-2.24	45.99	54.00	-8.01	peak
2	17235.000	50.94	-0.19	50.75	68.30	-17.55	peak

Mode:e; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:Low



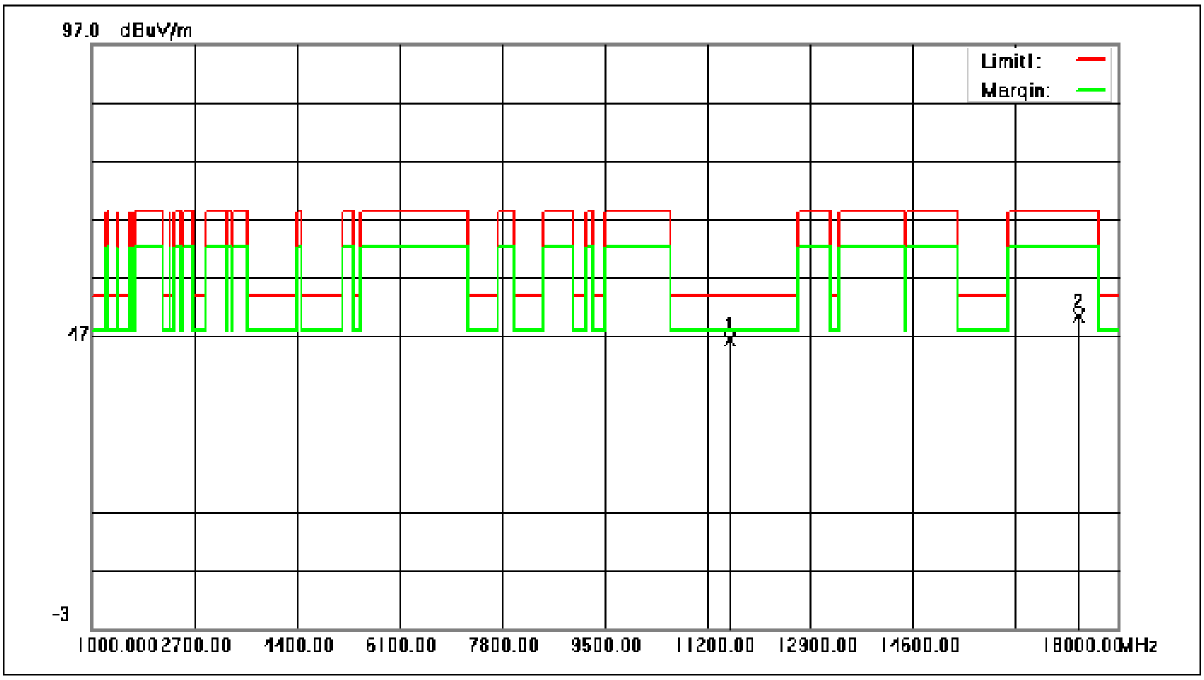
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11490.000	48.07	-2.24	45.83	54.00	-8.17	peak
2	17235.000	50.21	-0.19	50.02	68.30	-18.28	peak

Mode:e; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:middle



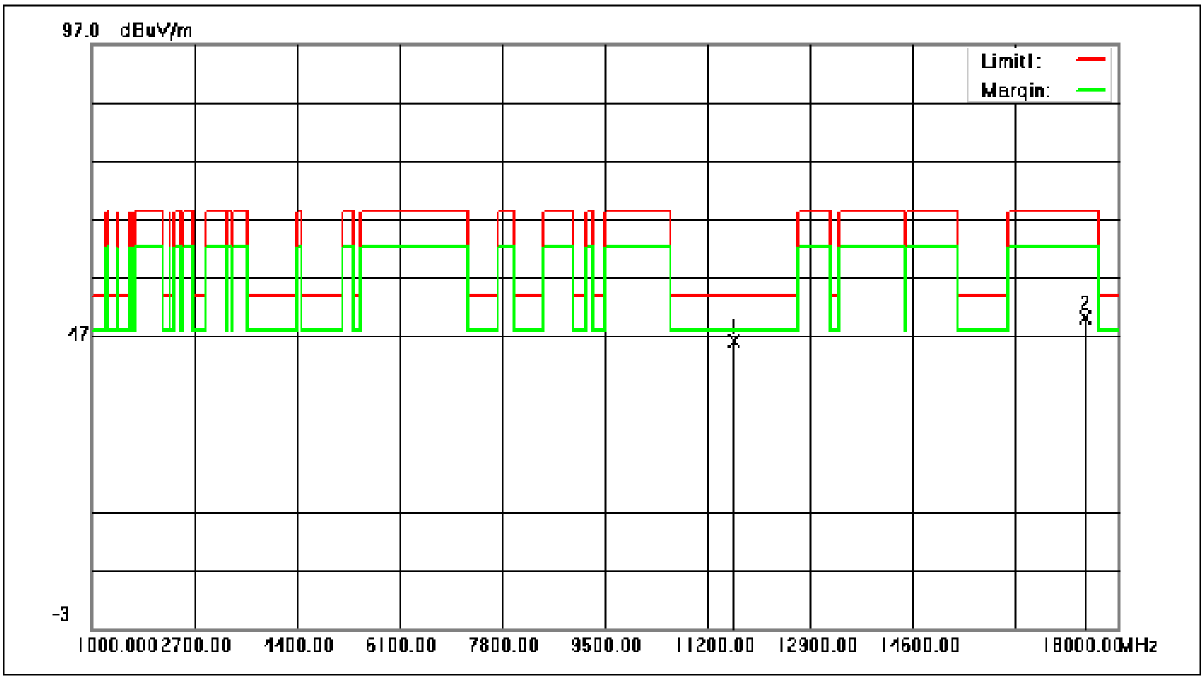
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11570.000	49.37	-2.33	47.04	54.00	-6.96	peak
2	17355.000	50.43	-0.29	50.14	68.30	-18.16	peak

Mode:e; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:middle



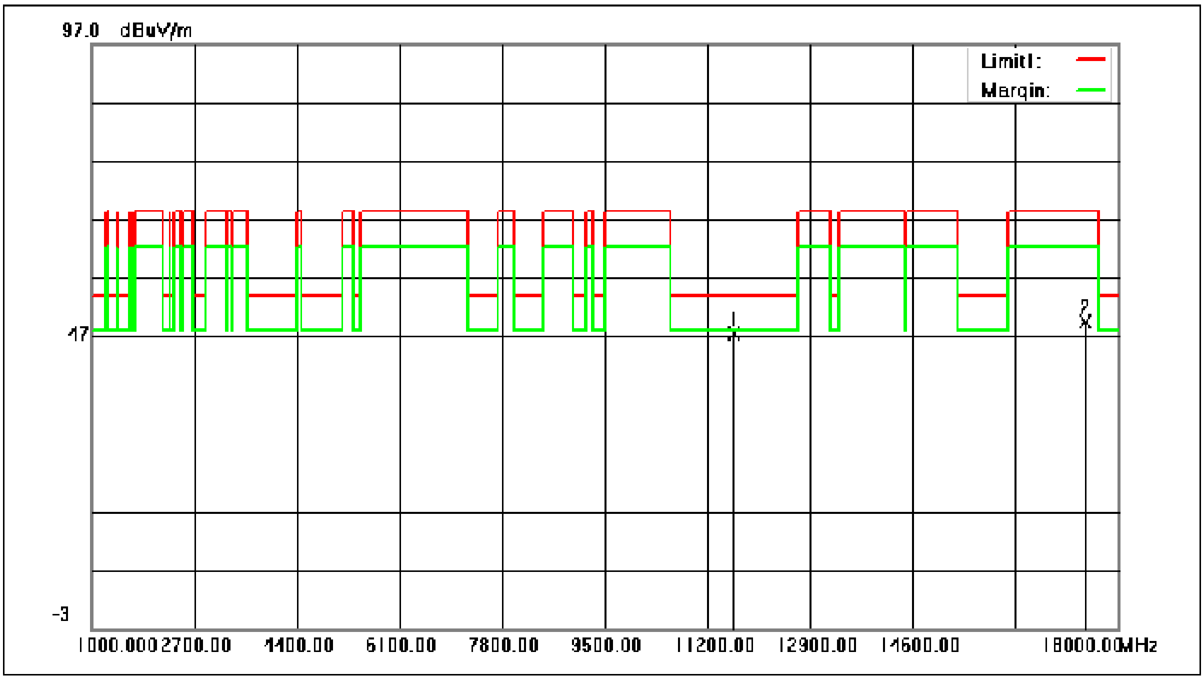
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11570.000	48.71	-2.33	46.38	54.00	-7.62	peak
2	17355.000	50.77	-0.29	50.48	68.30	-17.82	peak

Mode:e; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:High



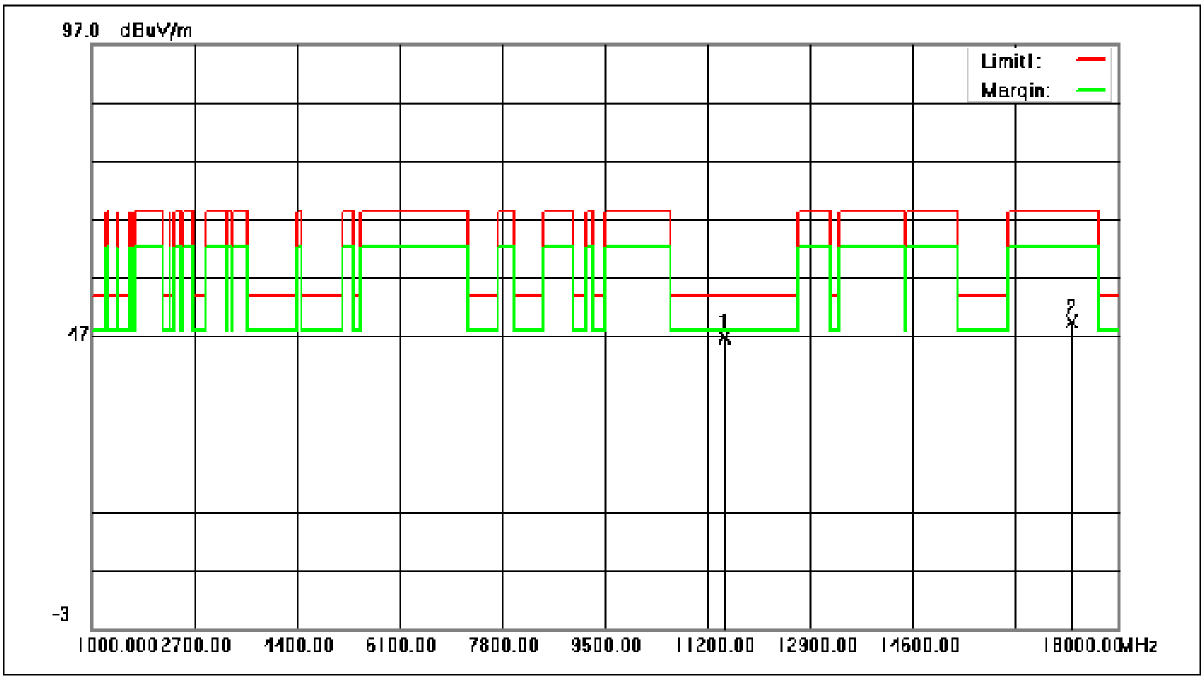
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11650.000	48.51	-2.40	46.11	54.00	-7.89	peak
2	17475.000	50.47	-0.39	50.08	68.30	-18.22	peak

Mode:e; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:High



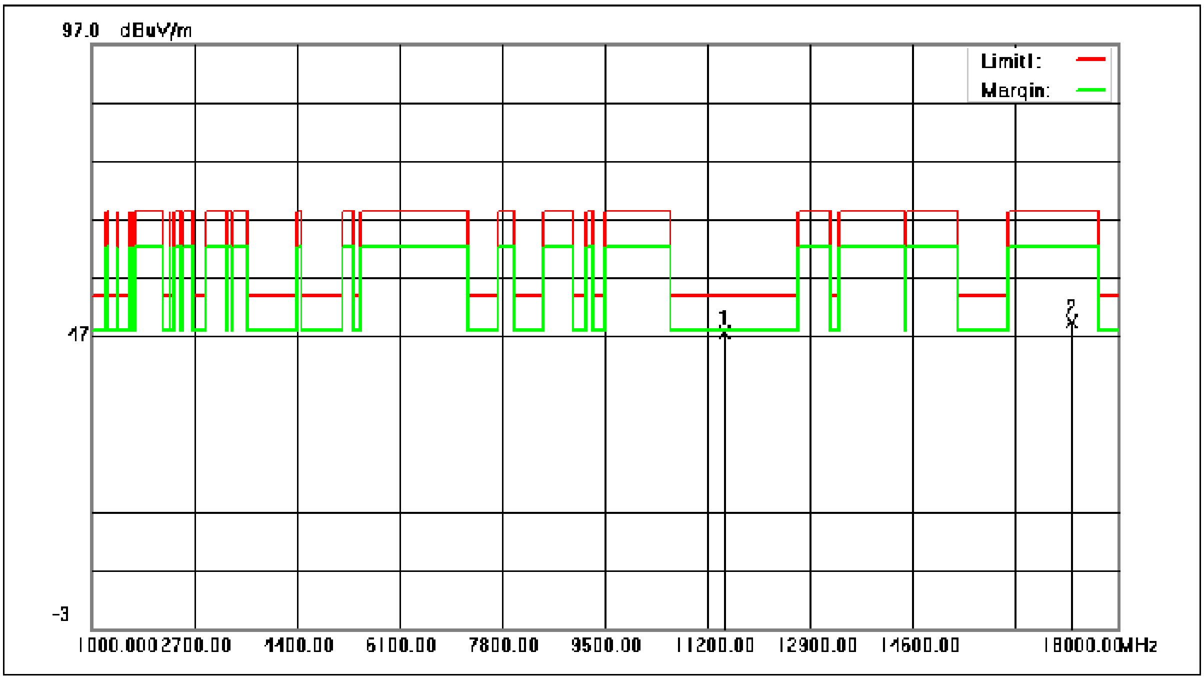
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11650.000	49.70	-2.40	47.30	54.00	-6.70	peak
2	17475.000	49.68	-0.39	49.29	68.30	-19.01	peak

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



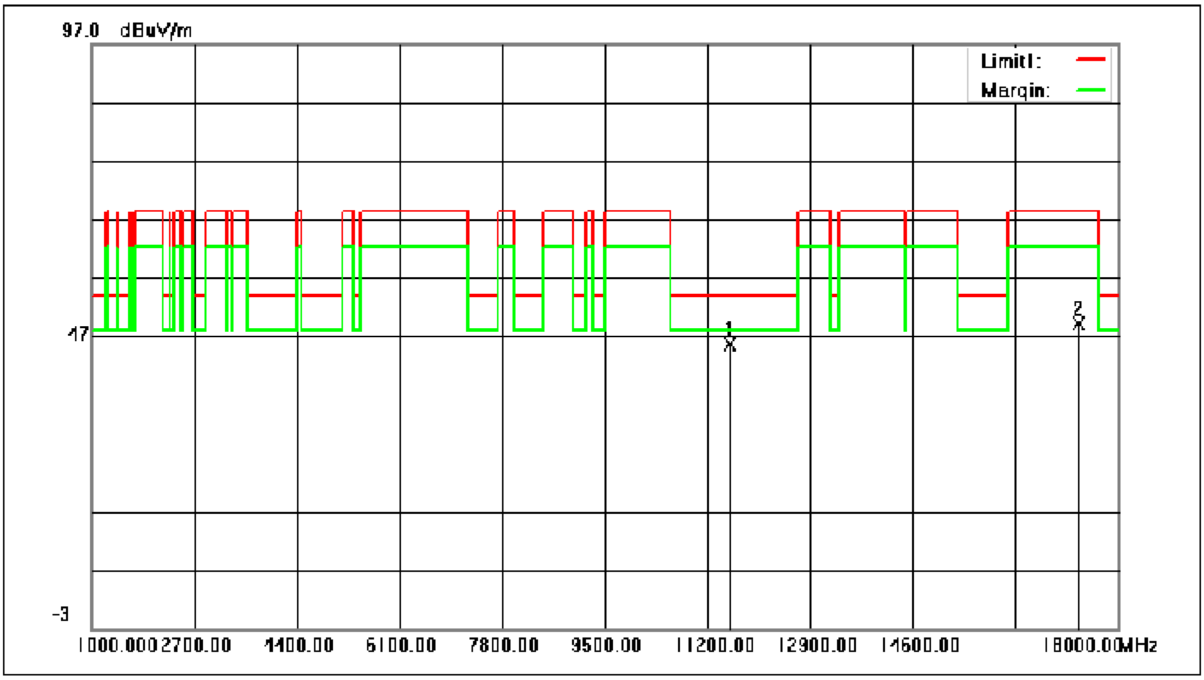
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11490.000	49.17	-2.24	46.93	54.00	-7.07	peak
2	17235.000	49.58	-0.19	49.39	68.30	-18.91	peak

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



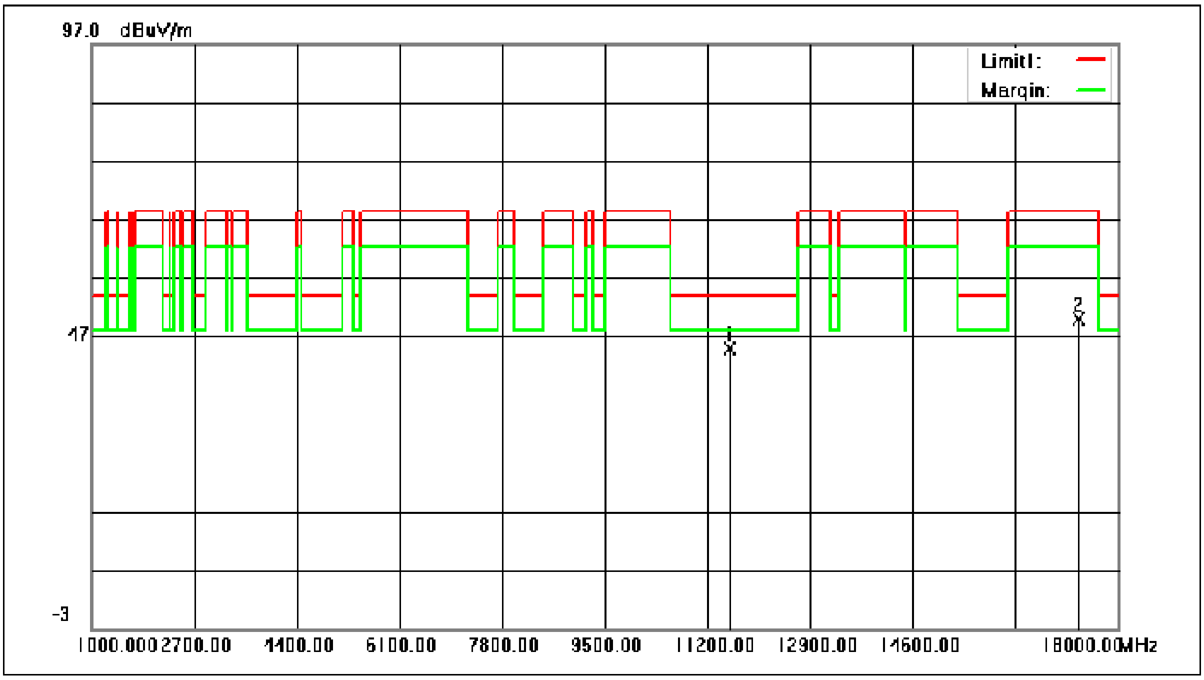
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11490.000	49.97	-2.24	47.73	54.00	-6.27	peak
2	17235.000	49.59	-0.19	49.40	68.30	-18.90	peak

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



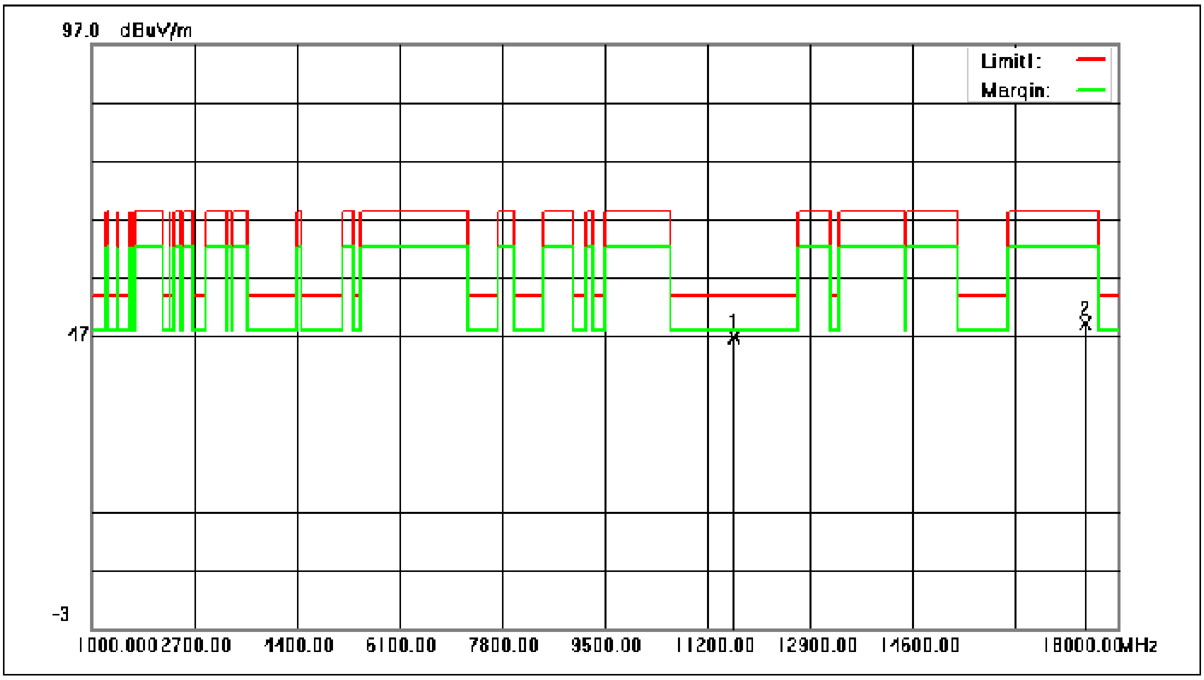
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11570.000	47.94	-2.33	45.61	54.00	-8.39	peak
2	17355.000	49.33	-0.29	49.04	68.30	-19.26	peak

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



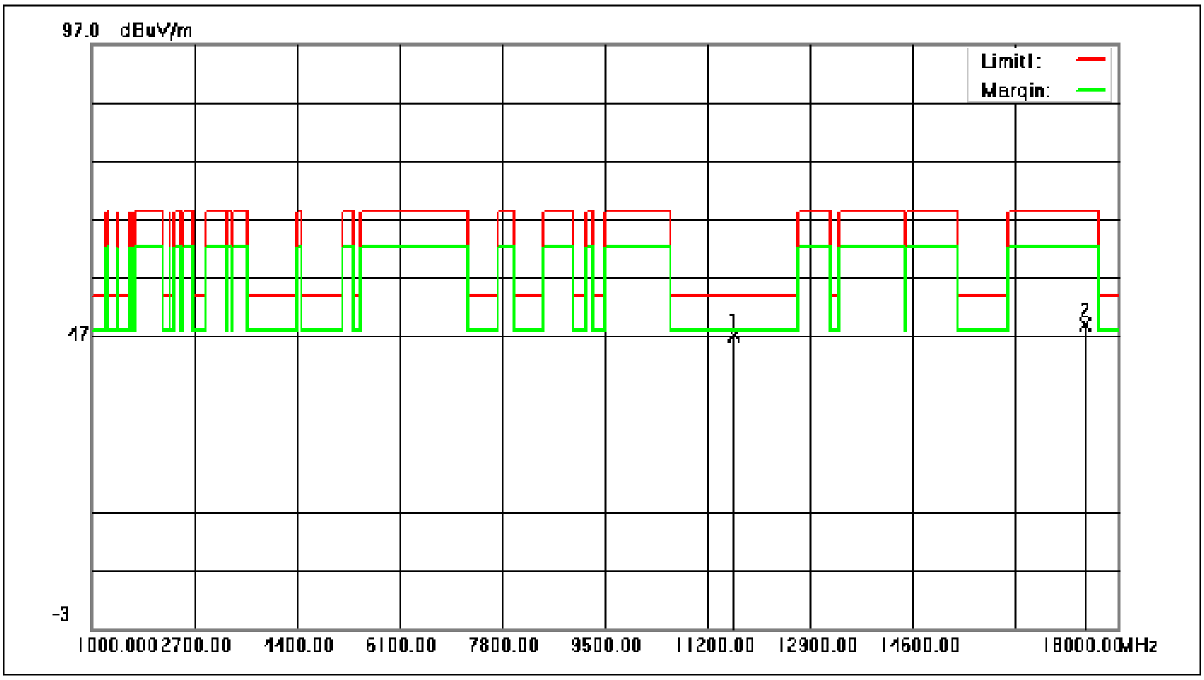
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11570.000	47.12	-2.33	44.79	54.00	-9.21	peak
2	17355.000	50.15	-0.29	49.86	68.30	-18.44	peak

