

Report No.: SHEM210200106001

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TEST REPORT

Application No.: SHEM2102001060CR **FCC ID:** 2AVYF-IPC-FX2FE-A

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: CONSUMER CAMERA

Model No.: IPC-F22FEN-0360B-imou, IPC-F22FEP-0600B-imou,

IPC-F22FEN-0600B-imou, IPC-F22FEP-0280B-imou, IPC-F22FEN-0280B-imou, IPC-F22FEP-0360B-imou,

IPC-F22FEP-imou, IPC-F22FEN-imou,

IPC-F22FEP, IPC-F22FEN,

IPC-F22FEN-A-0360B-imou, IPC-F22FEP-A-0600B-imou, IPC-F22FEN-A-0600B-imou, IPC-F22FEP-A-0280B-imou, IPC-F22FEN-A-0360B-imou, IPC-F22FEN-A-0360B-im

IPC-F22FEP-A-imou, IPC-F22FEN-A-imou;

IPC-F22FEP-A, IPC-F22FEN-A¤

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

Date of Receipt: 2021-02-02

Date of Test: 2021-02-02 to 2021-02-25

Date of Issue: 2021-02-27

Test Result: Pass*

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



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Revision Record							
Version Description Date Remark							
00	Original	2021-02-27	1				

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



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2 Test Summary

Radio Spectrum Technical Requirement						
Item	Standard	Method	Requirement	Result		
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)	Pass		

Radio Spectrum Matter Part							
Item	Standard	Method	Requirement	Result			
Conducted Emissions at AC Power Line (150kHz-30MHz)	wer Line 47 CFR Part 15, ANSI C63.10 (2013)		47 CFR Part 15, Subpart C 15.207	Pass			
Minimum 6dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass			
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.9.1	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass			
Power Spectrum Density	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass			
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass			
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass			
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.10.5	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass			
Radiated Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.209 & 15.247(d)	Pass			

Declaration of EUT Family Grouping:

Note 1: There are series models mentioned in this report, and they are the similar in electrical and electronic characters. Only the model IPC-F22FEP was tested since their differences were the model number and appearance.

Note 2: The antenna gain value is provided by the customer. The test lab will not be responsible for wrong test results due to incorrect information about antenna gain values.



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4 General Information

4.1 Details of E.U.T.

Antenna Type:

Power supply: DC 12V by Adapter

INPUT:100-240V,50/60Hz, Max 0.3A

OUTPUT:12V,1A

Test voltage: AC 120V/60Hz Antenna Gain: Ant 1:1.79dBi;

Ant 2:1.79dBi

Directional gain:4.8dBi
Antenna 1: Dipole Antenna

Antenna 2: Dipole 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:

Channal	802.	11b	802.11	g	802.11n(HT20)	
Channel	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
1	Default	Default	Default	Default	Default	Default
6	Default	Default	Default	Default	Default	Default
11	Default	Default	Default	Default	Default	Default
Channel	802.11n	(HT40)				
	Ant 1	Ant 2				
3	Default	Default				
6	Default	Default				
9	Default	Default				



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4.3 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	ThinkPad X100e	/
SecureCRT	VanDyke	V 6.2.0	/
Serial port adapter plate	1	Test Plate 3	/
AC Adapter	SHENZHEN HONOR ELECTRONIC CO.,LTD	ADS-12AM-12 12012EPCU	/

Parameter of Adapter:

A donto:	Rated Input	AC100V-240V 50/60Hz 0.3A
Adapter	Rated Output	12V,1A

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	2.9dB
7	Conducted Spurious Emissions	0.75dB
8	DE Dodieted Dower	5.1dB (Below 1GHz)
0	RF Radiated Power	4.9dB (Above 1GHz)
		4.2dB (Below 30MHz)
9	Padiated Spurious Emission Test	4.5dB (30MHz-1GHz)
9	Radiated Spurious Emission Test	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 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-1600, C-1707, T-1499, G-10216 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Emission at Mains Terminals (150kHz-30MHz)

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
1	Test Software	Farad	EZ-EMC	CCS-03A1	N.C.R	N.C.R
2	EMI Test Receive	R&S	ESCI	100781	02/24/2020	02/23/2021
3	LISN	R&S	ENV216	101604	10/19/2020	10/18/2021
4	LISN	Schwarzbeck	NNLK 8129	8129-143	10/19/2020	10/18/2021
5	Pulse Limiter	R&S	ESH3-Z2	100609	02/24/2020	02/23/2021
6	CE test Cable	Thermax		14	02/24/2020	02/23/2021

RF Conducted Test

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
1	Test Software	BST	TST PASS	V 1.1.0	N.C.R	N.C.R
2	Spectrum Analyzer	Agilent	E4446A	MY44020154	04/22/2020	04/21/2021
3	Spectrum Analyzer	Keysight	N9020A	MY53420174	09/25/2020	09/24/2021
4	Spectrum Analyzer	Keysight	N9020A	MY55370209	10/19/2020	10/18/2021
5	Signal Generator	Agilent	E8257C	MY43321570	10/10/2020	10/18/2021
6	MXG Vector Signal Generator	Agilent	N5182A	MY50142015	09/25/2020	09/24/2021
7	Universal Radio Communication Tester	R&S	CMU200	109525	10/19/2020	10/18/2021
8	Universal Radio Communication Tester	R&S	CMW500	159275	10/19/2020	10/18/2021
9	Power Meter	Anritsu	ML2495A	1445010	04/21/2020	04/20/2021
10	Switcher	CCSRF	FY562	KS301219	10/19/2020	10/18/2021
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	AISI	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	/	04/21/2020	04/22/2021
17	Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	04/21/2020	04/20/2021

RF Radiated Test

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
1	Test Software	Farad	EZ-EMC	CCS-03A1	N/A	N/A
2	Spectrum Analyzer	R&S	FSV40	101493	10/19/2020	10/18/2021
3	Signal Generator	Agilent	E8257C	MY43321570	10/10/2020	10/18/2021
4	Loop Antenna	COM-POWER	AL-130R	10160008	04/29/2019	04/28/2021
5	Bilog Antenna	TESEQ	CBL 6112D	35403	06/22/2019	06/21/2021
6	Bilog Antenna	SCHWARZBECK	VULB9160	9160-3342	04/29/2019	04/28/2021
7	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	267	10/26/2020	10/25/2022
8	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/23/2020	02/22/2021
9	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/22/2021	02/21/2023
10	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	BBHA9170171	02/27/2018	02/26/2021
11	Pre-Amplifier(30MHz~18GHz)	CCSRF	AMP1277	1	10/19/2020	10/18/2021
12	Pre-Amplifier(0.1~26.5GHz)	EMCI	EMC012645	980060	04/21/2020	04/20/2021



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13	Low Pass Filter	MICRO-TRONICS	VLFX-950	RV142900829	N.C.R	N.C.R
14	High Pass Filter	Mini-Circuits	VHF-1200	15542	N.C.R	N.C.R
15	Filter (5450MHz~5770 MHz)	MICRO-TRONICS	BRC50704-01	2	N.C.R	N.C.R
16	Filter (5690 MHz~5930 MHz)	MICRO-TRONICS	BRC50705-01	4	N.C.R	N.C.R
17	Filter (5150 MHz~5350 MHz)	MICRO-TRONICS	BRC50703-01	2	N.C.R	N.C.R
18	Filter (885 MHz~915 MHz)	MICRO-TRONICS	BRM14698	1	N.C.R	N.C.R
19	Filter (815 MHz~860 MHz)	MICRO-TRONICS	BRM14697	1	N.C.R	N.C.R
20	Filter (1745 MHz \sim 1910 MHz)	MICRO-TRONICS	BRM14700	1	N.C.R	N.C.R
21	Filter (1922 MHz \sim 1977 MHz)	MICRO-TRONICS	BRM50715	1	N.C.R	N.C.R
22	Filter (2550 MHz)	MICRO-TRONICS	HPM13362	5	N.C.R	N.C.R
23	Filter (1532 MHz \sim 1845 MHz)	MICRO-TRONICS	BRM50713	1	N.C.R	N.C.R
24	Filter (2.4GHz)	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
25	RE test cable	/	RE01-RE04	/	04/21/2020	04/22/2021
26	Software	ard technology co.,lt	EZ-EMC	1.1.1.2	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 6 dBi.