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



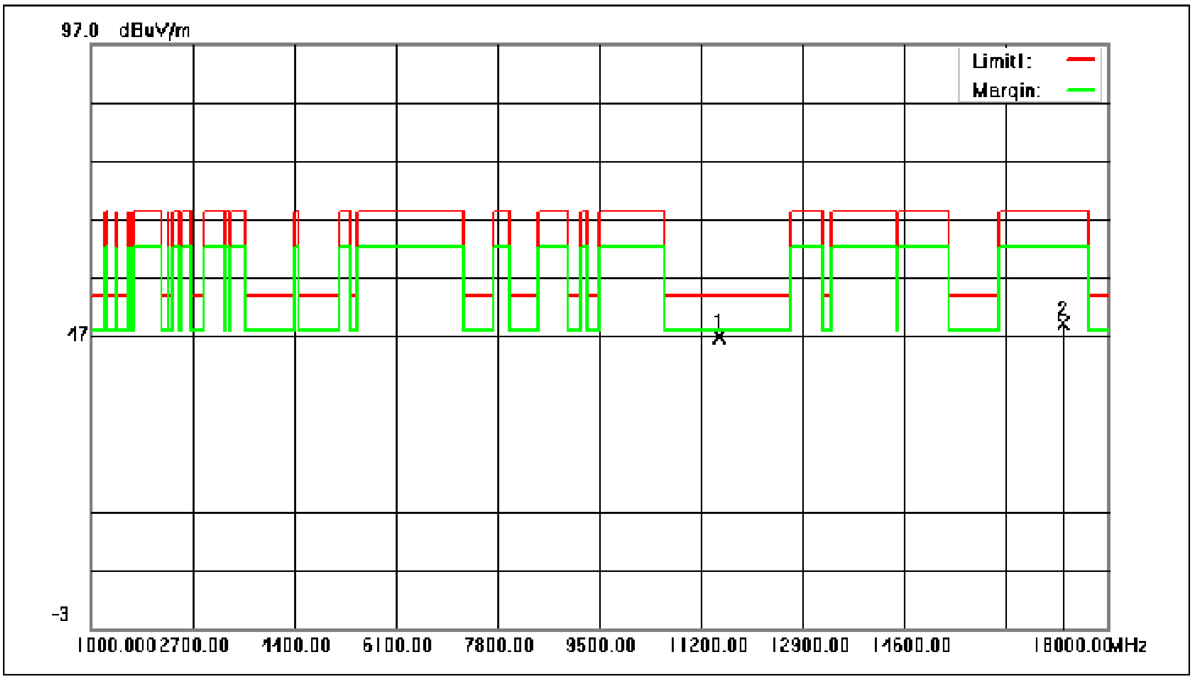
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11650.000	49.25	-2.40	46.85	54.00	-7.15	peak
2	17475.000	49.53	-0.39	49.14	68.30	-19.16	peak

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



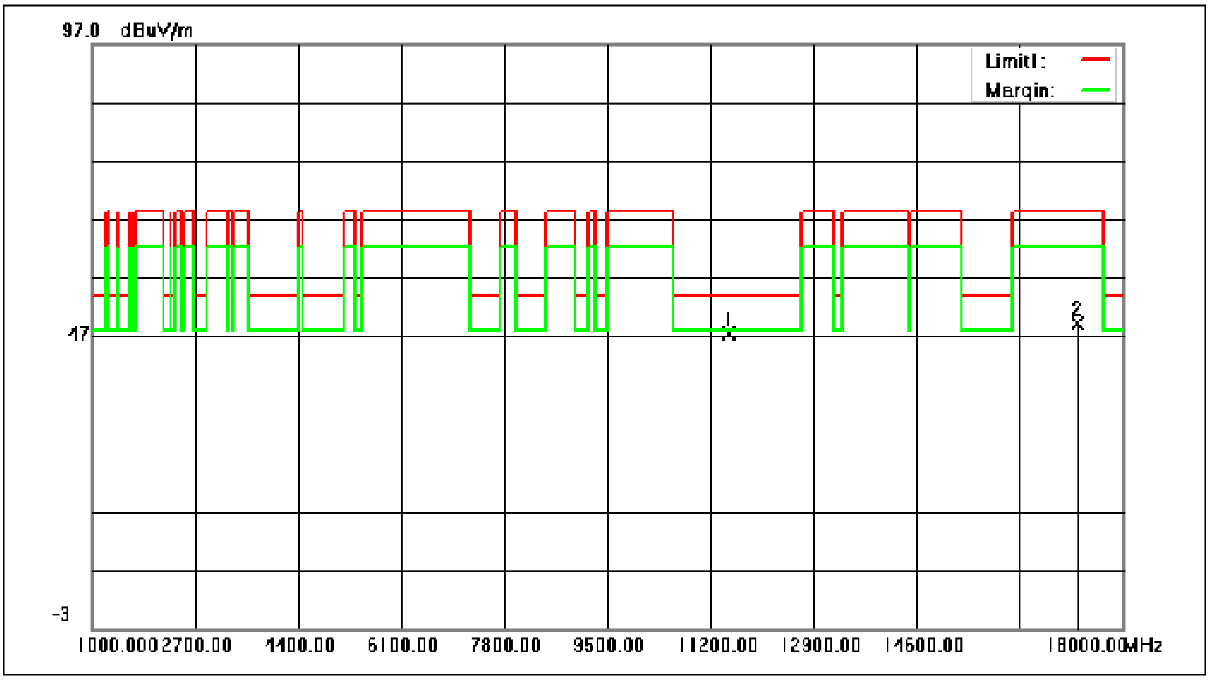
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11650.000	49.55	-2.40	47.15	54.00	-6.85	peak
2	17475.000	49.39	-0.39	49.00	68.30	-19.30	peak

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



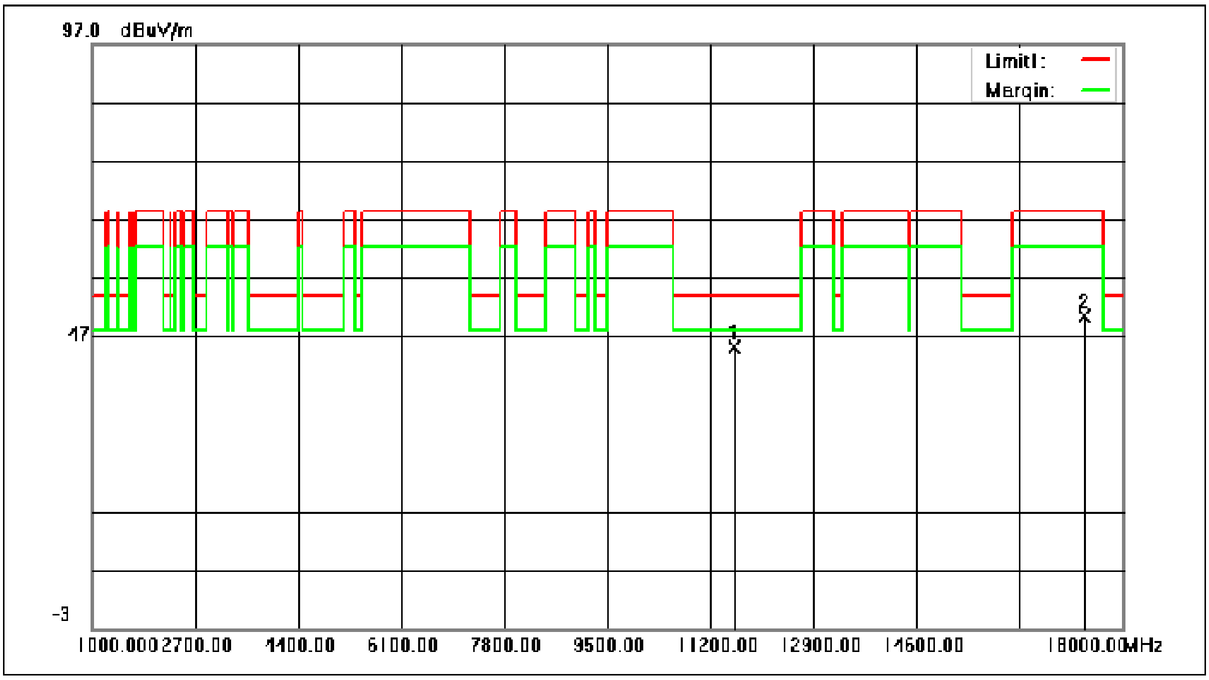
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11510.000	49.03	-2.27	46.76	54.00	-7.24	peak
2	17265.000	49.29	-0.22	49.07	68.30	-19.23	peak

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



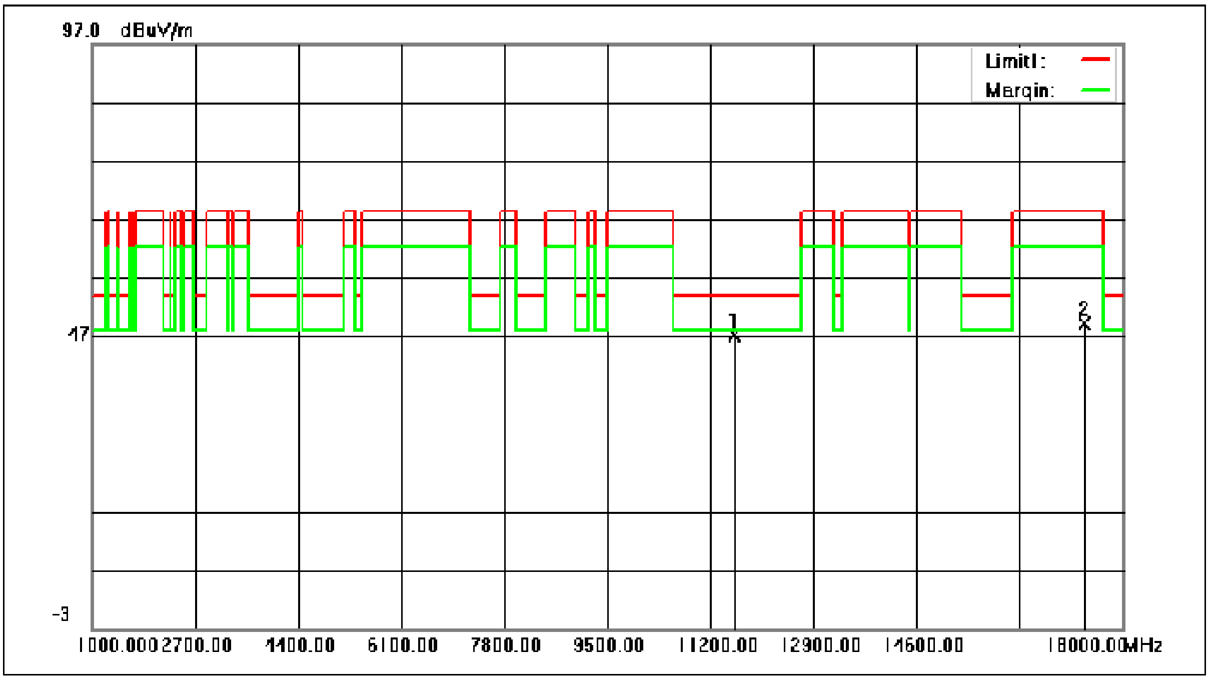
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11510.000	49.77	-2.27	47.50	54.00	-6.50	peak
2	17265.000	49.35	-0.22	49.13	68.30	-19.17	peak

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



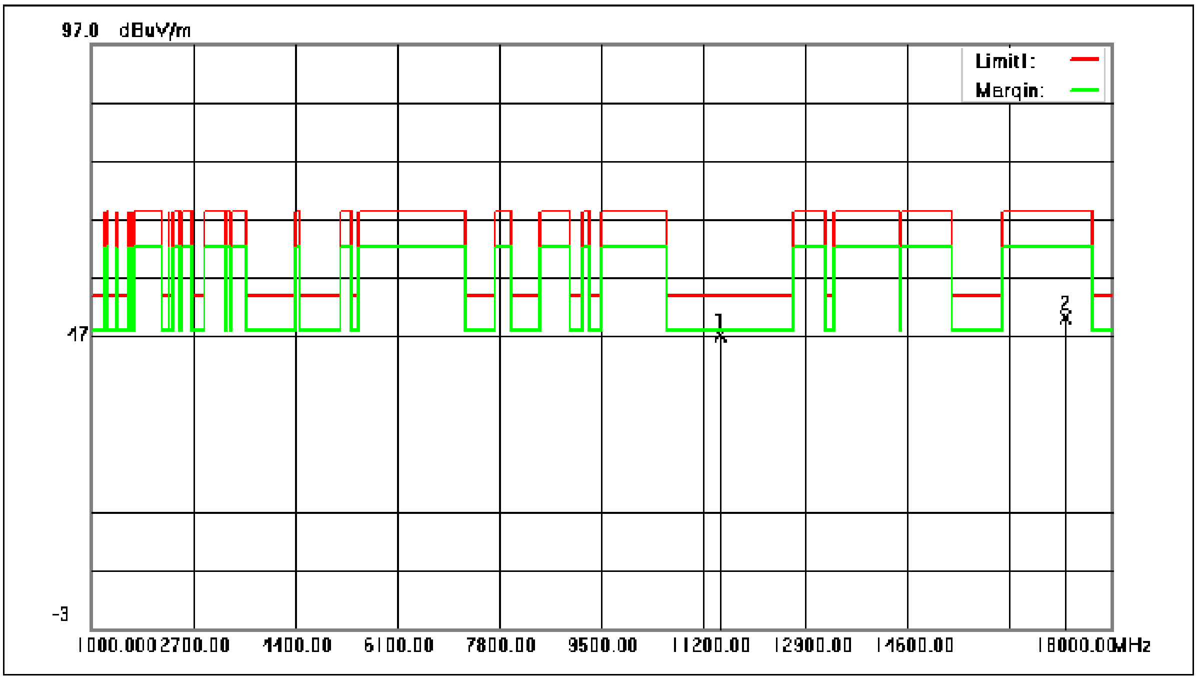
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11590.000	47.59	-2.34	45.25	54.00	-8.75	peak
2	17385.000	50.71	-0.32	50.39	68.30	-17.91	peak

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



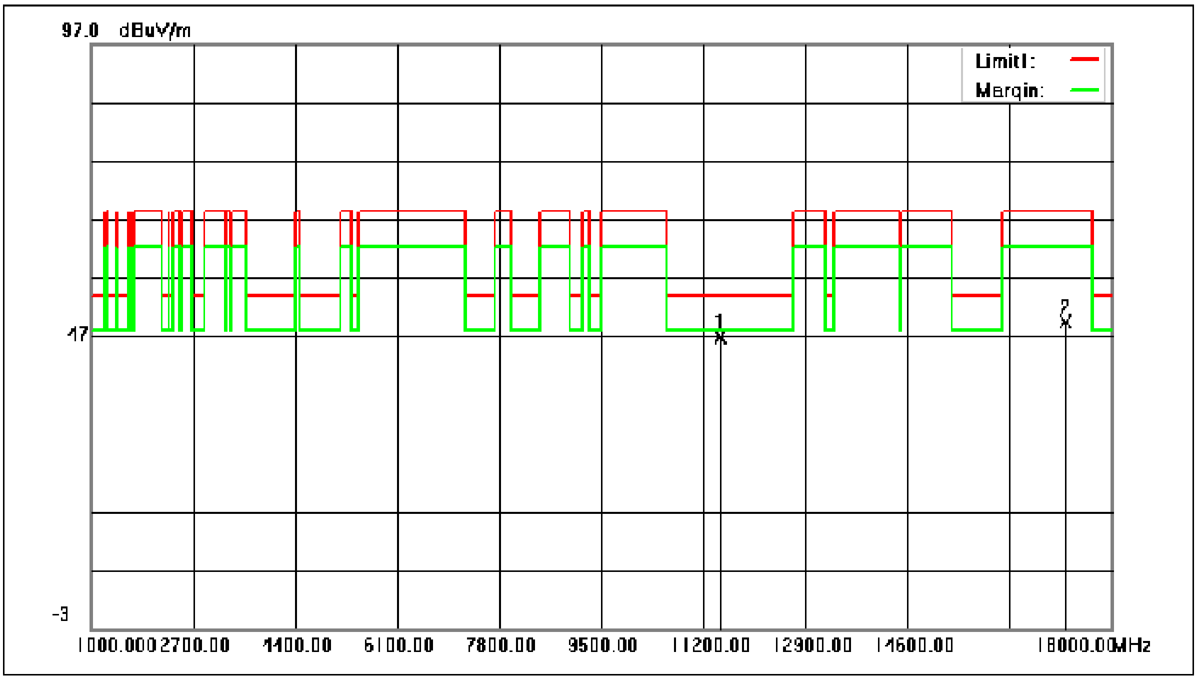
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11590.000	49.38	-2.34	47.04	54.00	-6.96	peak
2	17385.000	49.51	-0.32	49.19	68.30	-19.11	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:Low



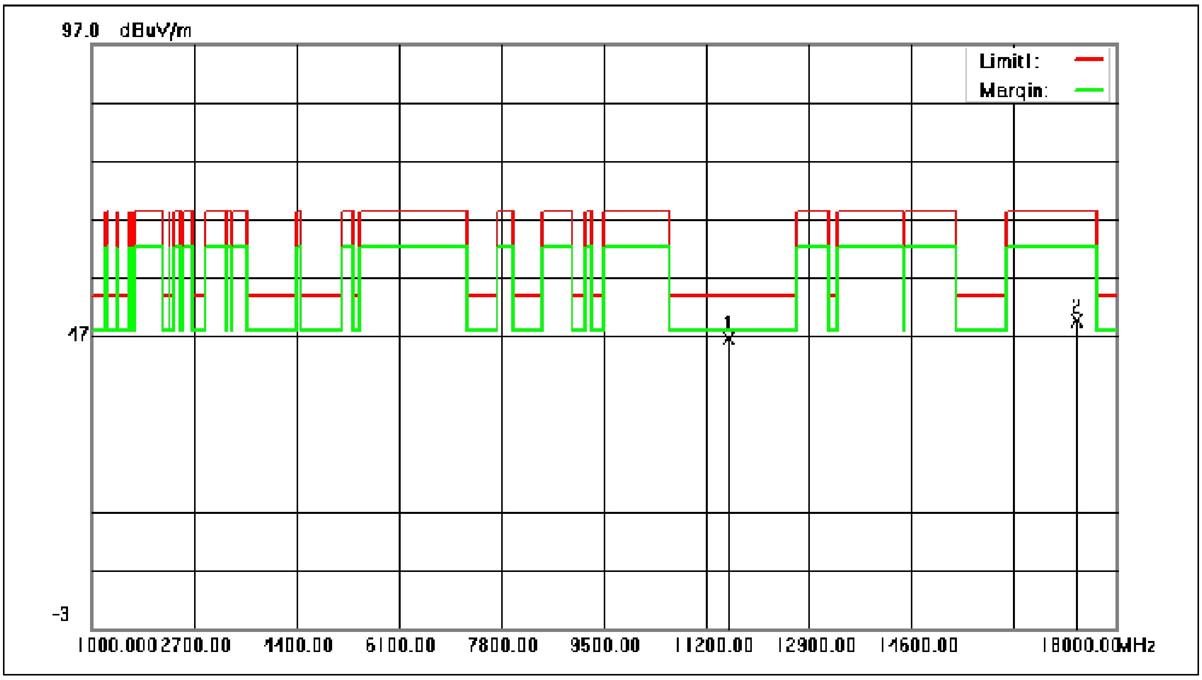
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11490.000	49.26	-2.24	47.02	54.00	-6.98	peak
2	17235.000	50.37	-0.19	50.18	68.30	-18.12	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:Low



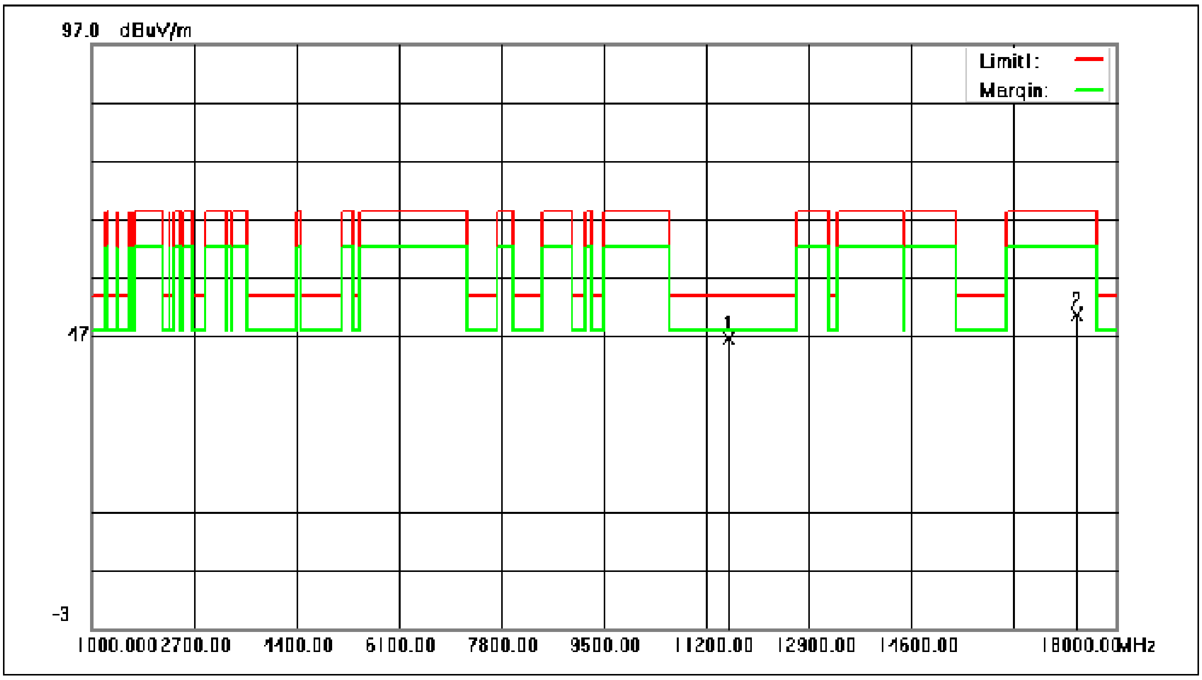
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11490.000	49.05	-2.24	46.81	54.00	-7.19	peak
2	17235.000	49.47	-0.19	49.28	68.30	-19.02	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:middle



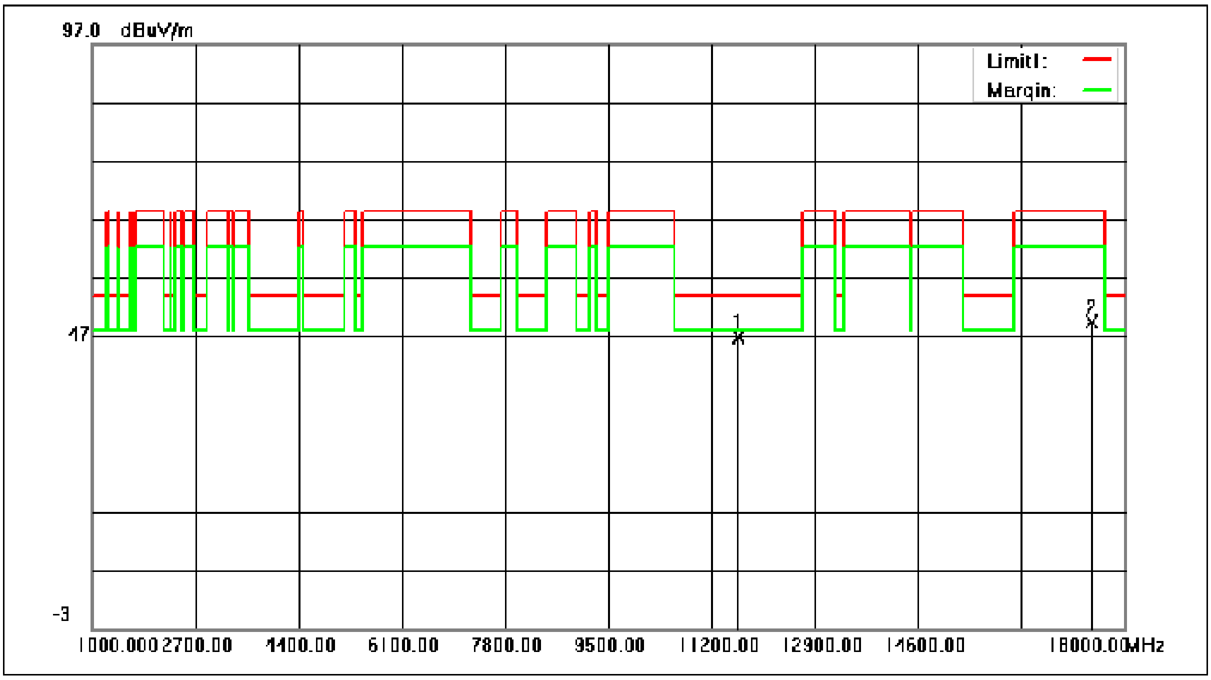
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11570.000	49.07	-2.33	46.74	54.00	-7.26	peak
2	17355.000	49.96	-0.29	49.67	68.30	-18.63	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:middle