EUT Antenna:

The antenna 1 and antenna 2 is Dipole antenna, and all no consideration of replacement. The best case gain of the antenna 1 and antenna 2 is 1.79dBi.

Antenna location: Refer to Appendix(External 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:

Fraguency of emission(MU=)	Conducted limit(dBµV)						
Frequency of emission(MHz)	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.							



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7.1.1 E.U.T. Operation

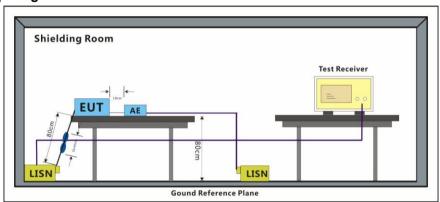
Operating Environment:

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

Test mode a: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.

7.1.2 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 $50\text{ohm}/50\mu\text{H}$ + 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:
- 1.LISN=Read Level+ Cable Loss+ LISN Factor
- 2. This test item was investigated while operating in each channel mode, however, it was determined that channel 11 operation for b modulation produced the worst conducted emissions. So the conducted emissions produced from other operation are not report.



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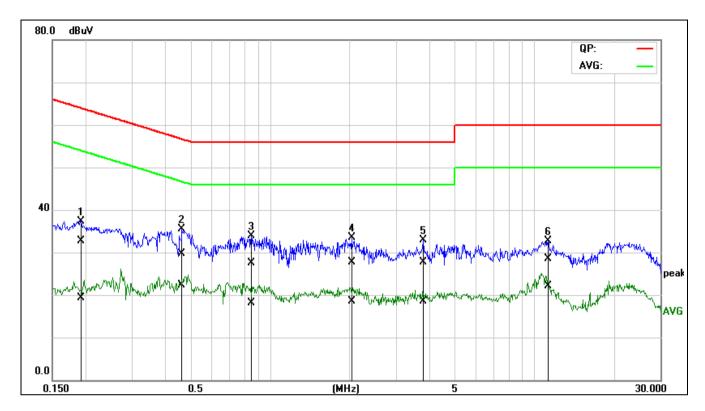
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Mode:a; Line:Live Line



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	0.1922	13.34	-0.07	19.43	32.77	19.36	63.94	53.94	-31.17	-34.58	Pass
2*	0.4660	10.19	2.86	19.46	29.65	22.32	56.58	46.58	-26.93	-24.26	Pass
3	0.8500	8.10	-1.43	19.48	27.58	18.05	56.00	46.00	-28.42	-27.95	Pass
4	2.0340	8.10	-0.95	19.54	27.64	18.59	56.00	46.00	-28.36	-27.41	Pass
5	3.8060	8.07	-1.15	19.62	27.69	18.47	56.00	46.00	-28.31	-27.53	Pass
6	11.2860	8.53	2.16	19.99	28.52	22.15	60.00	50.00	-31.48	-27.85	Pass



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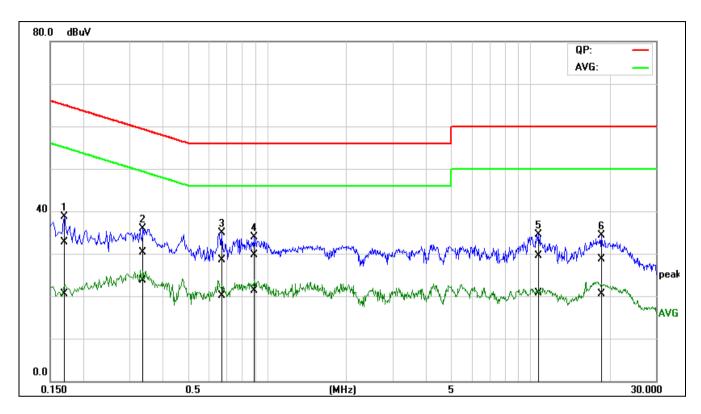
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Mode:a; Line:Neutral Line



No.	Frequency	QuasiPeak	Average	Correction	QuasiPeak	Average	QuasiPeak	Average	QuasiPeak	Average	Remark
		reading	reading	factor	result	result	limit	limit	margin	margin	
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1700	13.24	1.13	19.39	32.63	20.52	64.96	54.96	-32.33	-34.44	Pass
2	0.3379	10.92	4.22	19.41	30.33	23.63	59.25	49.25	-28.92	-25.62	Pass
3	0.6740	9.08	0.68	19.46	28.54	20.14	56.00	46.00	-27.46	-25.86	Pass
4*	0.8900	10.15	1.78	19.47	29.62	21.25	56.00	46.00	-26.38	-24.75	Pass
5	10.7860	9.50	0.68	19.95	29.45	20.63	60.00	50.00	-30.55	-29.37	Pass
6	18.6660	8.48	0.37	20.21	28.69	20.58	60.00	50.00	-31.31	-29.42	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

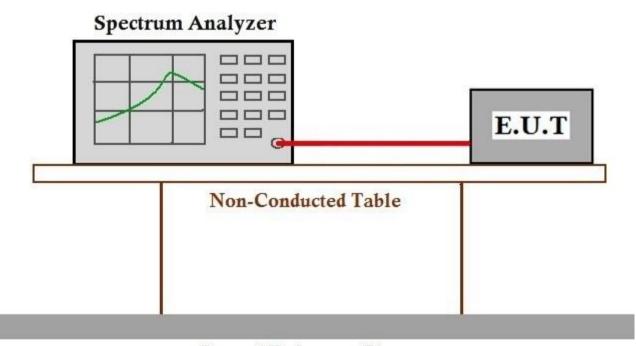
Operating Environment:

Temperature: 25 Humidity: 49 % RH Atmospheric Pressure: 1003 mbar

Test mode a: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



Ground Reference Plane

7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHEM210200106001



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7.3 Conducted Peak Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(3) Test Method: ANSI C63.10 (2013) Section 11.9.1

Limit:

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

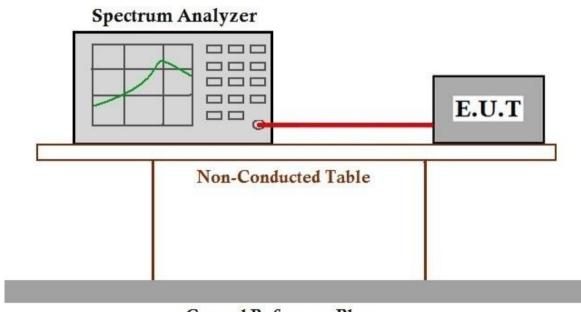
7.3.1 Operating Environment:

Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1003 mbar

Test mode

a: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



Ground Reference Plane

7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHEM210200106001



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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: ≤8dBm in any 3 kHz band during any time interval of continuous

transmission

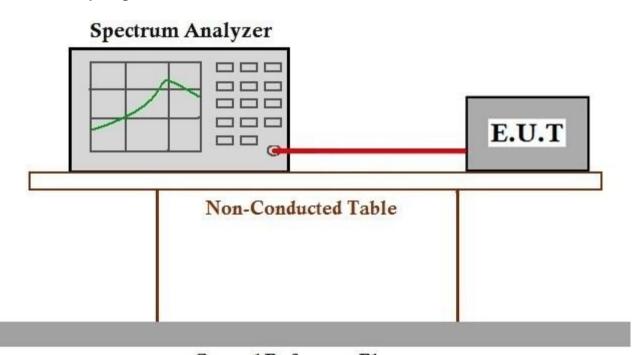
7.4.1 Operating Environment:

Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1003 mbar

Test mode a: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



Ground Reference Plane

7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHEM210200106001



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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)