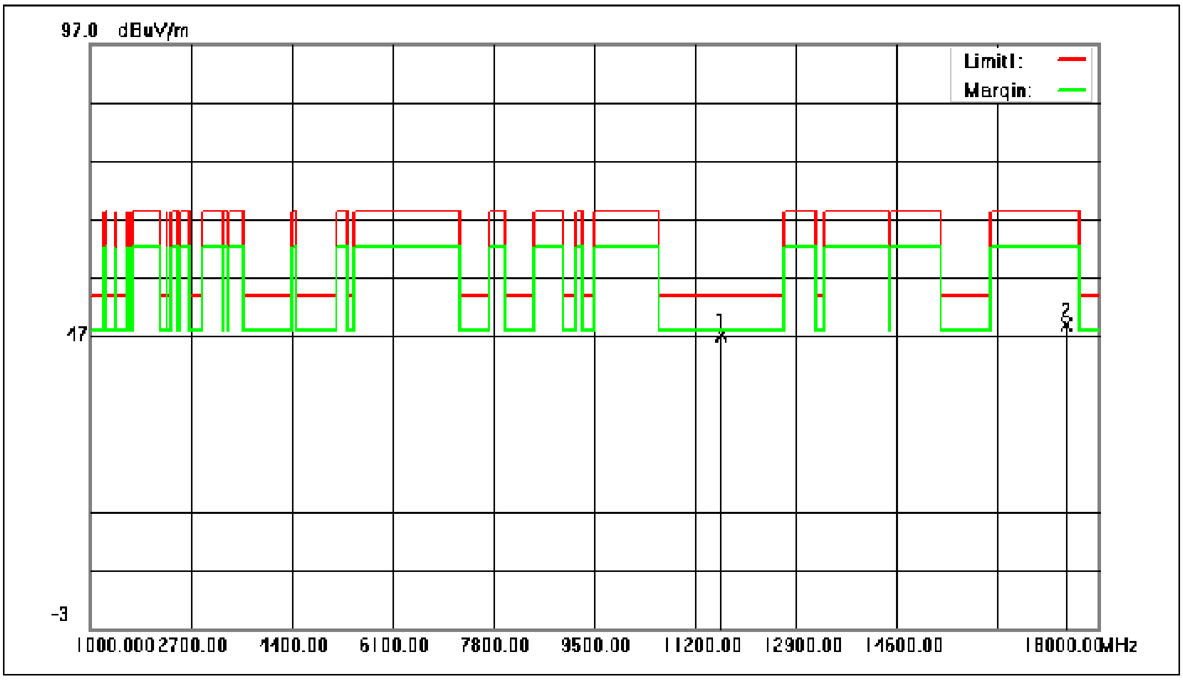
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11570.000	48.90	-2.33	46.57	54.00	-7.43	peak
2	17355.000	50.81	-0.29	50.52	68.30	-17.78	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:High



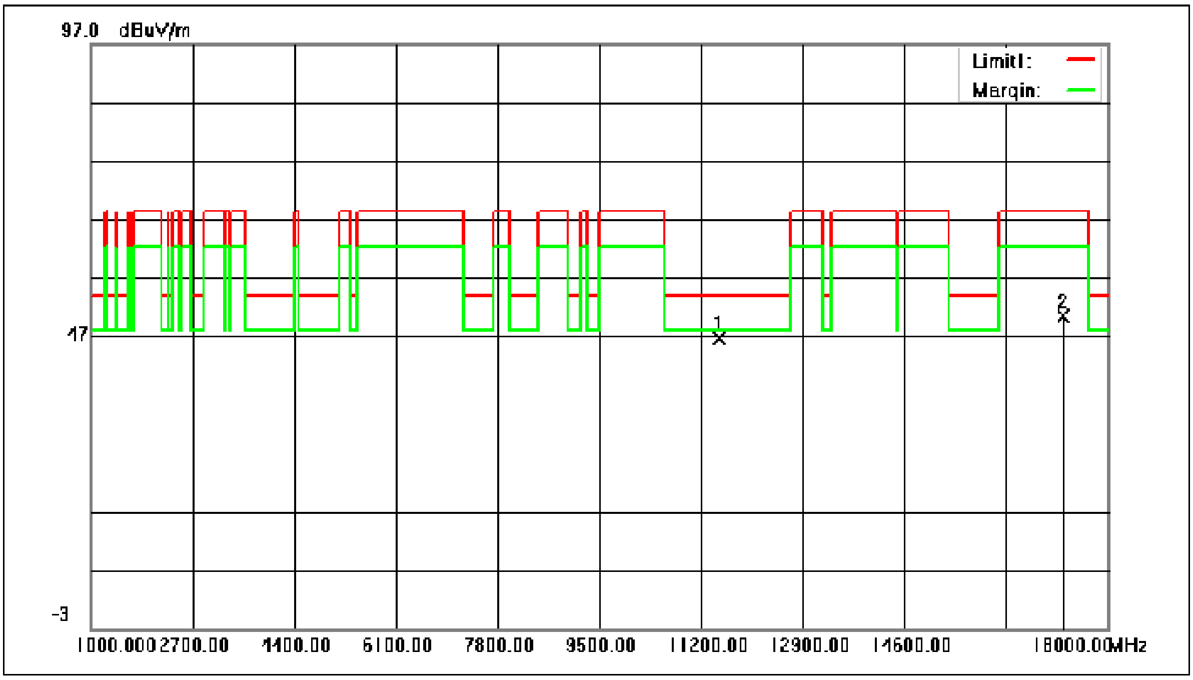
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11650.000	49.34	-2.40	46.94	54.00	-7.06	peak
2	17475.000	49.68	-0.39	49.29	68.30	-19.01	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:High



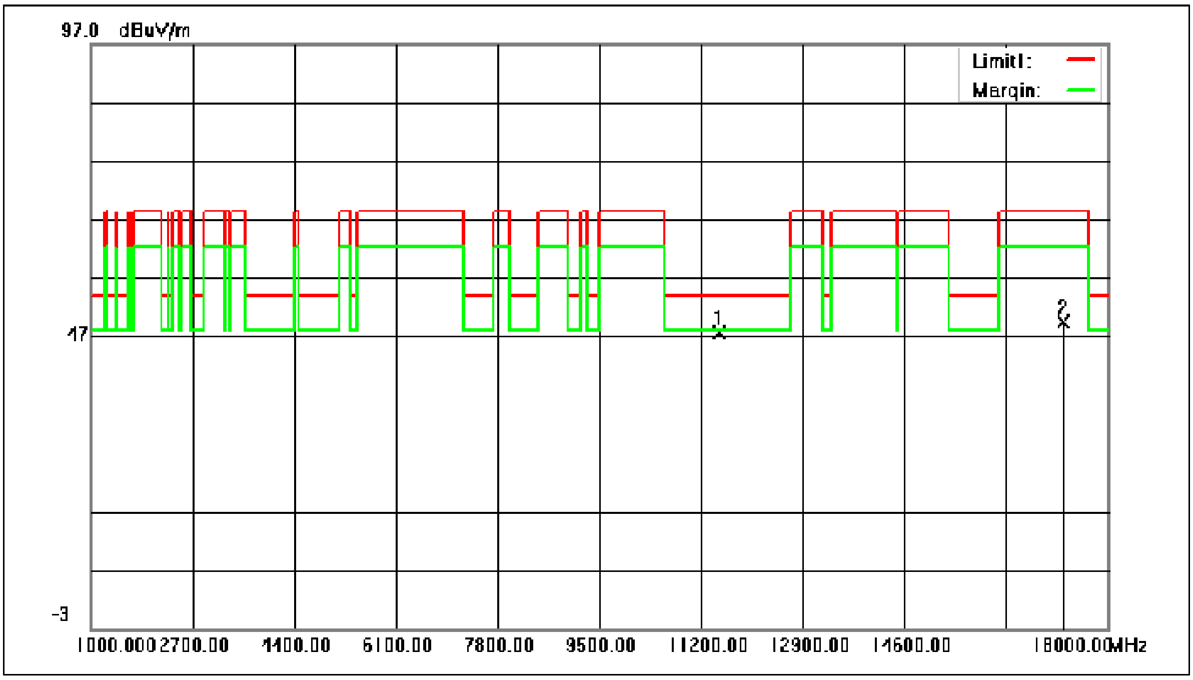
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11650.000	49.58	-2.40	47.18	54.00	-6.82	peak
2	17475.000	49.24	-0.39	48.85	68.30	-19.45	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:Low



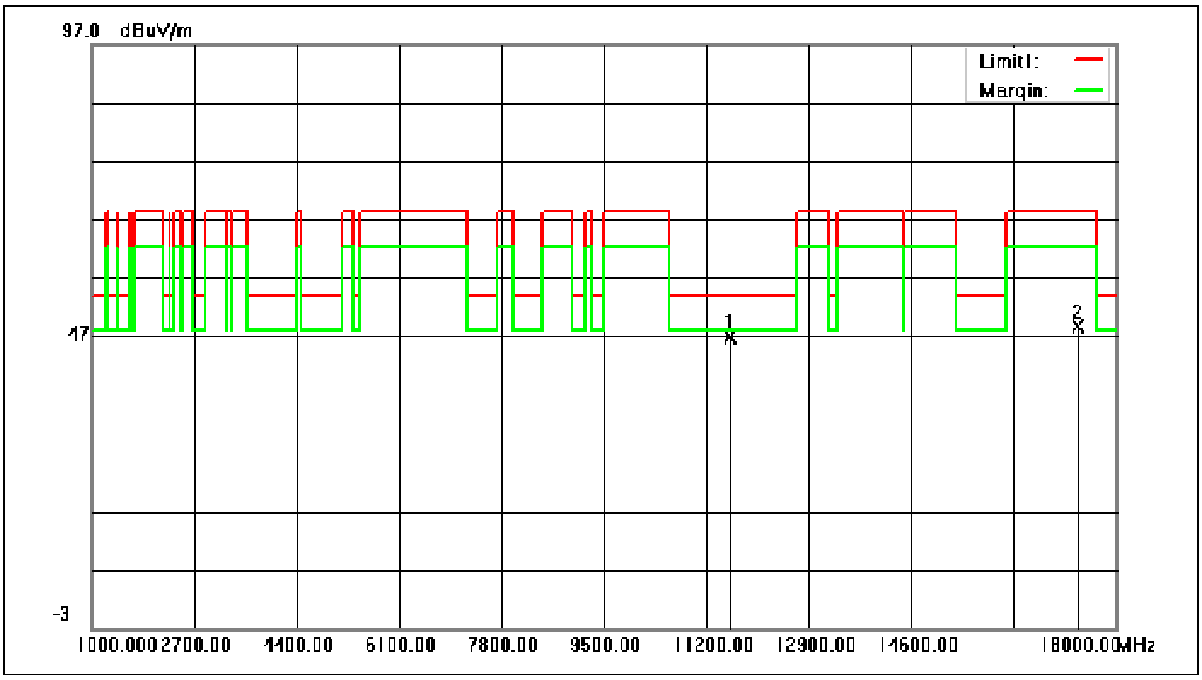
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11510.000	48.97	-2.27	46.70	54.00	-7.30	peak
2	17265.000	50.57	-0.22	50.35	68.30	-17.95	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:Low



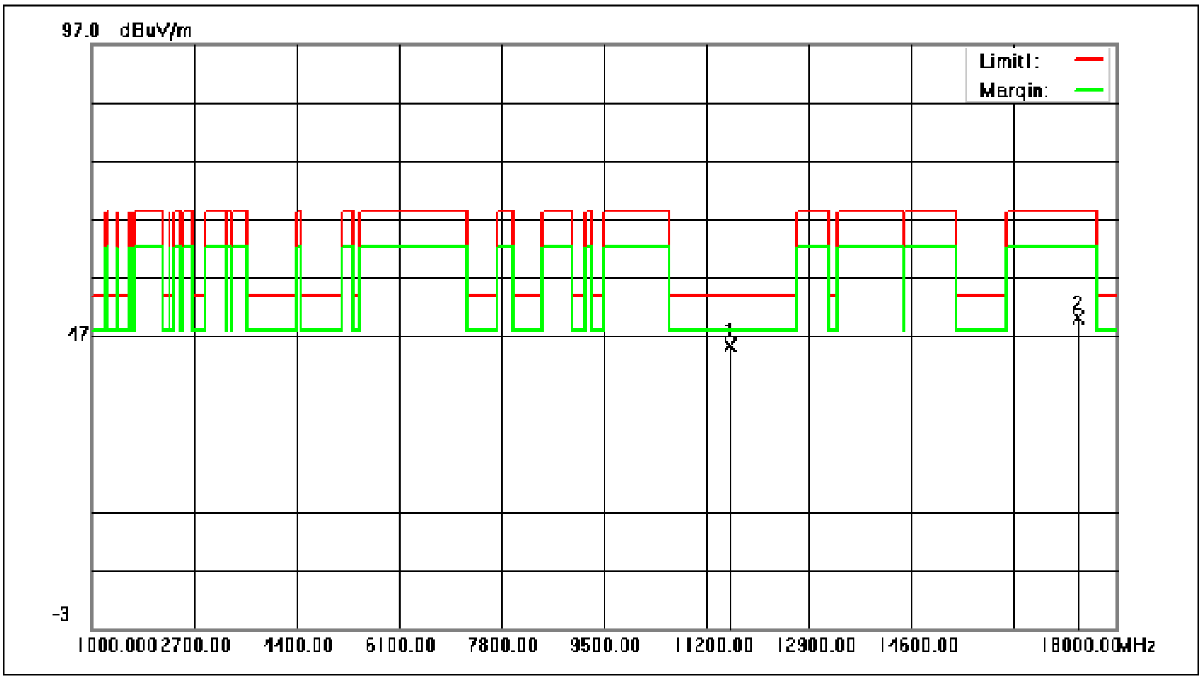
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11510.000	49.96	-2.27	47.69	54.00	-6.31	peak
2	17265.000	49.50	-0.22	49.28	68.30	-19.02	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:High



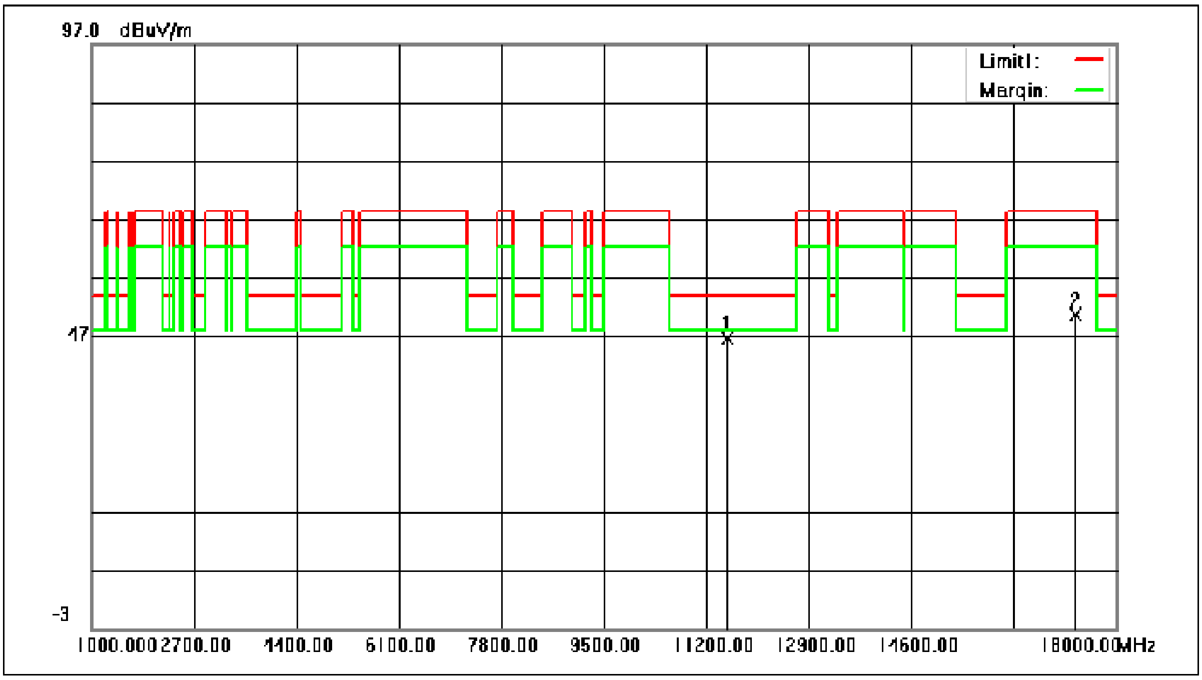
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11590.000	49.22	-2.34	46.88	54.00	-7.12	peak
2	17385.000	49.05	-0.32	48.73	68.30	-19.57	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:High



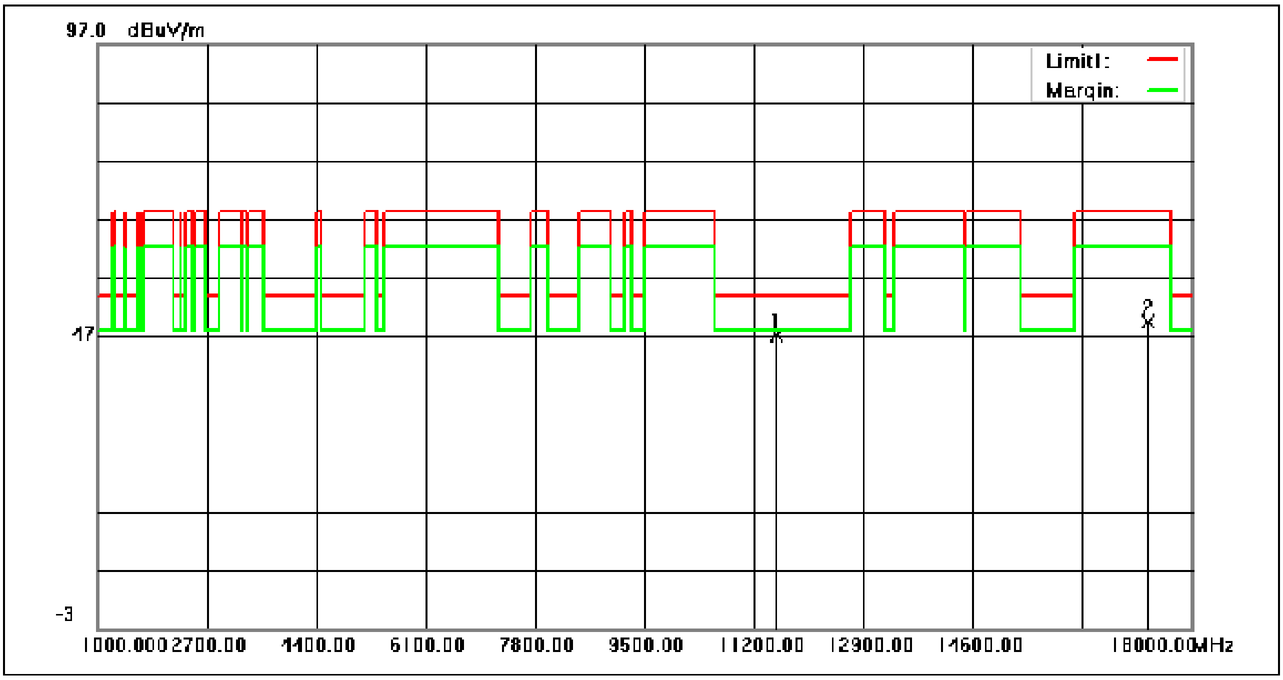
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11590.000	47.80	-2.34	45.46	54.00	-8.54	peak
2	17385.000	50.57	-0.32	50.25	68.30	-18.05	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:80MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11550.000	48.98	-2.31	46.67	54.00	-7.33	peak
2	17325.000	50.99	-0.27	50.72	68.30	-17.58	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:80MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	11550.000	49.41	-2.31	47.10	54.00	-6.90	peak
2	17325.000	49.65	-0.27	49.38	68.30	-18.92	peak

7.8 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)
Test Method: KDB 789033 D02 II G
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.		

7.8.1 E.U.T. Operation

Operating Environment:

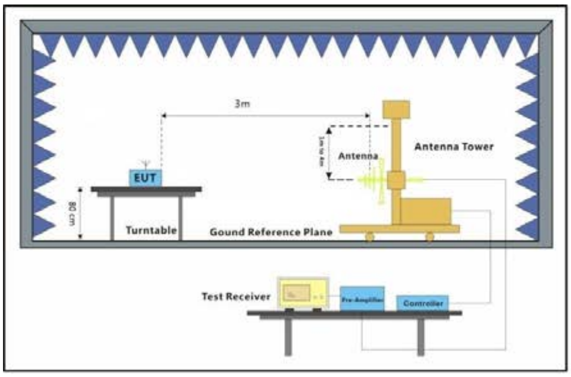
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

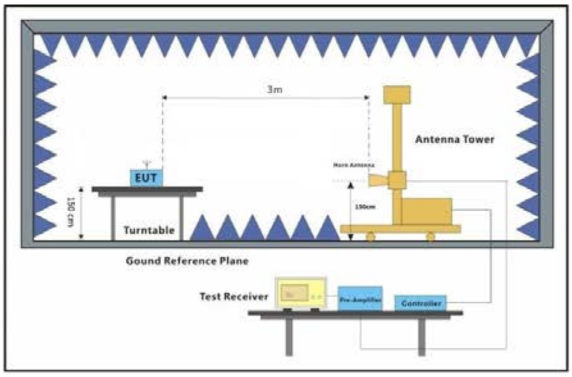
Pretest these modes to find the worst case:

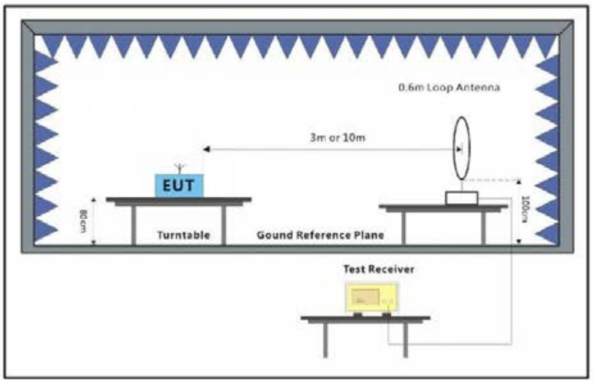
d:TX mode (Band 1)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.8.2 Test Setup Diagram


3m
1m to 4m
Antenna
Antenna Tower
EUT
80 cm
Turntable
Gound Reference Plane
Test Receiver
Pre-Amplifier
Controller


3m
Antenna Tower
Horn Antenna
150cm
EUT
150 cm
Turntable
Gound Reference Plane
Test Receiver
Pre-Amplifier
Controller


0.6m Loop Antenna
3m or 10m
EUT
80cm
Turntable
Gound Reference Plane
100cm
Test Receiver

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.

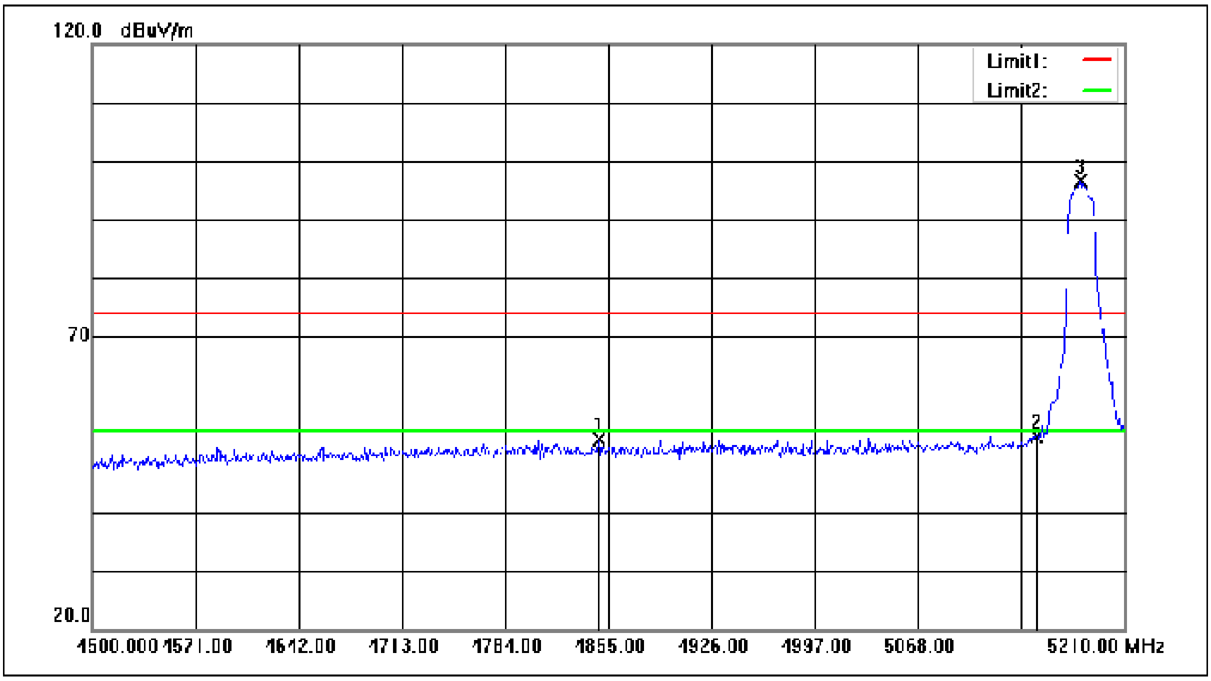
h. Test the EUT in the lowest channel, the middle channel, the Highest channel.

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.

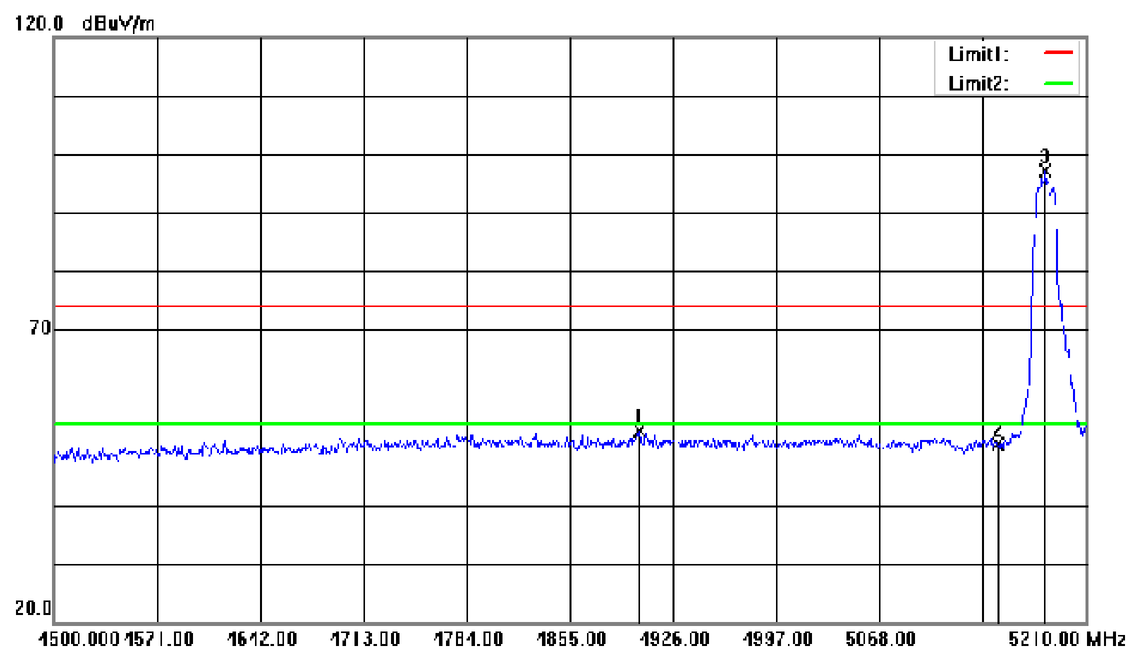
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Mode:d; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:Low



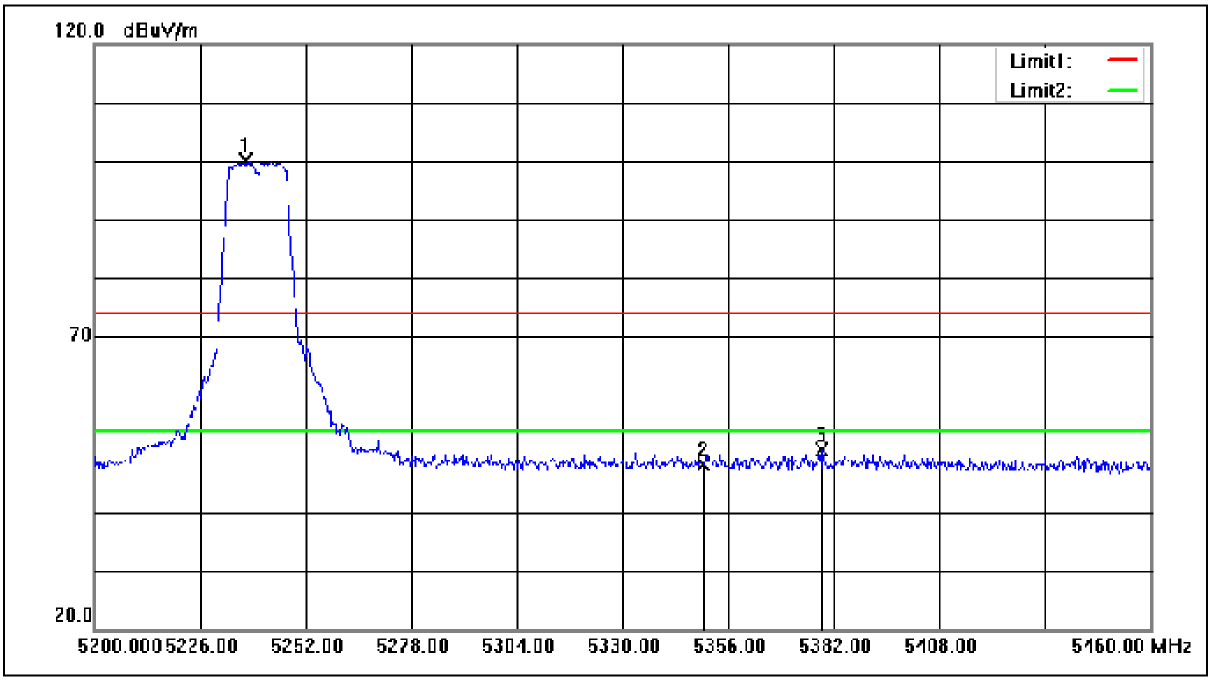
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4848.610	62.45	-10.11	52.34	74.00	-21.66	peak
2	5150.000	62.31	-9.51	52.80	74.00	-21.20	peak
3	5180.180	106.26	-9.51	96.75	74.00	22.75	peak

Mode:d; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:Low



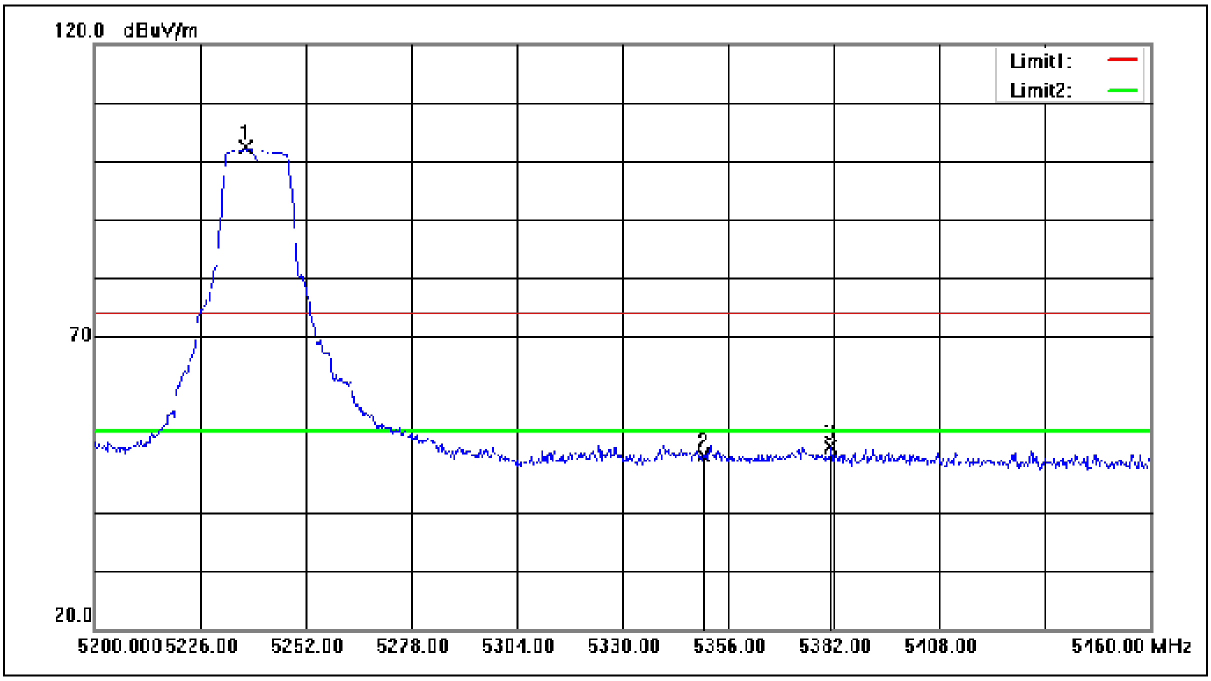
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4902.570	62.52	-9.90	52.62	74.00	-21.38	peak
2	5150.000	59.80	-9.51	50.29	74.00	-23.71	peak
3	5182.310	106.64	-9.51	97.13	74.00	23.13	peak

Mode:d; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:High



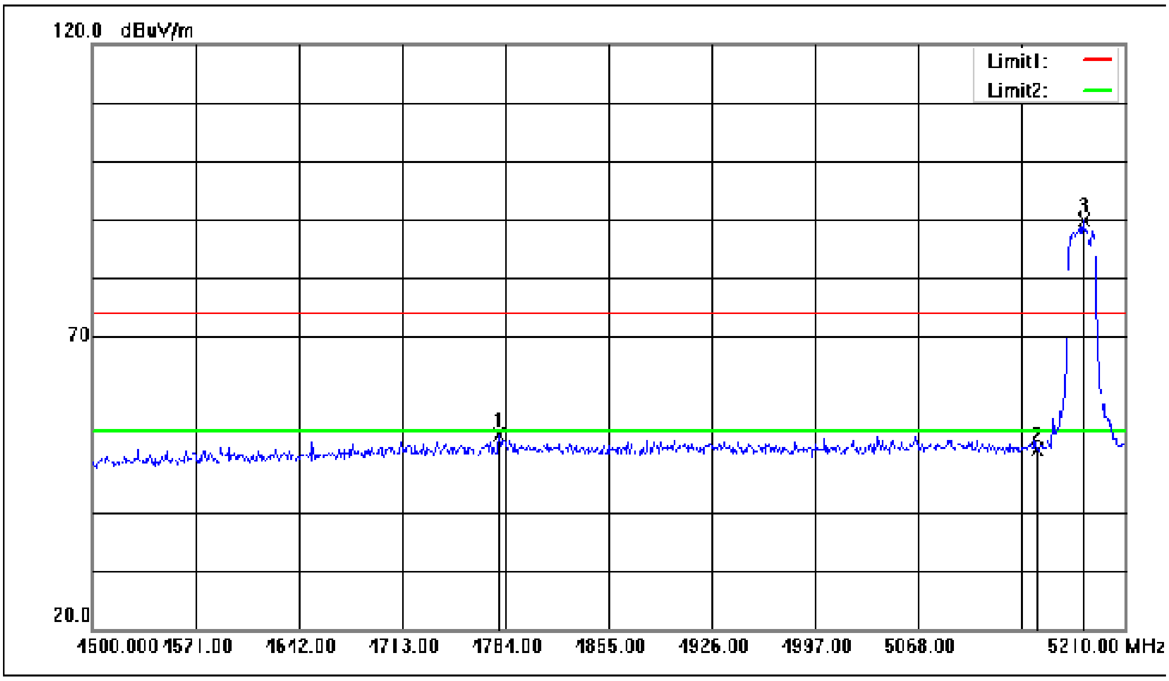
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5237.180	99.03	1.11	100.14	74.00	26.14	peak
2	5350.000	47.01	1.18	48.19	74.00	-25.81	peak
3	5378.880	49.33	1.19	50.52	74.00	-23.48	peak

Mode:d; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:High



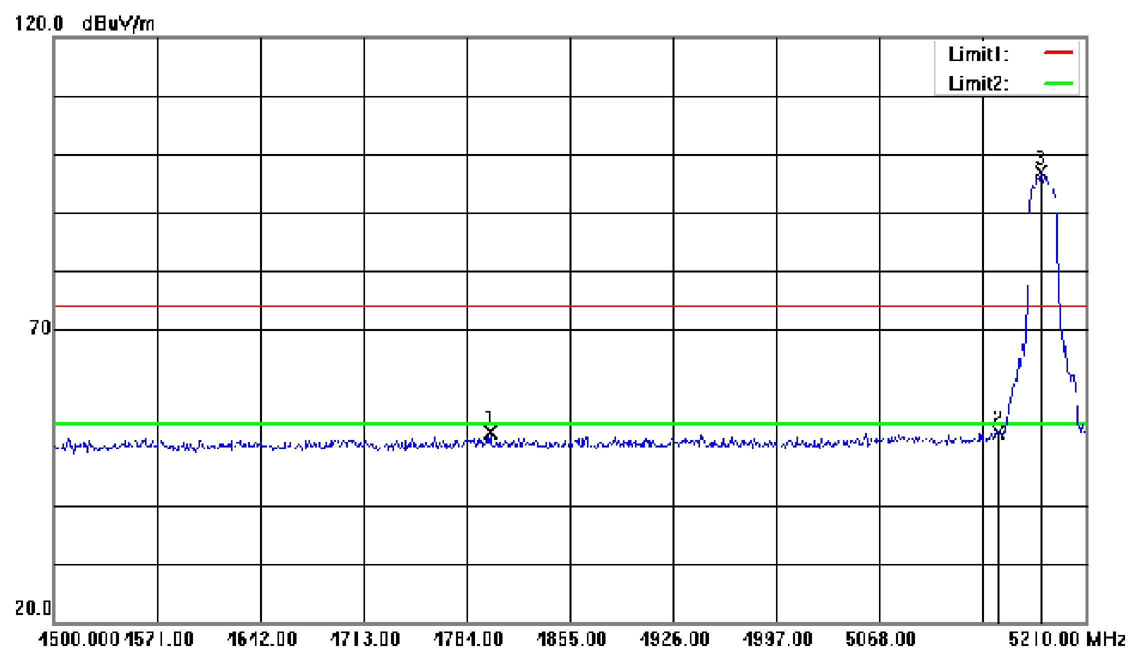
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5237.180	101.20	1.11	102.31	74.00	28.31	peak
2	5350.000	48.55	1.18	49.73	74.00	-24.27	peak
3	5381.220	49.96	1.20	51.16	74.00	-22.84	peak

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



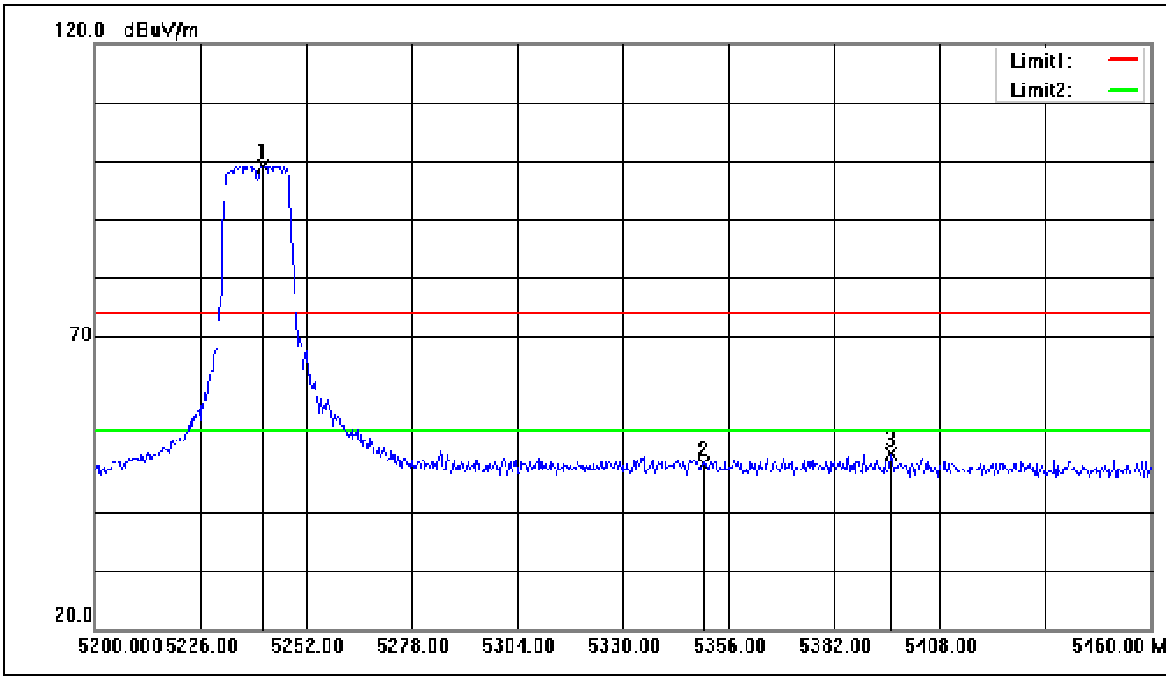
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4779.740	63.47	-10.38	53.09	74.00	-20.91	peak
2	5150.000	60.09	-9.51	50.58	74.00	-23.42	peak
3	5181.600	99.49	-9.51	89.98	74.00	15.98	peak

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



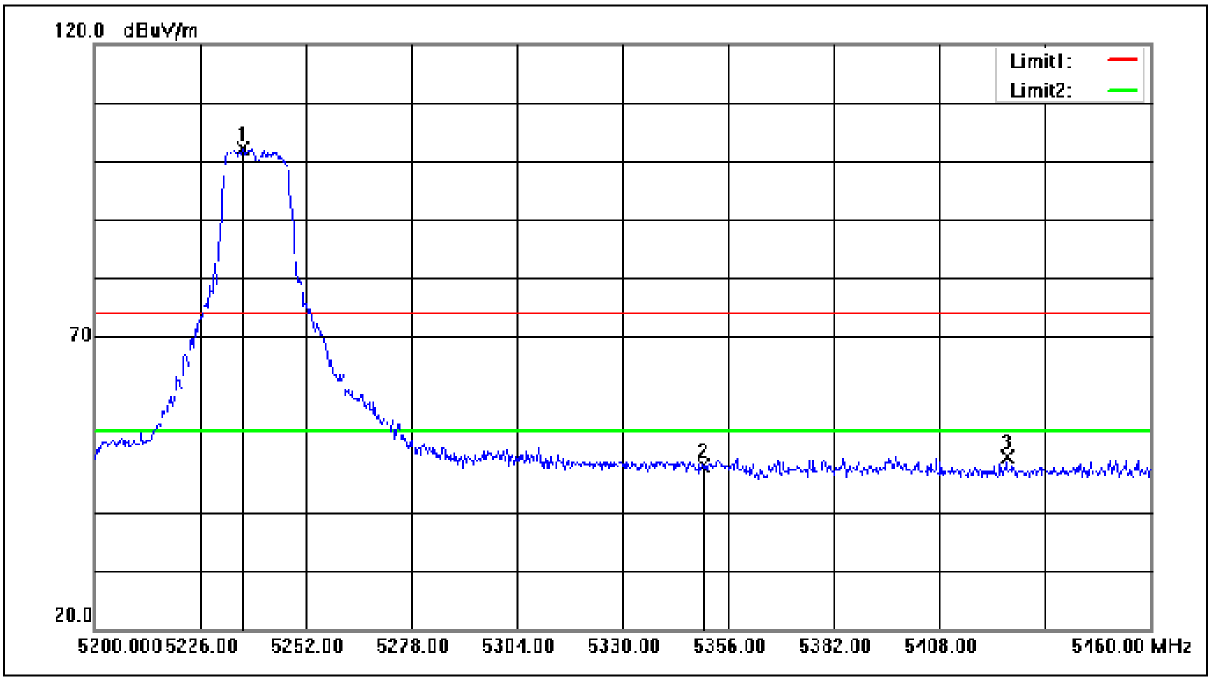
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4800.330	62.69	-10.30	52.39	74.00	-21.61	peak
2	5150.000	61.99	-9.51	52.48	74.00	-21.52	peak
3	5178.760	106.31	-9.51	96.80	74.00	22.80	peak

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



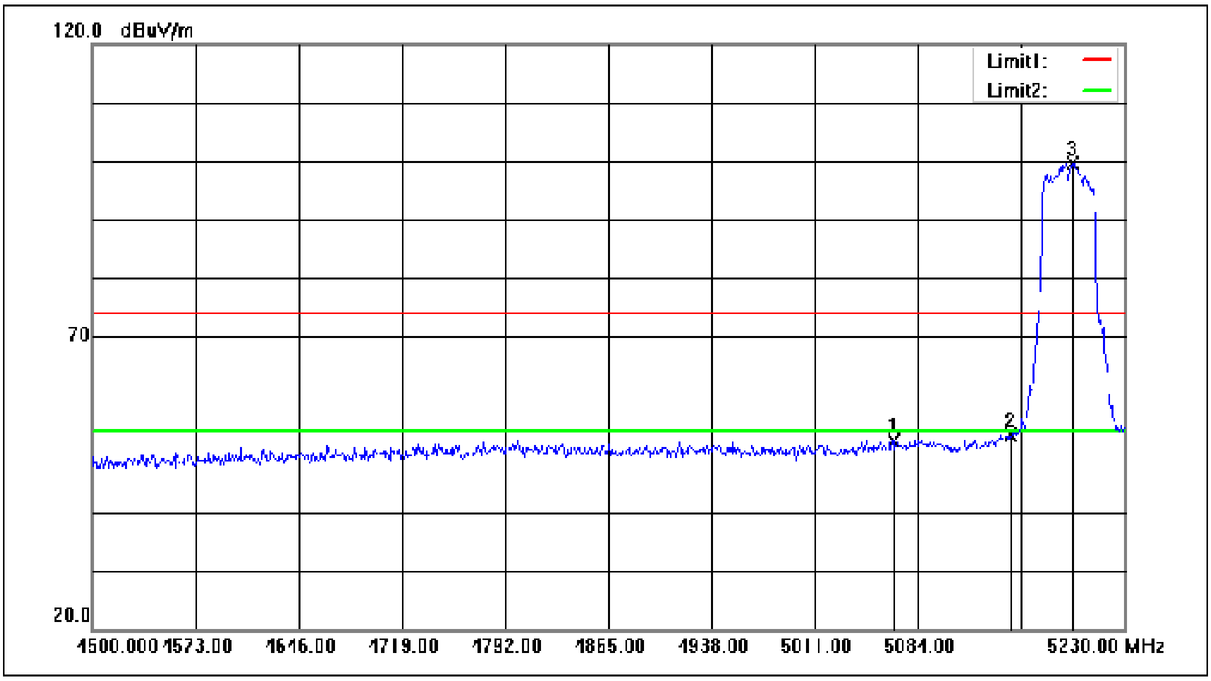
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5241.340	98.12	1.11	99.23	74.00	25.23	peak
2	5350.000	47.04	1.18	48.22	74.00	-25.78	peak
3	5396.040	48.65	1.21	49.86	74.00	-24.14	peak

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



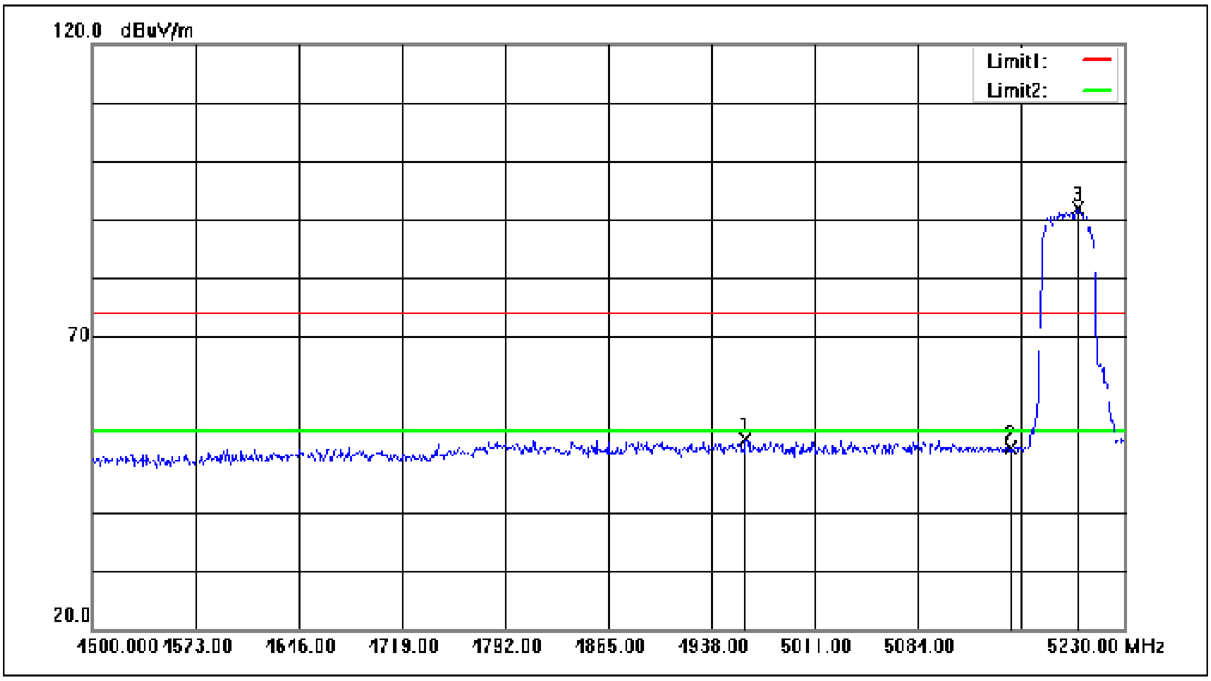
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5236.660	100.99	1.11	102.10	74.00	28.10	peak
2	5350.000	46.65	1.18	47.83	74.00	-26.17	peak
3	5424.640	48.28	1.22	49.50	74.00	-24.50	peak

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



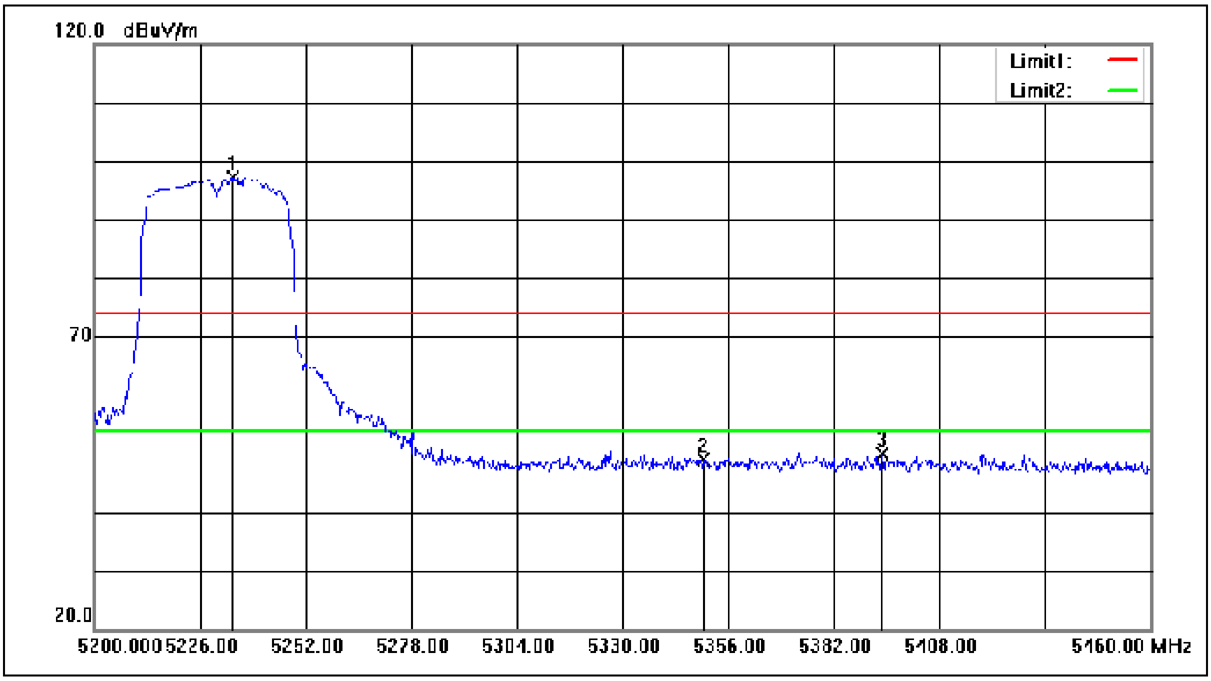
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5066.480	61.66	-9.52	52.14	74.00	-21.86	peak
2	5150.000	62.76	-9.51	53.25	74.00	-20.75	peak
3	5193.500	109.19	-9.51	99.68	74.00	25.68	peak

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



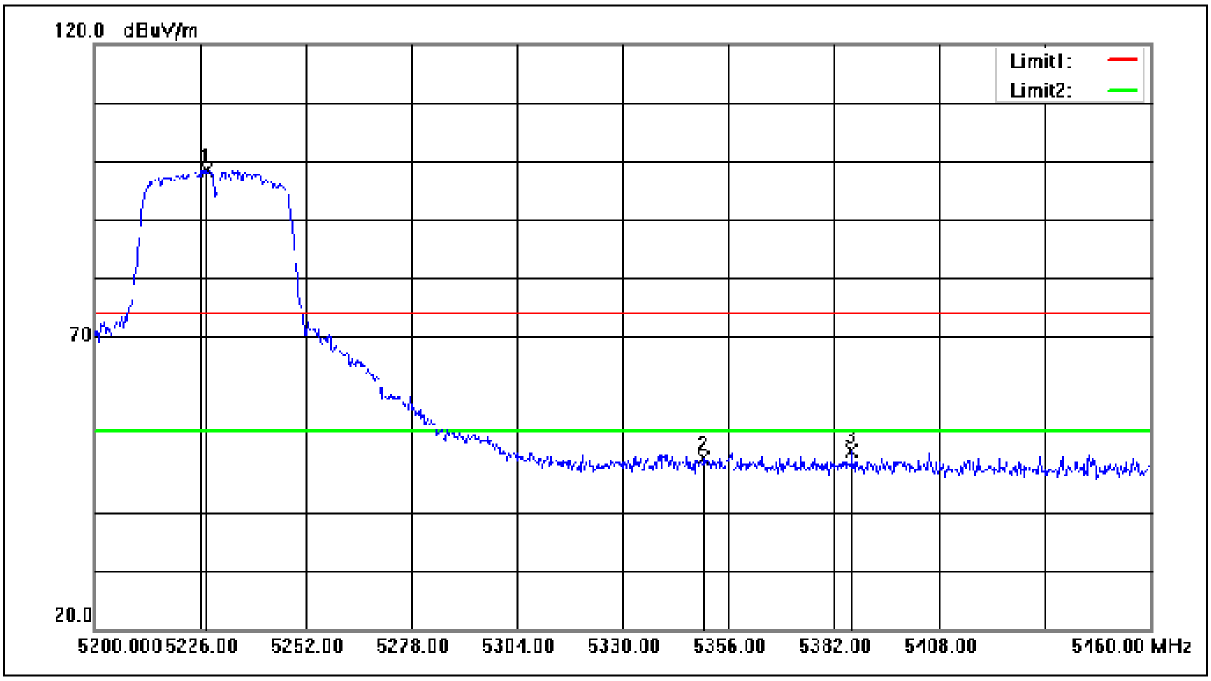
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4962.090	62.09	-9.67	52.42	74.00	-21.58	peak
2	5150.000	60.48	-9.51	50.97	74.00	-23.03	peak
3	5197.150	101.37	-9.51	91.86	74.00	17.86	peak

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



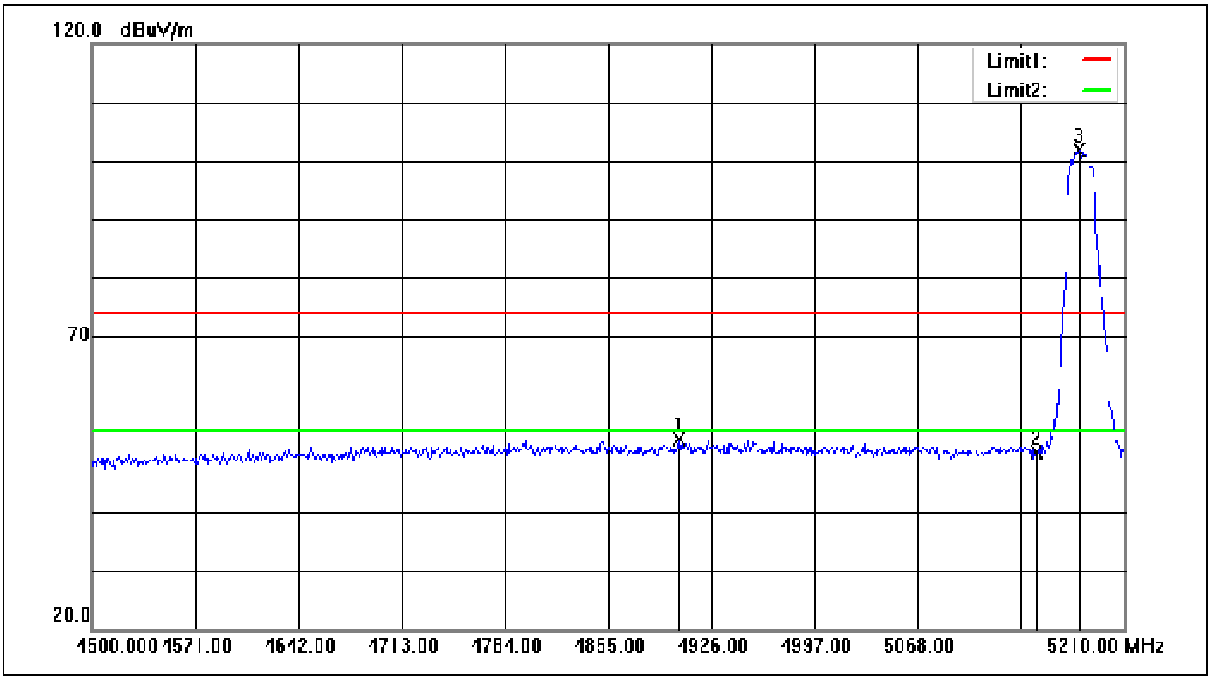
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5234.060	96.06	1.11	97.17	74.00	23.17	peak
2	5350.000	47.58	1.18	48.76	74.00	-25.24	peak
3	5393.960	48.75	1.20	49.95	74.00	-24.05	peak

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



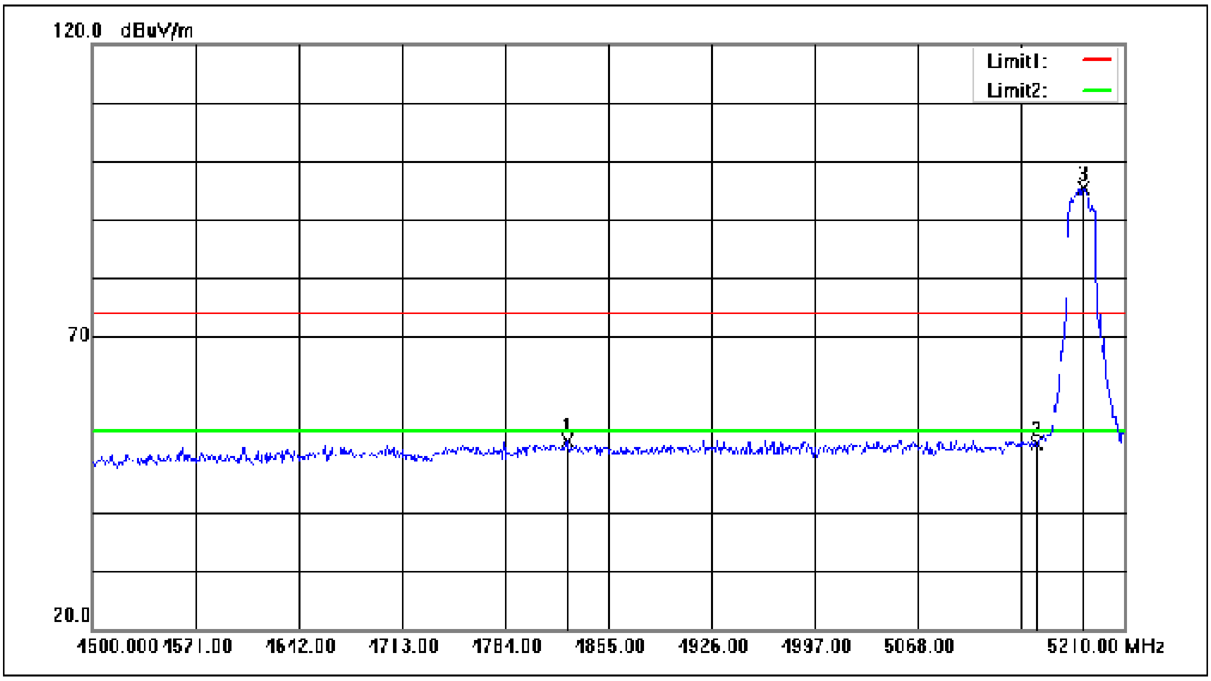
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5227.560	97.35	1.10	98.45	74.00	24.45	peak
2	5350.000	47.90	1.18	49.08	74.00	-24.92	peak
3	5386.420	49.26	1.20	50.46	74.00	-23.54	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:Low



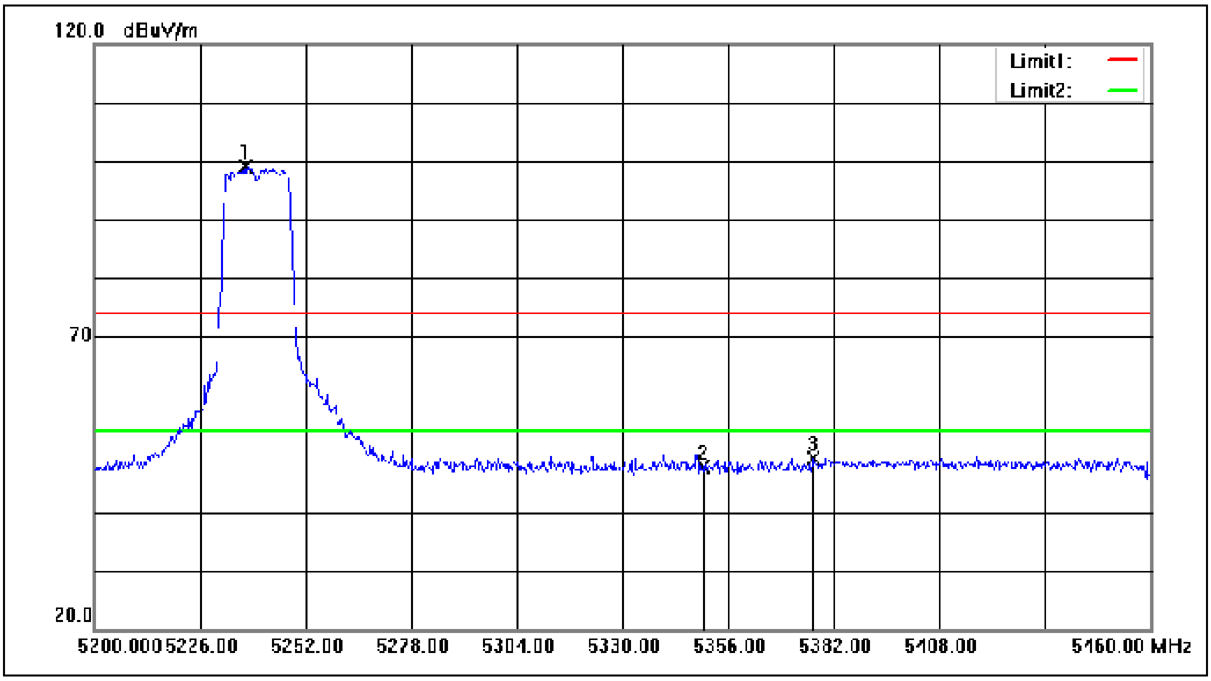
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4903.280	62.27	-9.90	52.37	74.00	-21.63	peak
2	5150.000	59.72	-9.51	50.21	74.00	-23.79	peak
3	5179.470	111.47	-9.51	101.96	74.00	27.96	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:Low



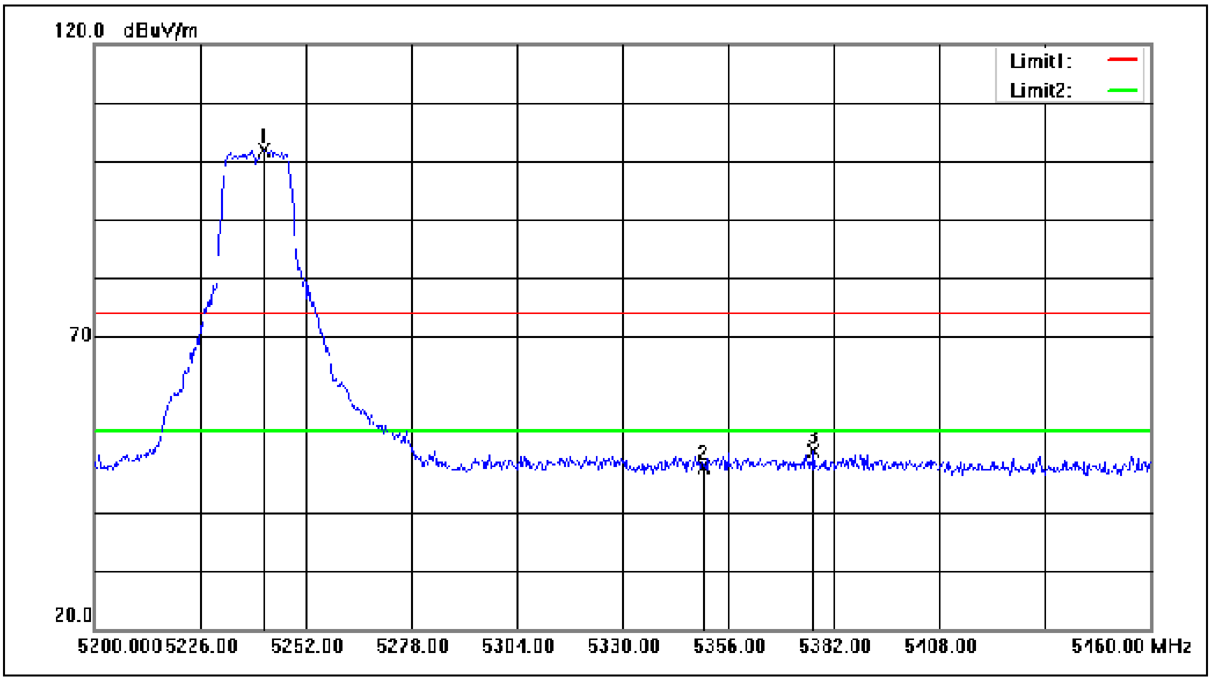
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4826.600	62.34	-10.20	52.14	74.00	-21.86	peak
2	5150.000	61.12	-9.51	51.61	74.00	-22.39	peak
3	5181.600	104.77	-9.51	95.26	74.00	21.26	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:High



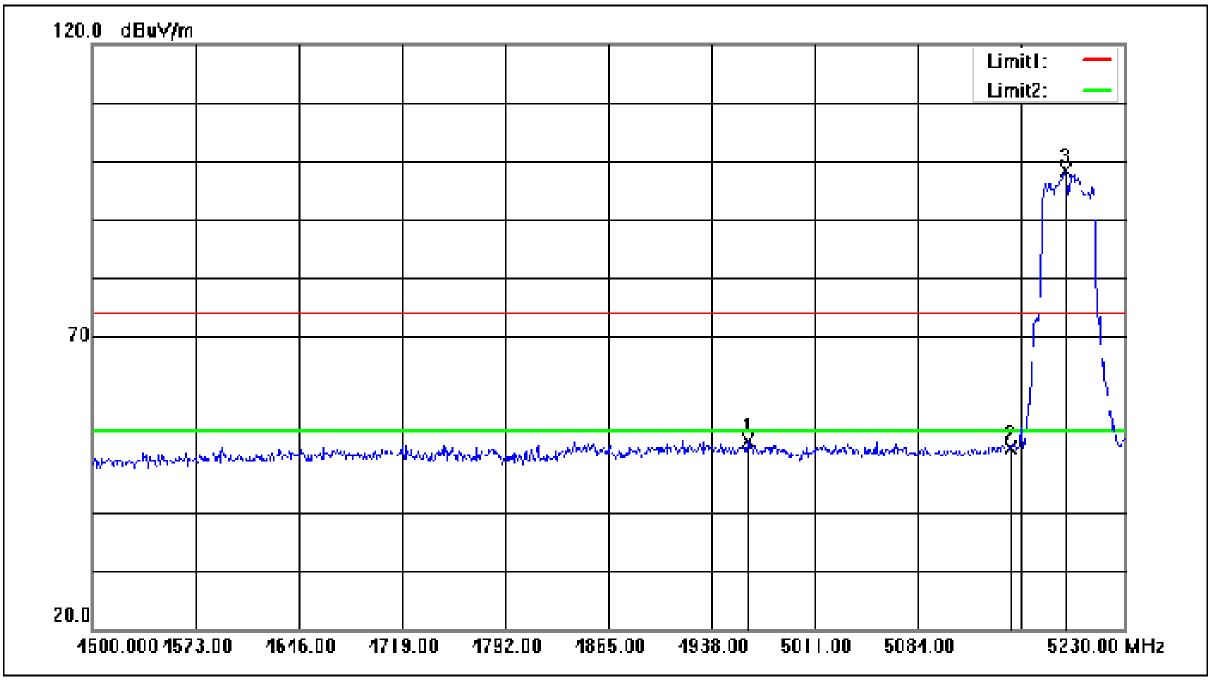
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5237.180	98.02	1.11	99.13	74.00	25.13	peak
2	5350.000	46.40	1.18	47.58	74.00	-26.42	peak
3	5377.060	48.02	1.19	49.21	74.00	-24.79	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:High



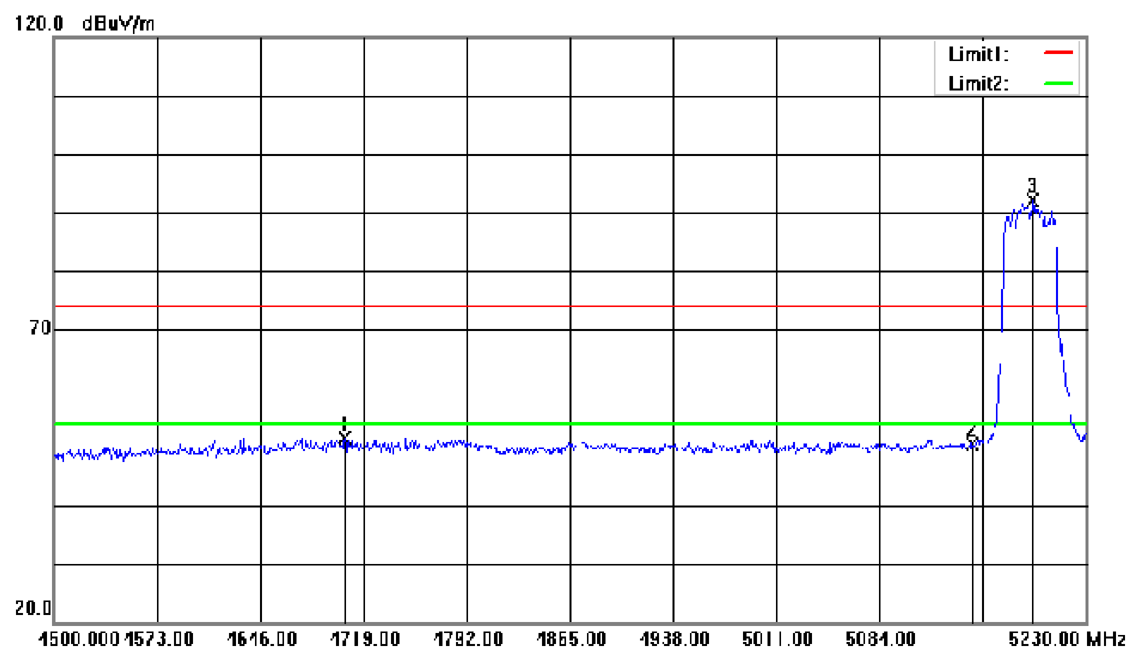
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5241.600	100.74	1.11	101.85	74.00	27.85	peak
2	5350.000	46.57	1.18	47.75	74.00	-26.25	peak
3	5377.060	49.12	1.19	50.31	74.00	-23.69	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:Low



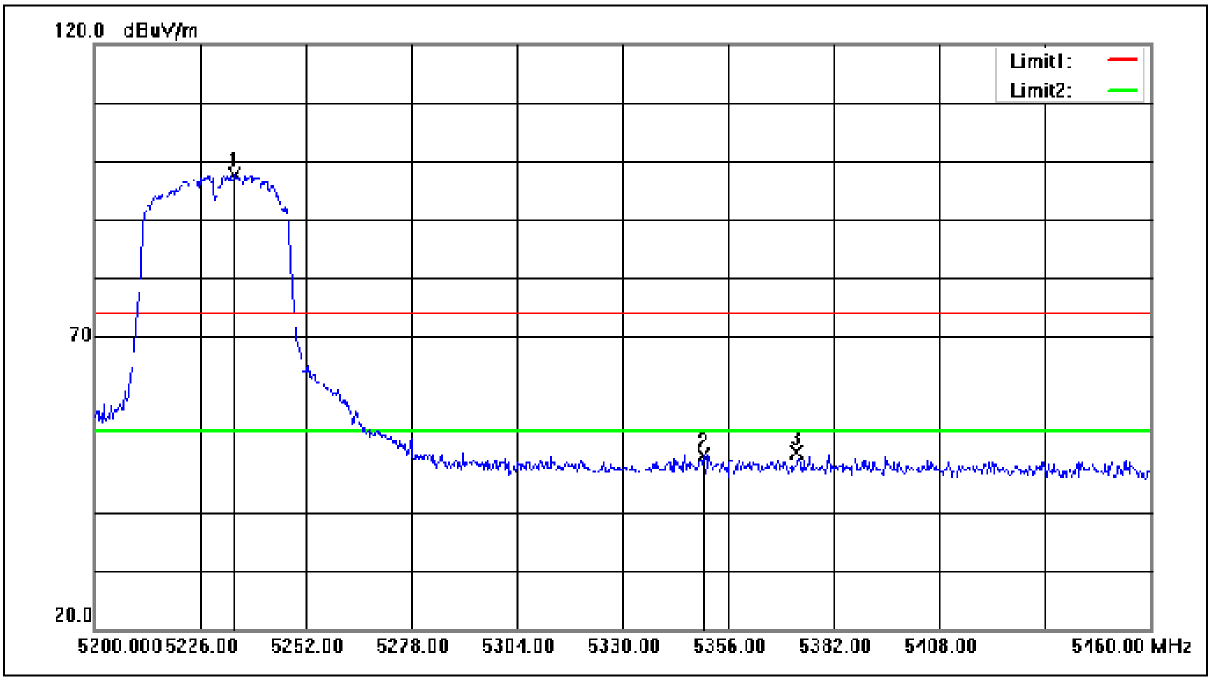
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4963.550	61.88	-9.66	52.22	74.00	-21.78	peak
2	5150.000	60.33	-9.51	50.82	74.00	-23.18	peak
3	5188.390	107.84	-9.51	98.33	74.00	24.33	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:Low



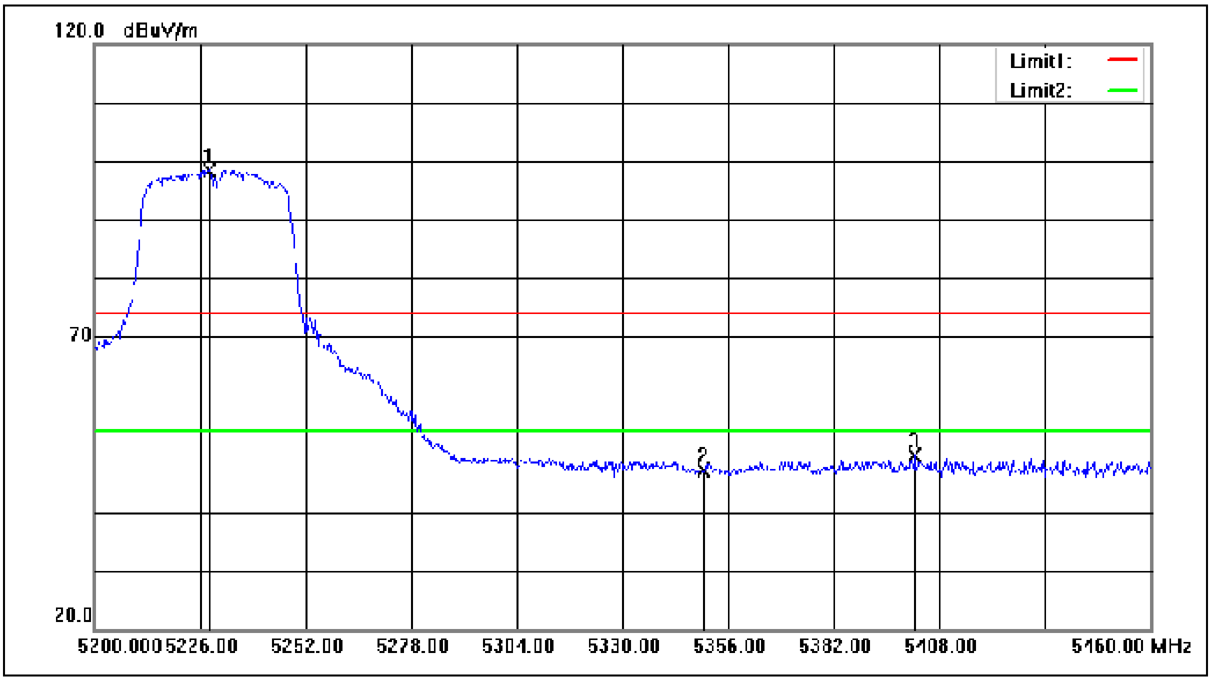
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4705.860	62.10	-10.67	51.43	74.00	-22.57	peak
2	5150.000	59.99	-9.51	50.48	74.00	-23.52	peak
3	5192.770	101.67	-9.51	92.16	74.00	18.16	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:High



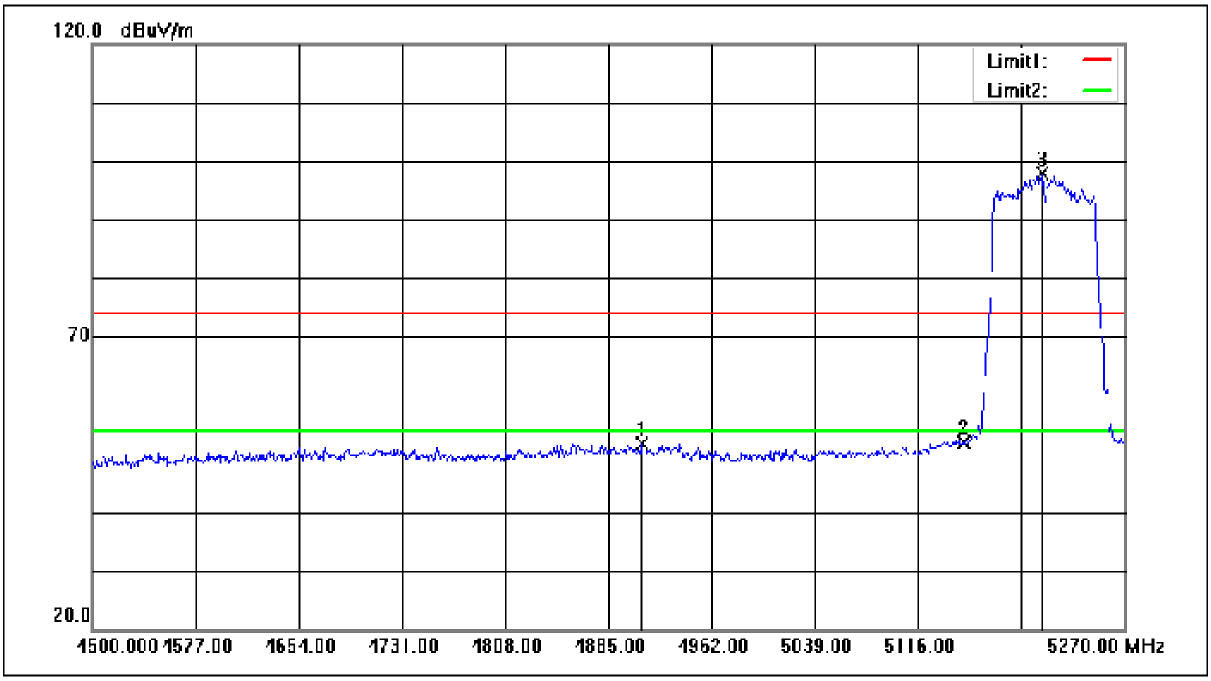
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5234.580	96.44	1.11	97.55	74.00	23.55	peak
2	5350.000	48.49	1.18	49.67	74.00	-24.33	peak
3	5372.900	48.97	1.19	50.16	74.00	-23.84	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:High



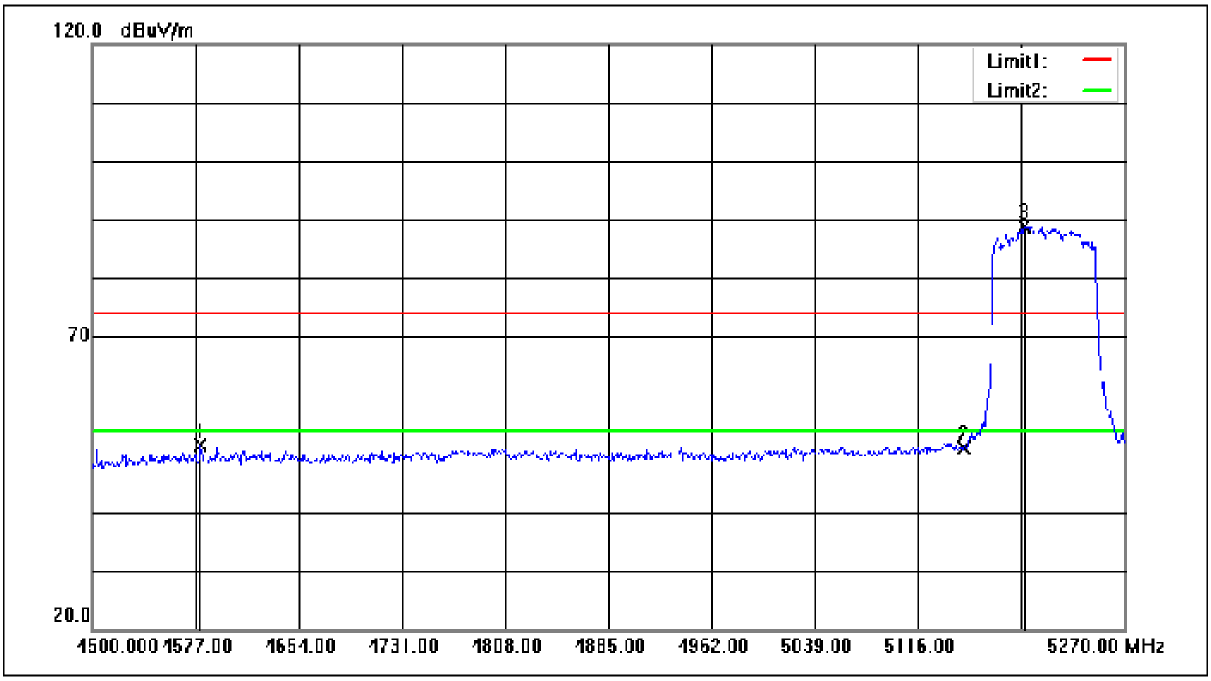
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5228.080	97.40	1.10	98.50	74.00	24.50	peak
2	5350.000	45.99	1.18	47.17	74.00	-26.83	peak
3	5402.020	48.43	1.21	49.64	74.00	-24.36	peak

Mode:d; Polarization:Horizontal; Modulation:c; bandwidth:80MHz; Channel:Low



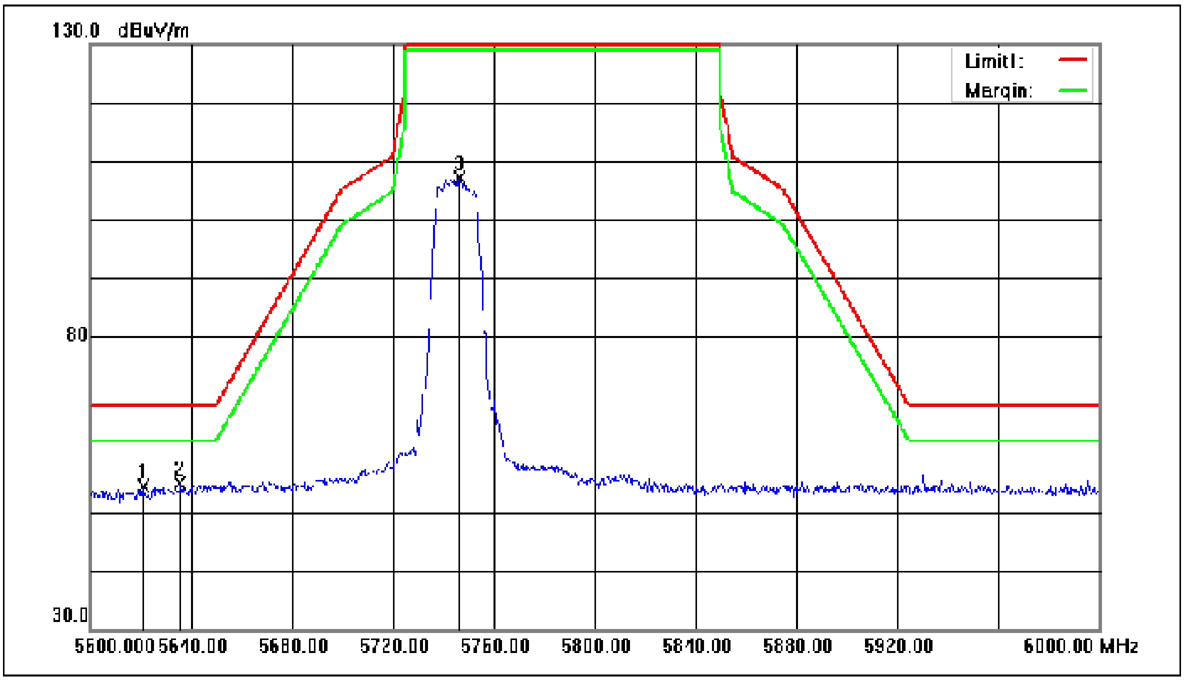
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4909.640	61.56	-9.87	51.69	74.00	-22.31	peak
2	5150.000	61.41	-9.51	51.90	74.00	-22.10	peak
3	5209.170	107.48	-9.51	97.97	74.00	23.97	peak

Mode:d; Polarization:Vertical; Modulation:c; bandwidth:80MHz; Channel:Low



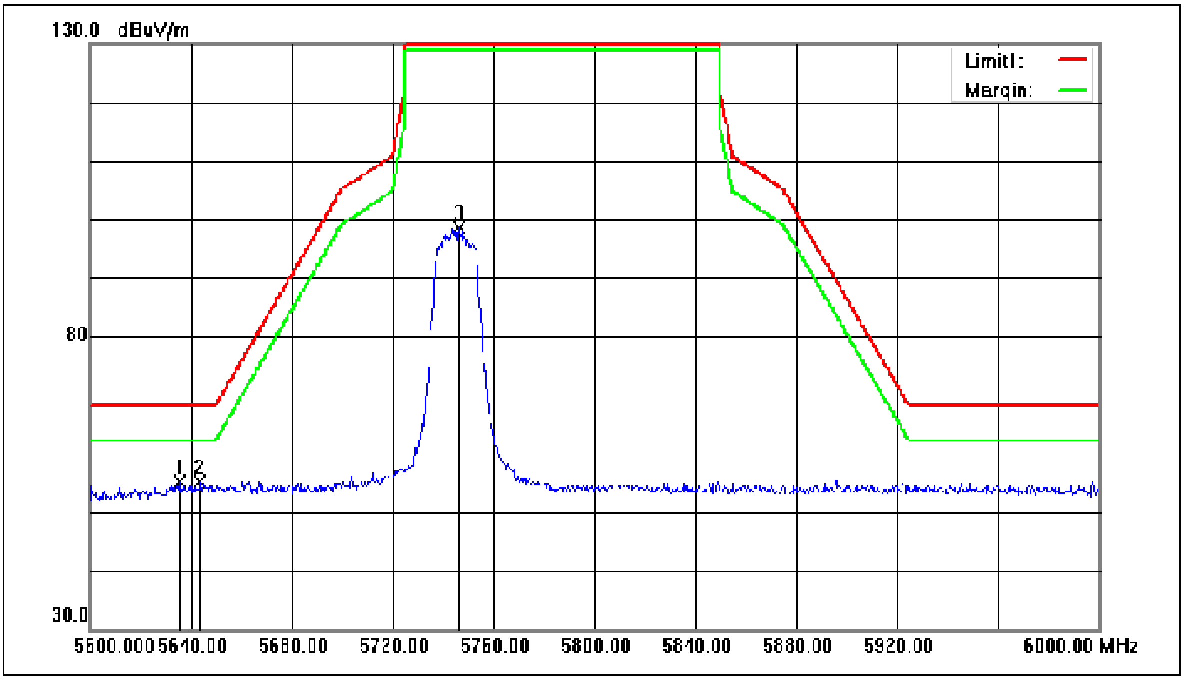
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	4580.080	62.48	-11.16	51.32	74.00	-22.68	peak
2	5150.000	60.33	-9.51	50.82	74.00	-23.18	peak
3	5195.310	98.31	-9.51	88.80	74.00	14.80	peak

Mode:e; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:Low



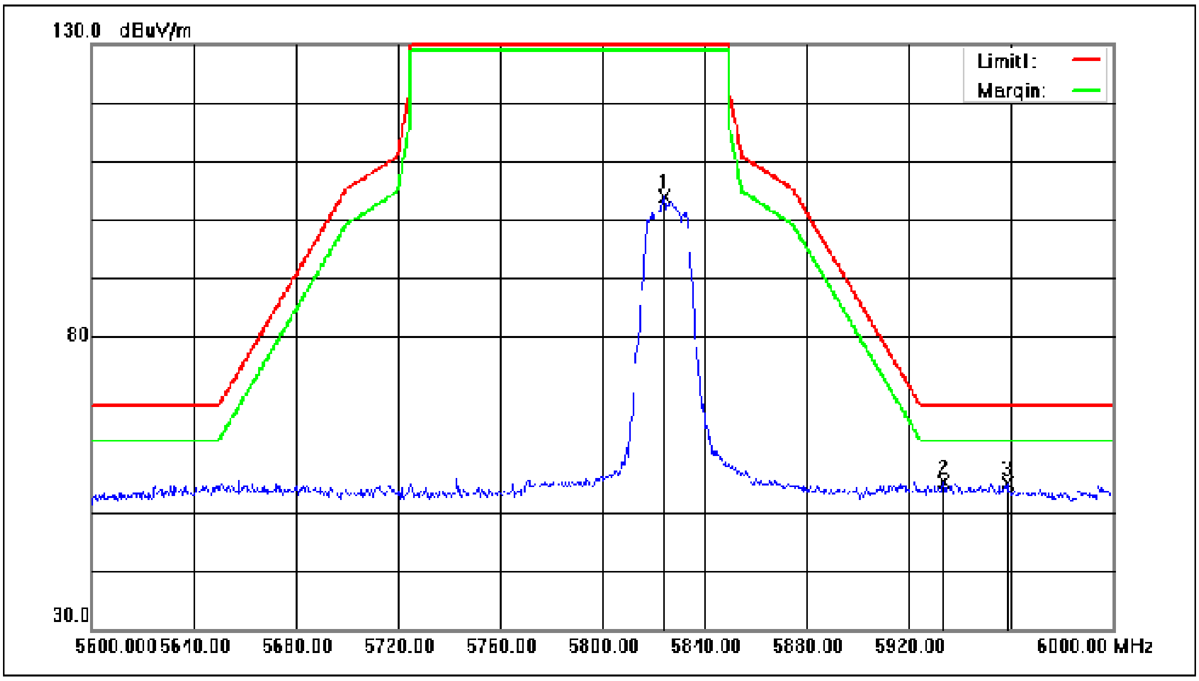
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5620.800	63.22	-8.96	54.26	68.20	-13.94	peak
2	5635.600	63.87	-8.89	54.98	68.20	-13.22	peak
3	5746.400	115.56	-8.40	107.16	135.00	-27.84	peak

Mode:e; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:Low



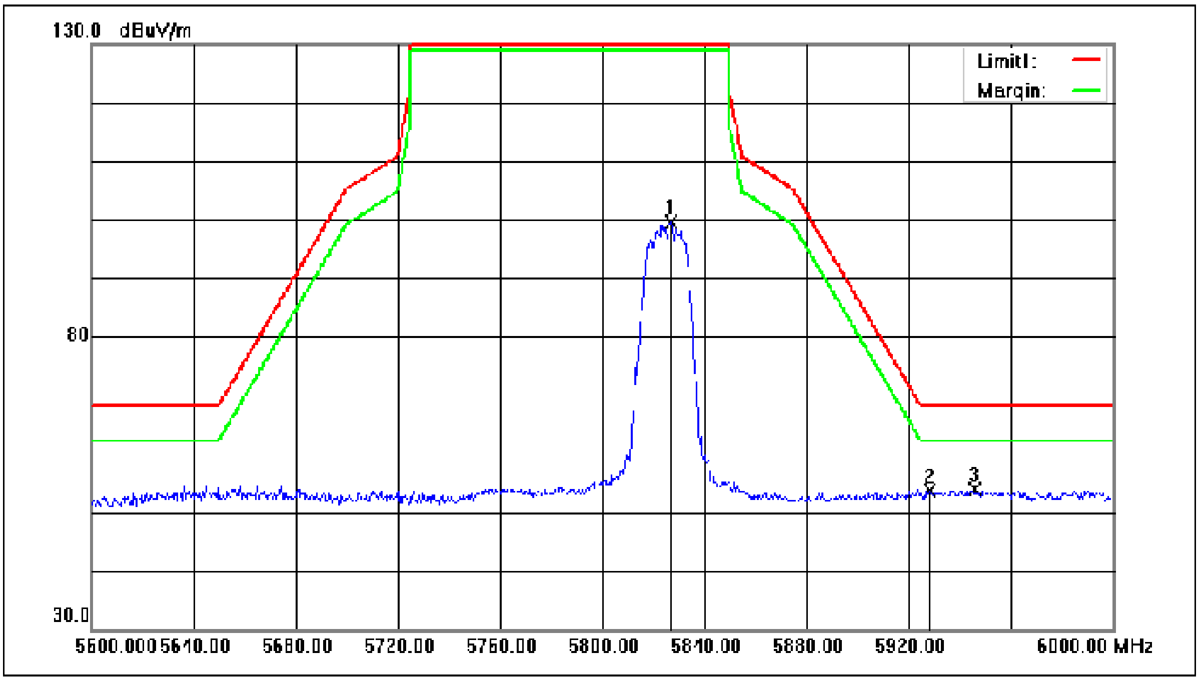
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5635.600	63.90	-8.89	55.01	68.20	-13.19	peak
2	5643.600	64.11	-8.86	55.25	68.20	-12.95	peak
3	5746.400	107.00	-8.40	98.60	135.00	-36.40	peak

Mode:e; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:High



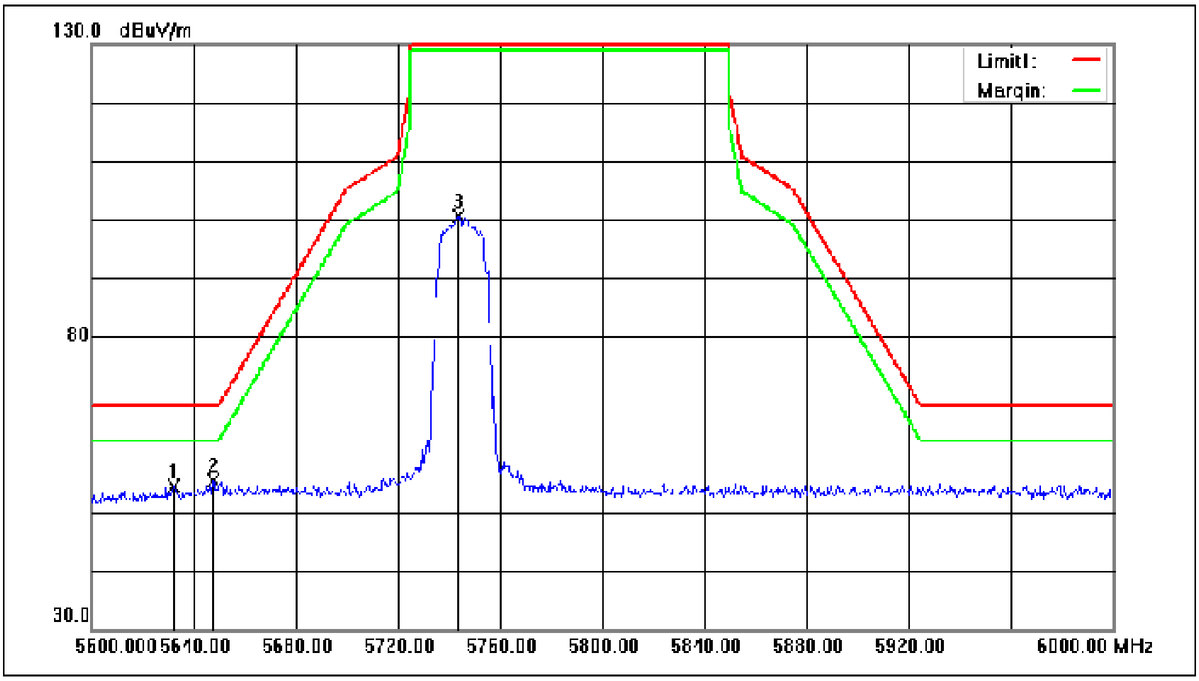
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5824.400	112.01	-8.06	103.95	135.00	-31.05	peak
2	5933.600	62.60	-7.57	55.03	68.20	-13.17	peak
3	5958.400	62.24	-7.46	54.78	68.20	-13.42	peak

Mode:e; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:High



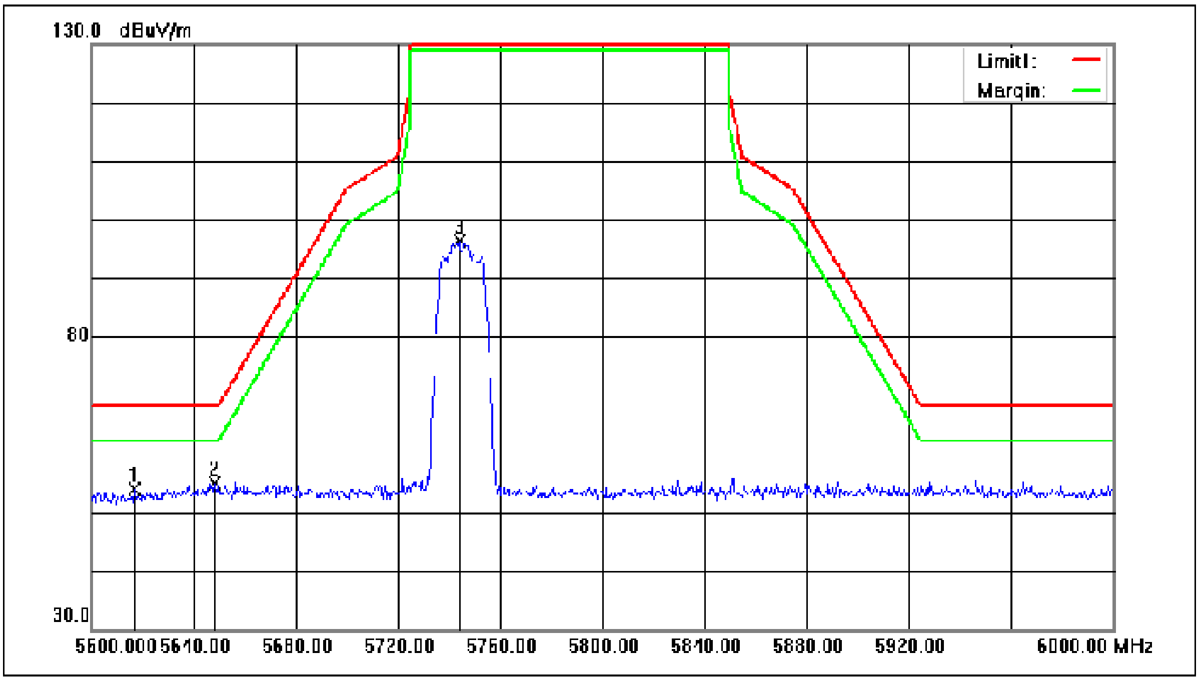
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5826.800	107.64	-8.05	99.59	135.00	-35.41	peak
2	5928.000	61.34	-7.60	53.74	68.20	-14.46	peak
3	5945.600	61.47	-7.52	53.95	68.20	-14.25	peak

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



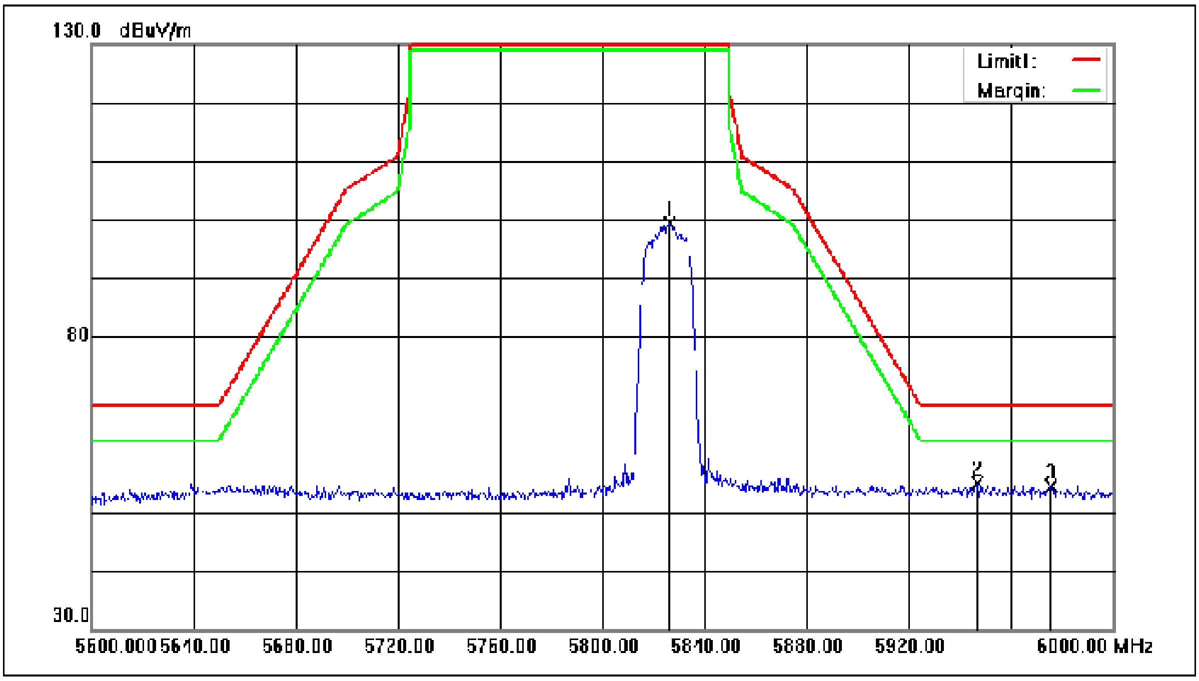
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5632.000	63.38	-8.91	54.47	68.20	-13.73	peak
2	5647.600	64.11	-8.84	55.27	68.20	-12.93	peak
3	5743.600	109.16	-8.41	100.75	135.00	-34.25	peak

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



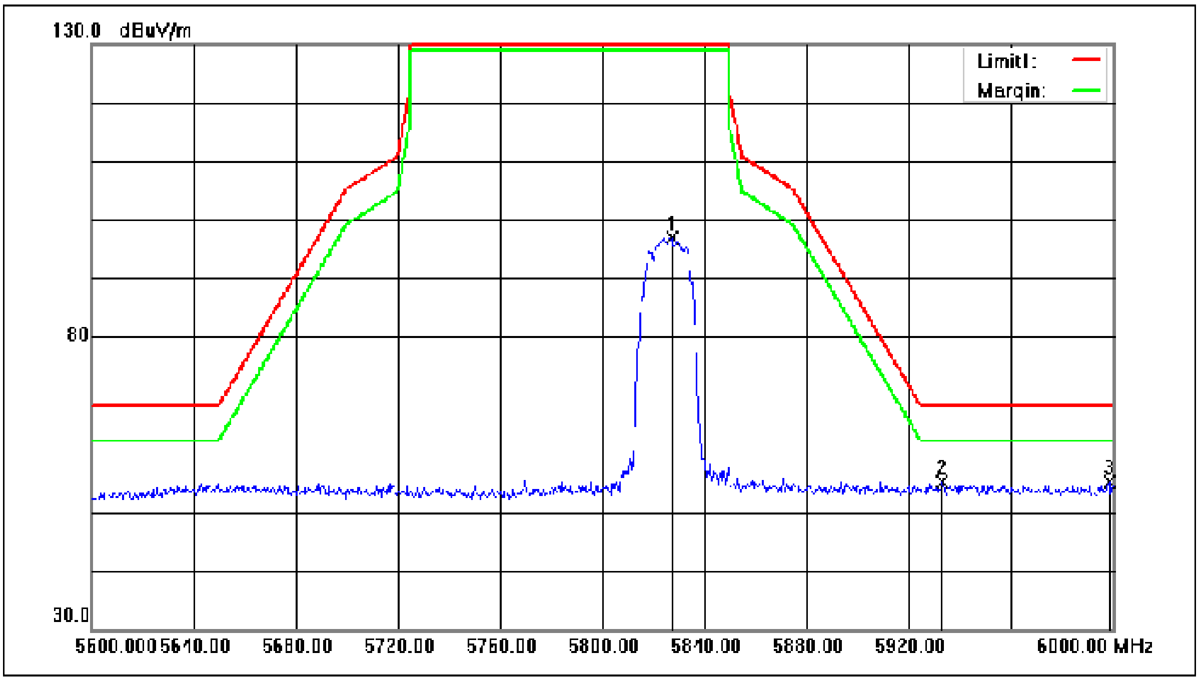
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5616.800	62.88	-8.97	53.91	68.20	-14.29	peak
2	5648.400	63.80	-8.83	54.97	68.20	-13.23	peak
3	5744.000	104.77	-8.41	96.36	135.00	-38.64	peak

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



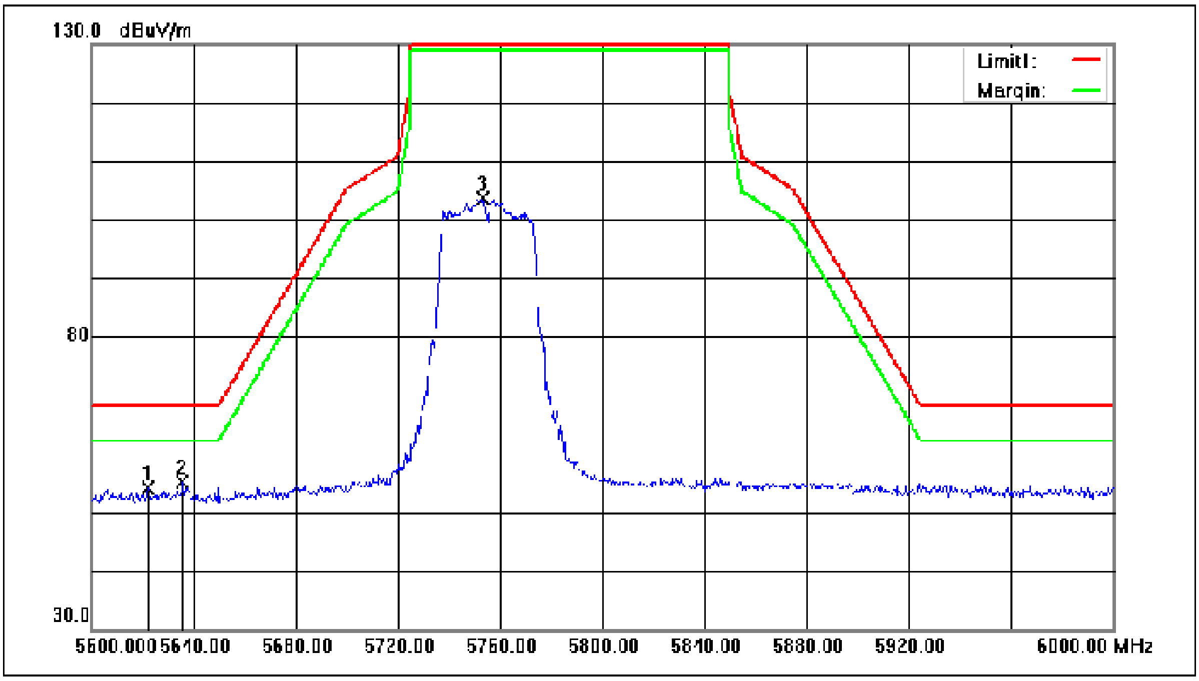
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5826.400	107.33	-8.05	99.28	135.00	-35.72	peak
2	5946.800	62.35	-7.52	54.83	68.20	-13.37	peak
3	5975.600	61.83	-7.39	54.44	68.20	-13.76	peak

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



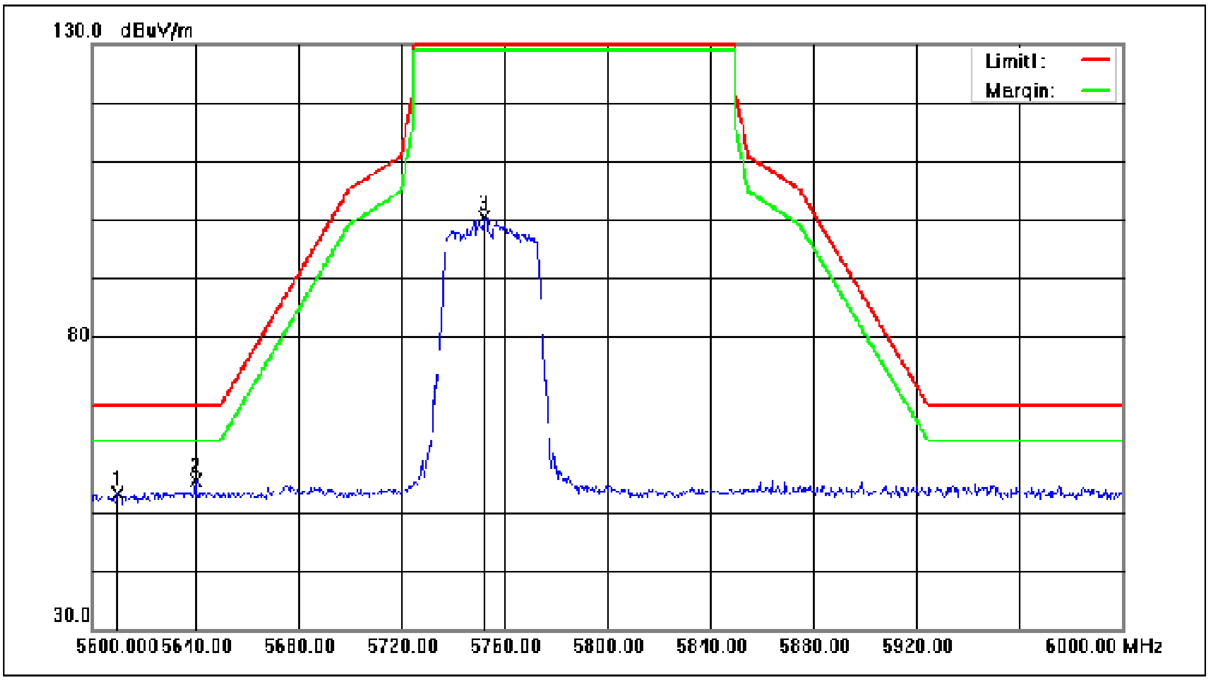
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5827.200	104.93	-8.04	96.89	135.00	-38.11	peak
2	5933.200	62.83	-7.58	55.25	68.20	-12.95	peak
3	5998.400	62.30	-7.29	55.01	68.20	-13.19	peak

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



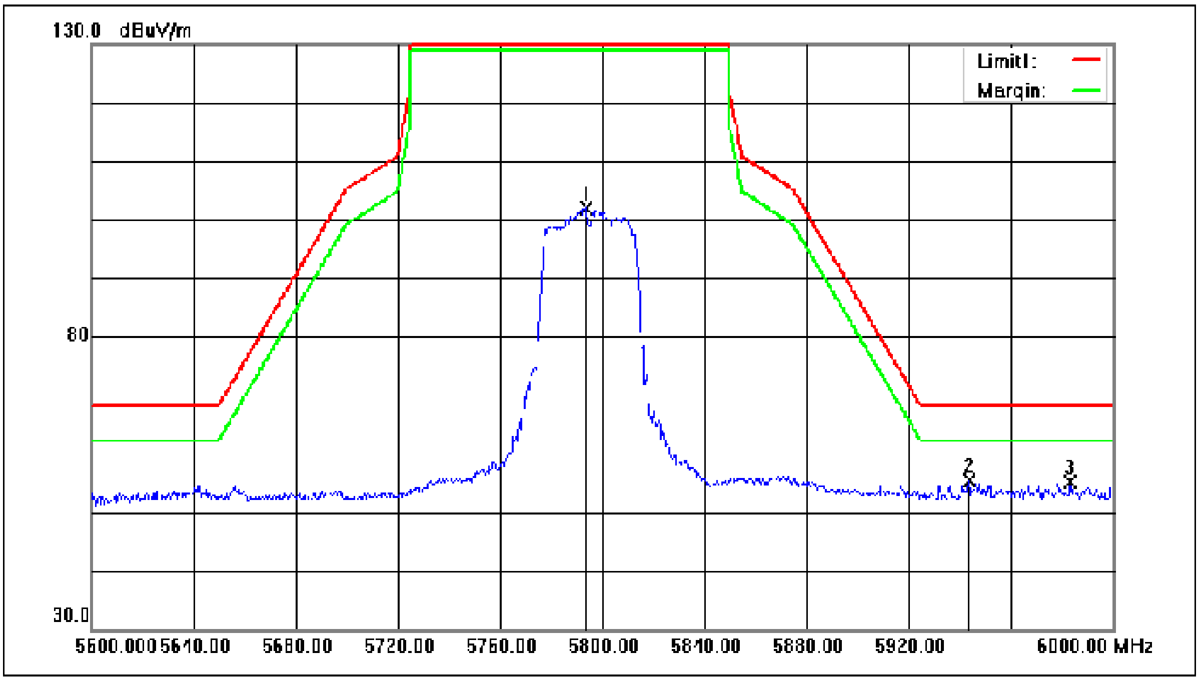
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5622.000	63.10	-8.95	54.15	68.20	-14.05	peak
2	5635.600	63.98	-8.89	55.09	68.20	-13.11	peak
3	5753.200	111.92	-8.37	103.55	135.00	-31.45	peak

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



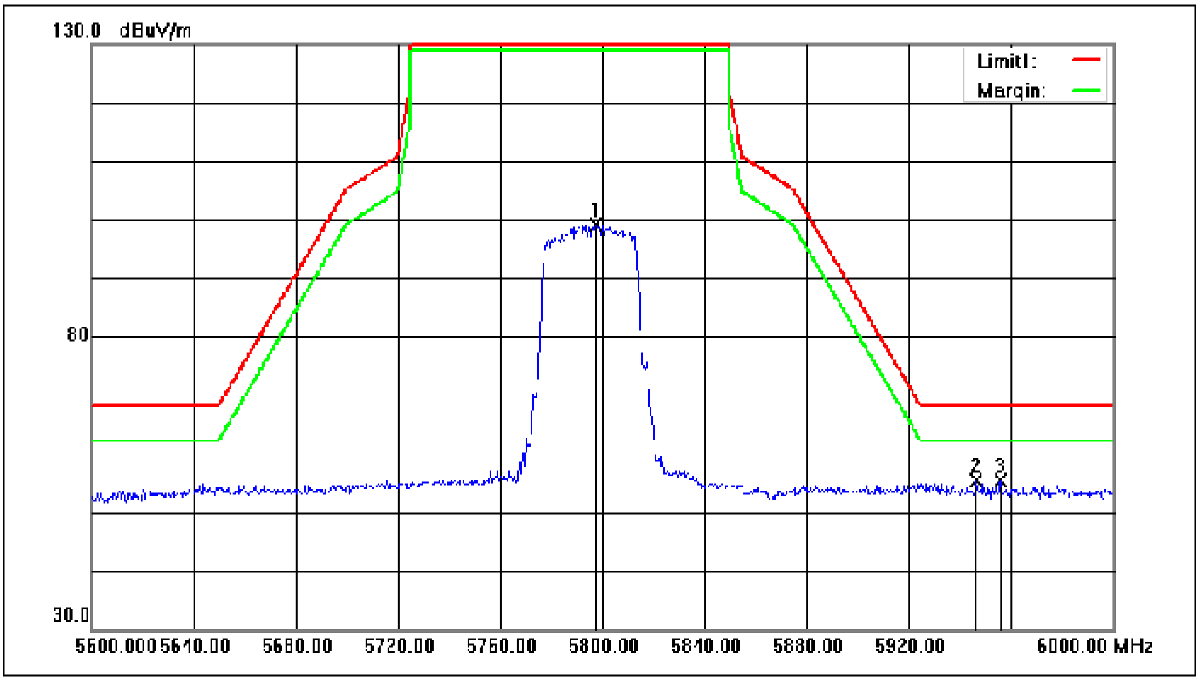
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5609.600	62.26	-9.01	53.25	68.20	-14.95	peak
2	5640.000	64.15	-8.87	55.28	68.20	-12.92	peak
3	5752.400	108.83	-8.37	100.46	135.00	-34.54	peak

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



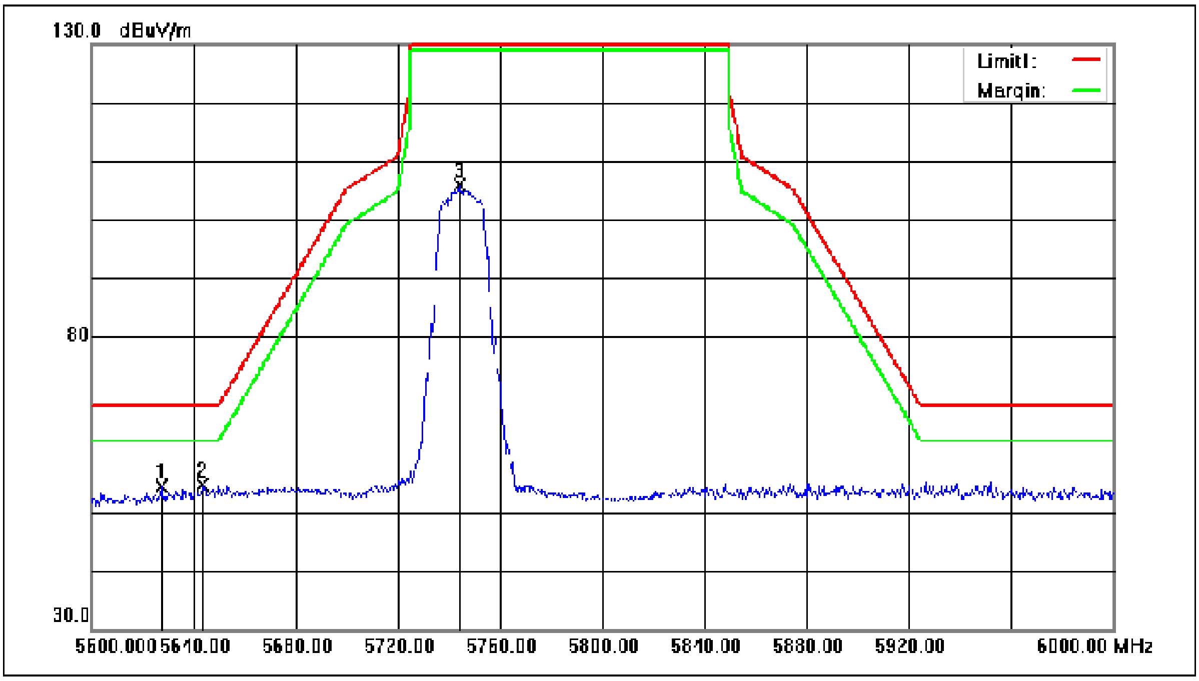
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5793.600	110.19	-8.19	102.00	135.00	-33.00	peak
2	5943.600	62.79	-7.53	55.26	68.20	-12.94	peak
3	5983.200	62.41	-7.35	55.06	68.20	-13.14	peak

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



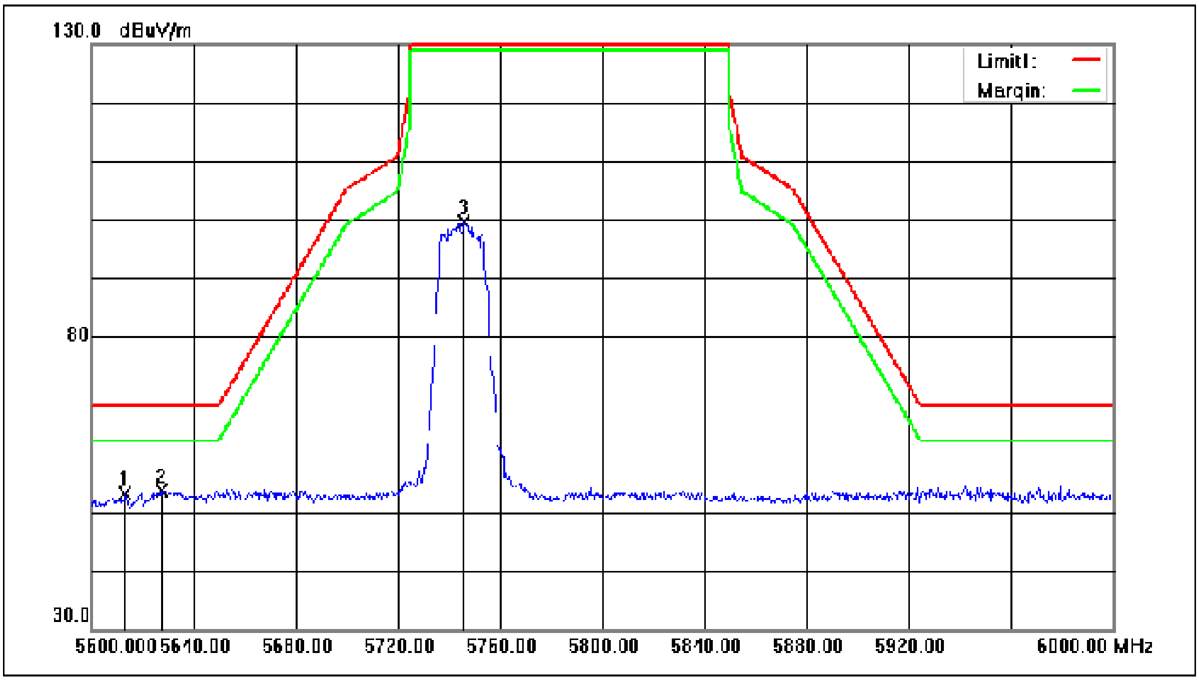
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5797.600	107.24	-8.17	99.07	135.00	-35.93	peak
2	5946.400	62.94	-7.52	55.42	68.20	-12.78	peak
3	5956.000	62.76	-7.47	55.29	68.20	-12.91	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:Low



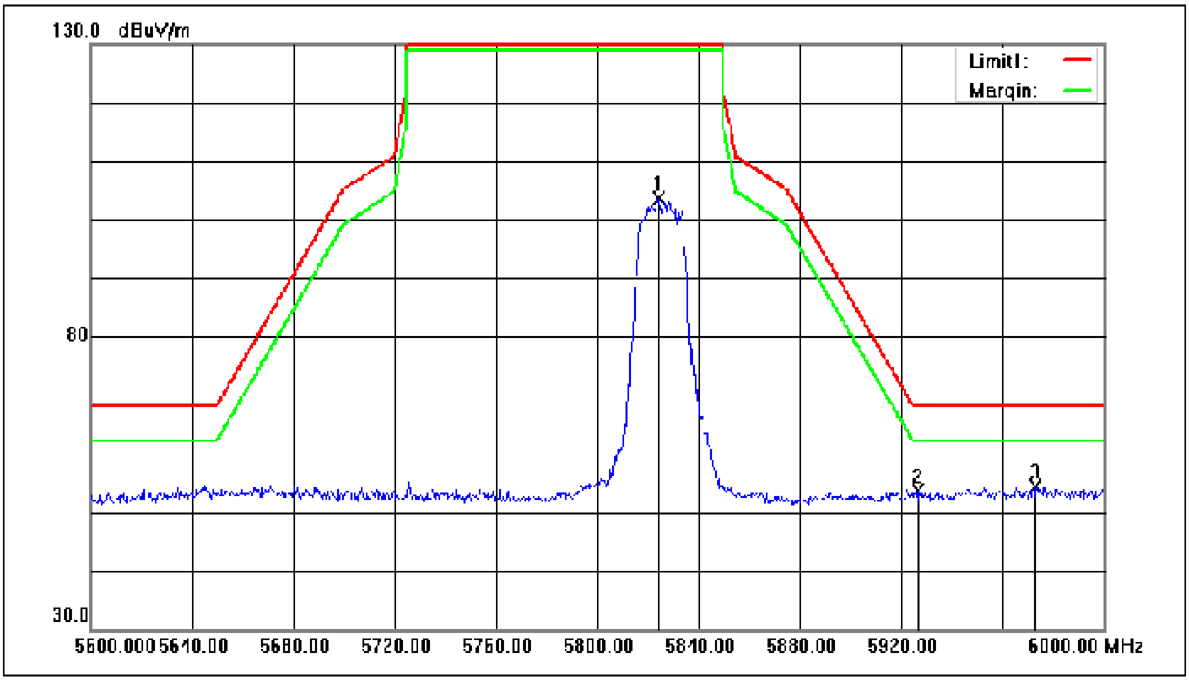
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5627.200	63.42	-8.93	54.49	68.20	-13.71	peak
2	5643.600	63.46	-8.86	54.60	68.20	-13.60	peak
3	5744.000	114.17	-8.41	105.76	135.00	-29.24	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:Low



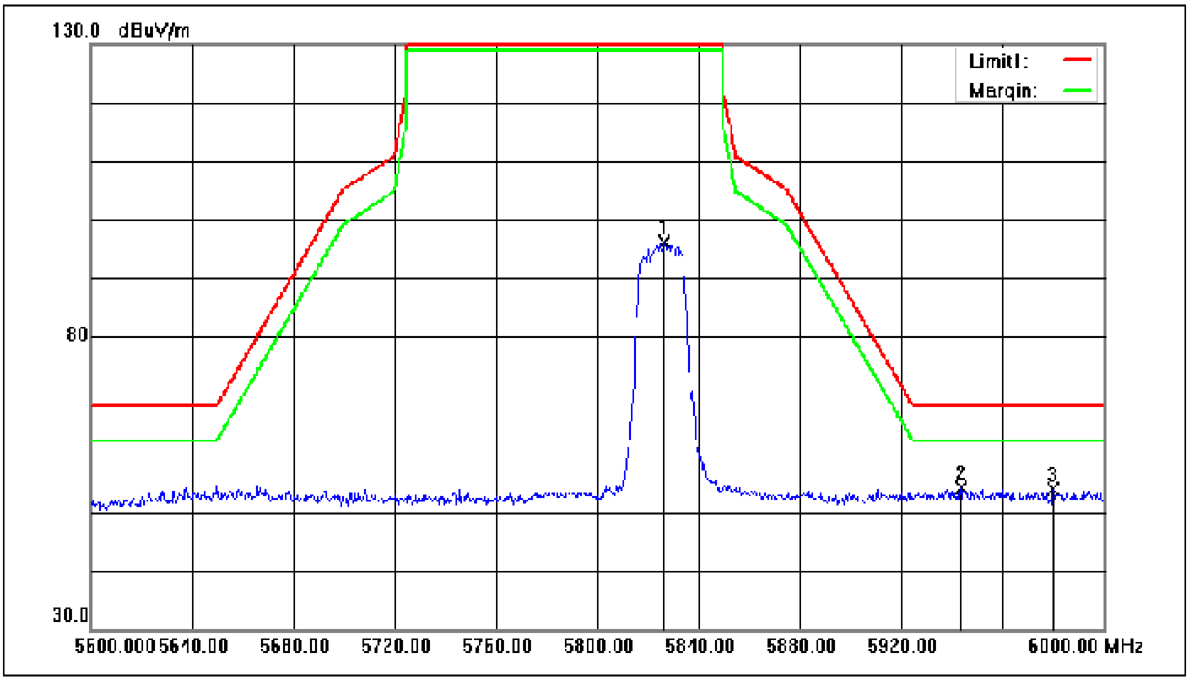
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5613.200	62.07	-8.99	53.08	68.20	-15.12	peak
2	5627.200	62.56	-8.93	53.63	68.20	-14.57	peak
3	5746.000	108.03	-8.40	99.63	135.00	-35.37	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:High



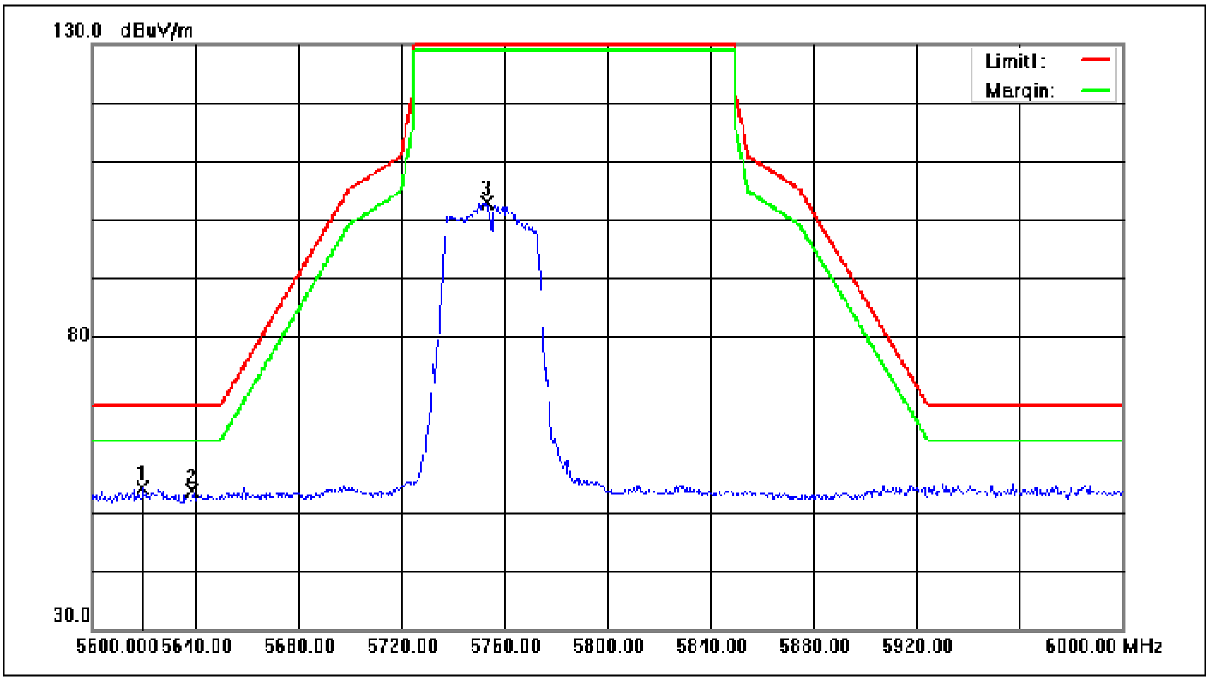
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5824.000	111.62	-8.06	103.56	135.00	-31.44	peak
2	5926.400	61.30	-7.61	53.69	68.20	-14.51	peak
3	5973.200	61.67	-7.40	54.27	68.20	-13.93	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:High



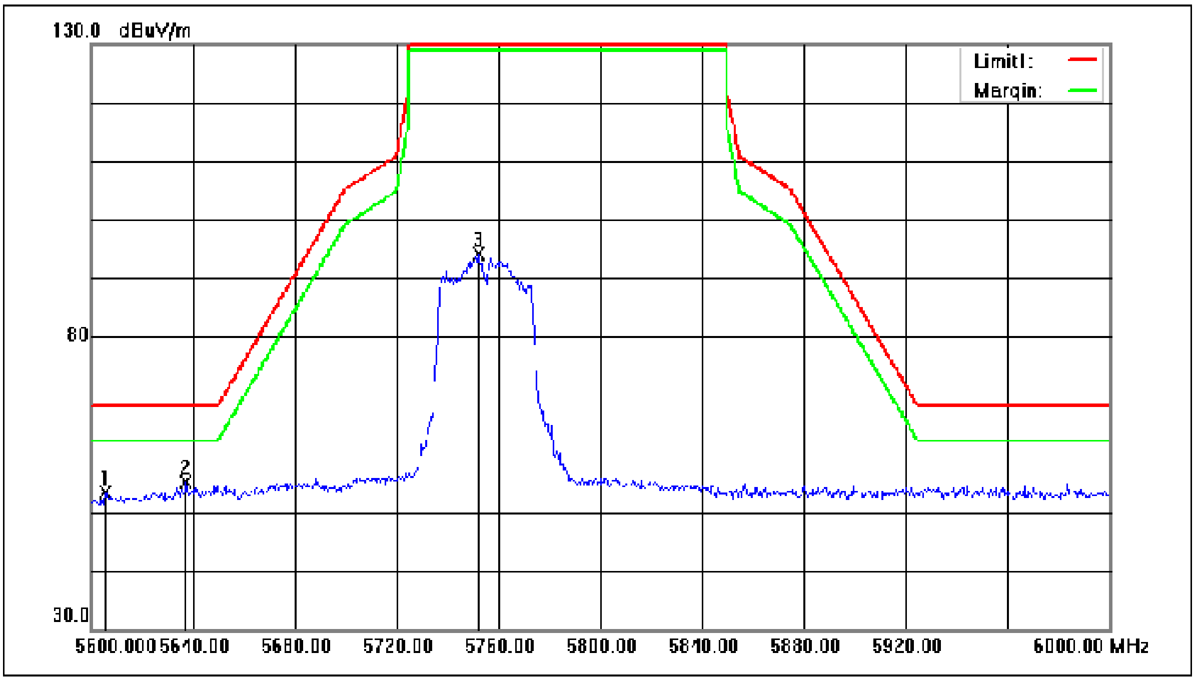
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5826.400	104.20	-8.05	96.15	135.00	-38.85	peak
2	5943.600	61.67	-7.53	54.14	68.20	-14.06	peak
3	5980.000	61.30	-7.37	53.93	68.20	-14.27	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:Low



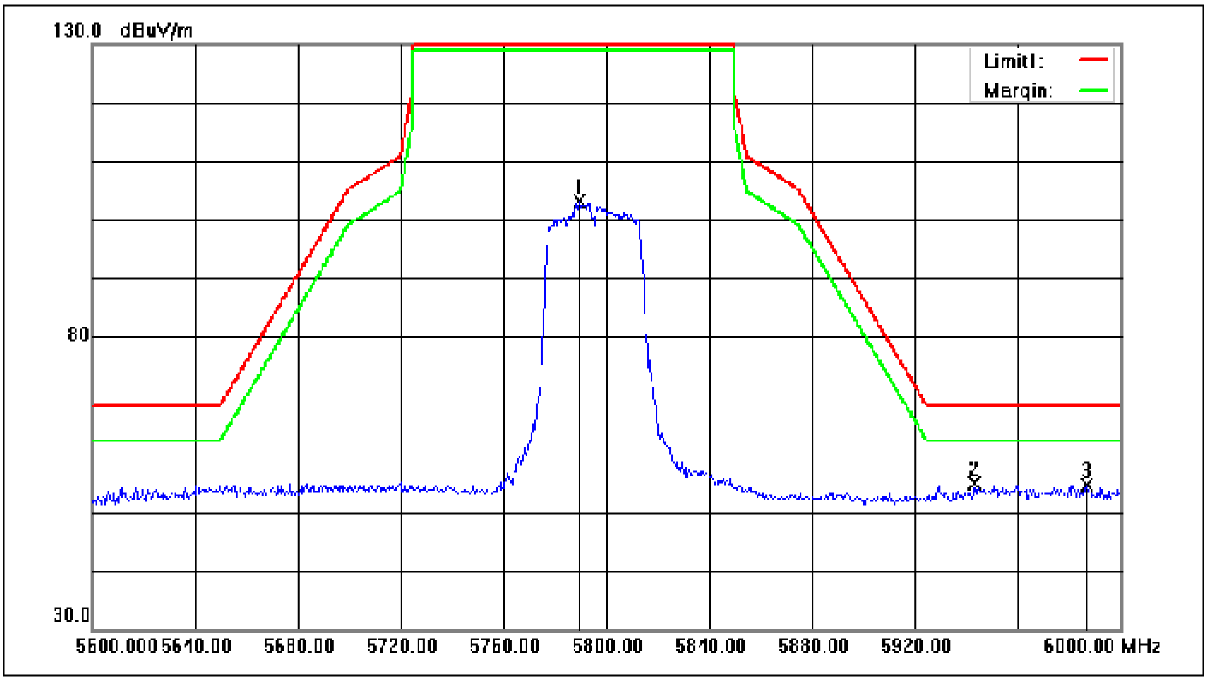
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5619.600	63.19	-8.96	54.23	68.20	-13.97	peak
2	5638.800	62.51	-8.88	53.63	68.20	-14.57	peak
3	5753.200	111.35	-8.37	102.98	135.00	-32.02	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:Low



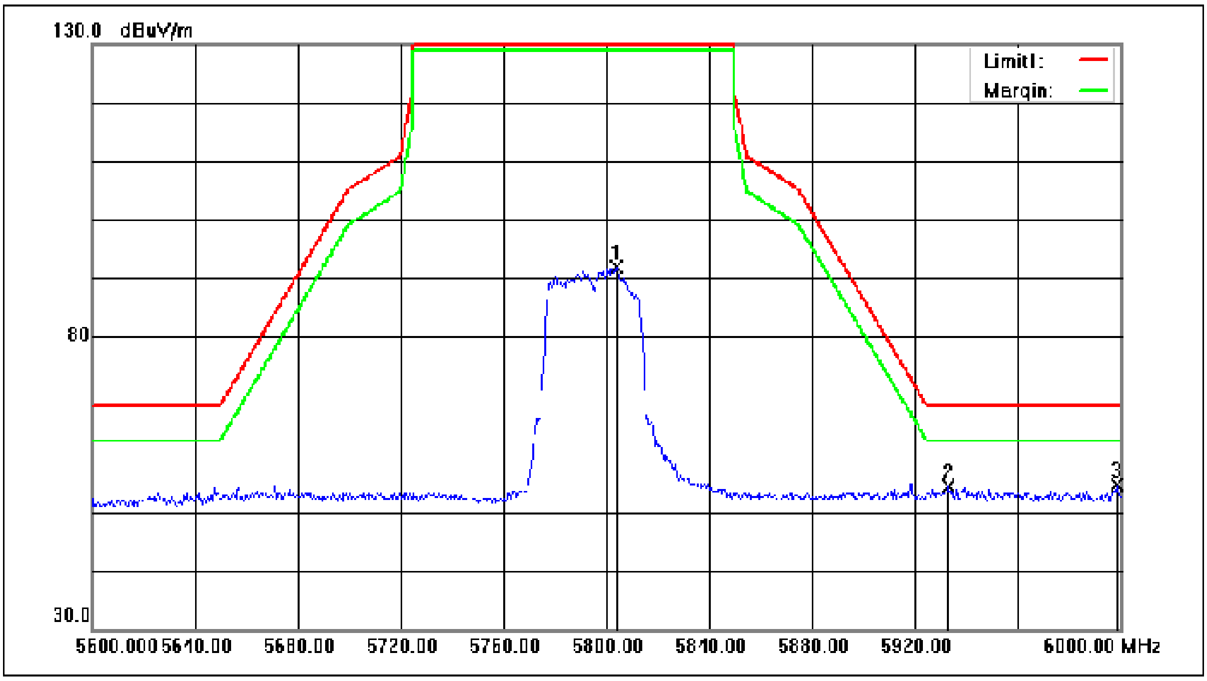
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5605.600	62.35	-9.02	53.33	68.20	-14.87	peak
2	5637.200	63.93	-8.88	55.05	68.20	-13.15	peak
3	5752.000	102.46	-8.38	94.08	135.00	-40.92	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:High



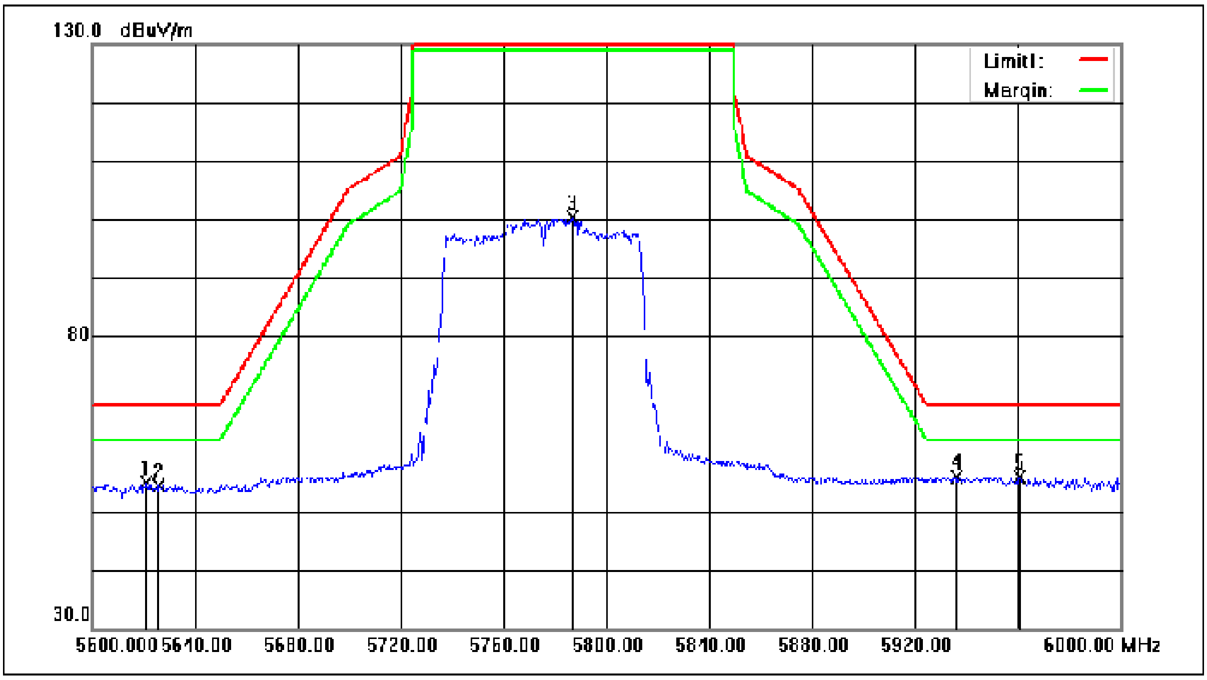
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5789.600	111.35	-8.21	103.14	135.00	-31.86	peak
2	5943.200	62.29	-7.53	54.76	68.20	-13.44	peak
3	5986.800	61.93	-7.34	54.59	68.20	-13.61	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:High



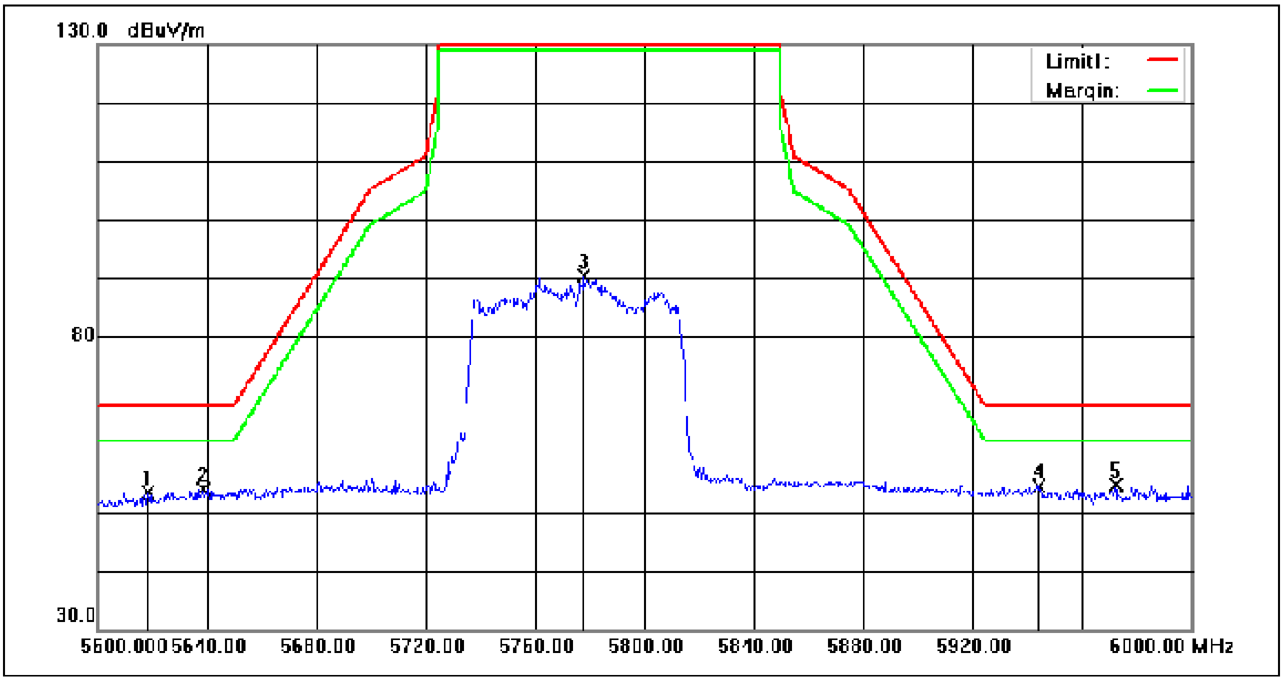
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5804.000	100.08	-8.15	91.93	135.00	-43.07	peak
2	5932.800	61.85	-7.58	54.27	68.20	-13.93	peak
3	5998.400	61.85	-7.29	54.56	68.20	-13.64	peak

Mode:e; Polarization:Horizontal; Modulation:c; bandwidth:80MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5621.200	63.74	-8.95	54.79	68.20	-13.41	peak
2	5626.000	63.42	-8.93	54.49	68.20	-13.71	peak
3	5786.800	108.71	-8.22	100.49	135.00	-34.51	peak
4	5936.000	63.53	-7.56	55.97	68.20	-12.23	peak
5	5960.800	63.37	-7.45	55.92	68.20	-12.28	peak

Mode:e; Polarization:Vertical; Modulation:c; bandwidth:80MHz; Channel:Low



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5618.400	62.35	-8.97	53.38	68.20	-14.82	peak
2	5638.400	62.82	-8.88	53.94	68.20	-14.26	peak
3	5777.600	98.72	-8.26	90.46	135.00	-44.54	peak
4	5944.400	61.81	-7.53	54.28	68.20	-13.92	peak
5	5972.400	62.01	-7.40	54.61	68.20	-13.59	peak

7.9 Frequency Stability

Test Requirement	47 CFR Part 15, Subpart C 15.407 (g)
Test Method:	ANSI C63.10 (2013) Section 6.8
Limit:	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

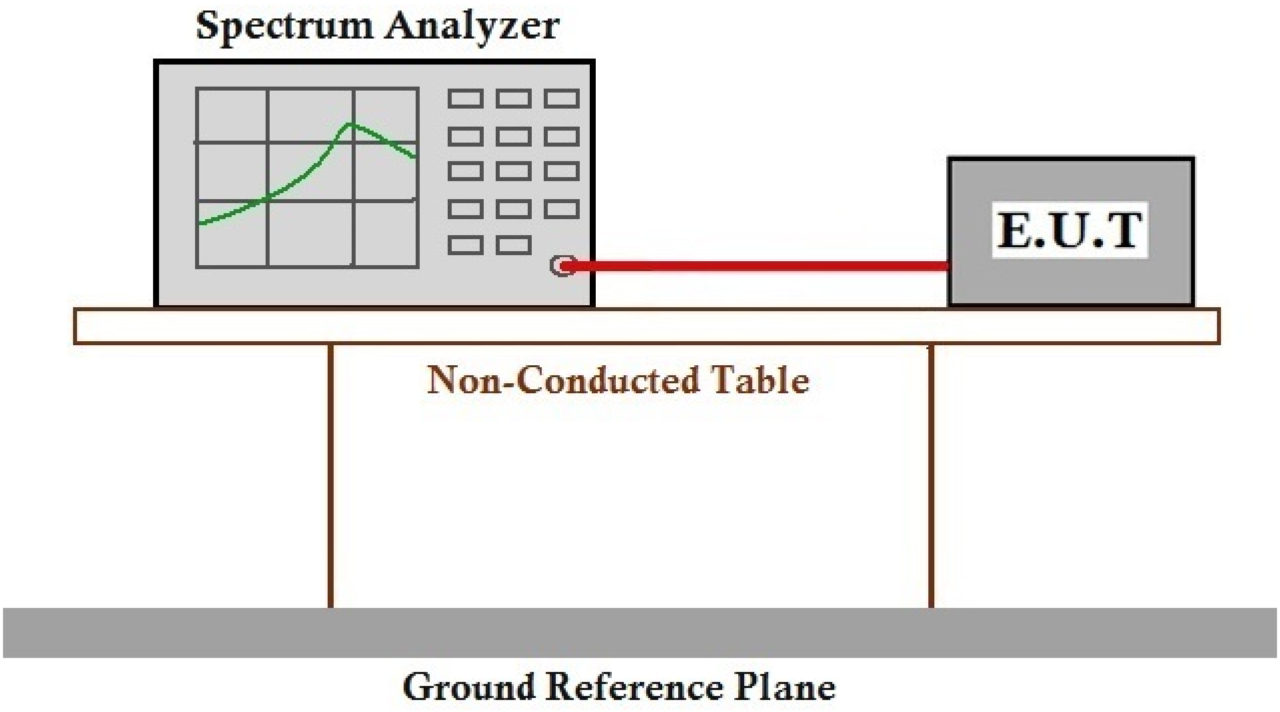
7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Pretest these modes to find the worst case:	d:TX mode (Band 1)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.
	e:TX mode (Band 3)_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 @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). 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 D for SHEM200300156704

8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

9 EUT Constructional Details

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

- End of the Report -