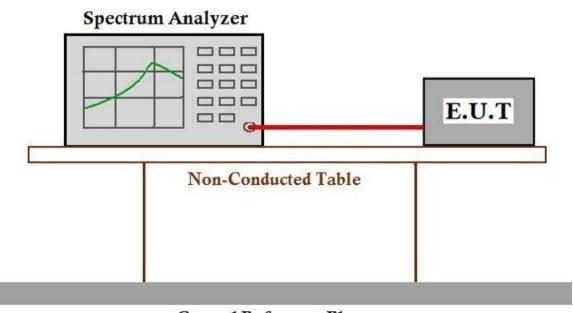
7.5.1 Operating Environment:

Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1003 mbar

Test mode

a: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



Ground Reference Plane

7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHEM210200106001



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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)

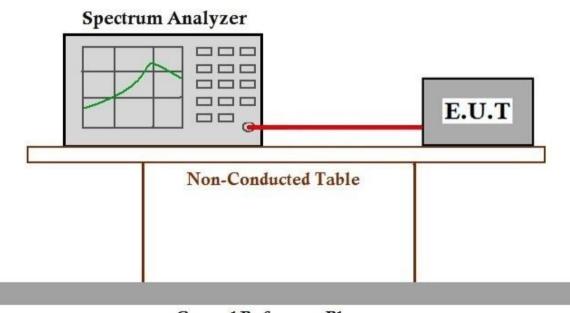
7.6.1 Operating Environment:

Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1003 mbar

Test mode

a: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



Ground Reference Plane

7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix A for SHEM210200106001



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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.



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7.7.1 E.U.T. Operation

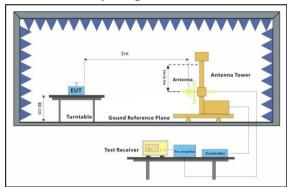
Operating Environment:

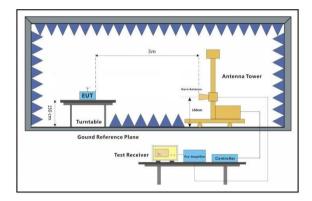
Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1002 mbar

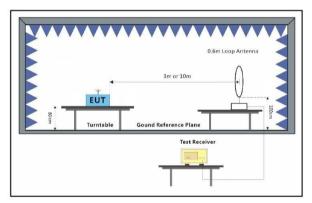
Test mode

a: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.

7.7.2 Test Setup Diagram









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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.



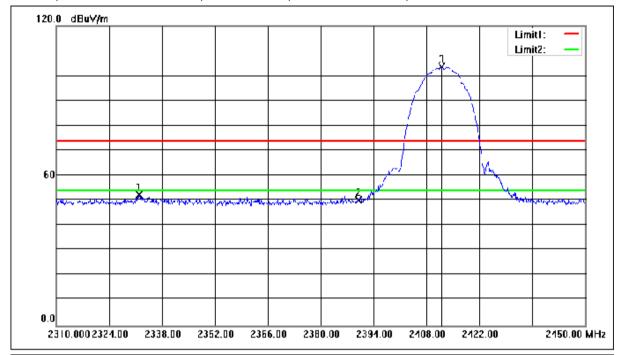
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Mode:a; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2331.980	56.60	-4.39	52.21	74.00	-21.79	peak
2	2390.000	54.60	-4.24	50.36	74.00	-23.64	peak
3	2412.060	107.96	-4.19	103.77	74.00	29.77	peak



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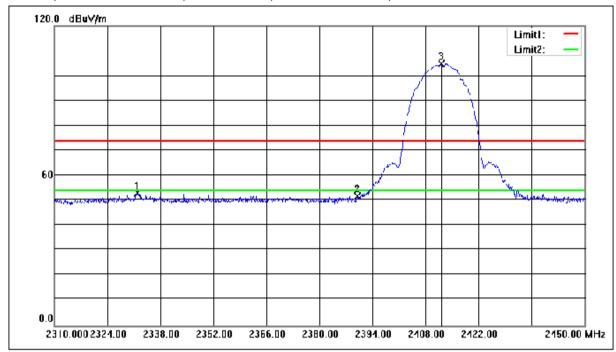
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Mode:a; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2331.980	57.46	-4.39	53.07	74.00	-20.93	peak
2	2390.000	55.95	-4.24	51.71	74.00	-22.29	peak
3	2412.200	109.12	-4.19	104.93	74.00	30.93	peak



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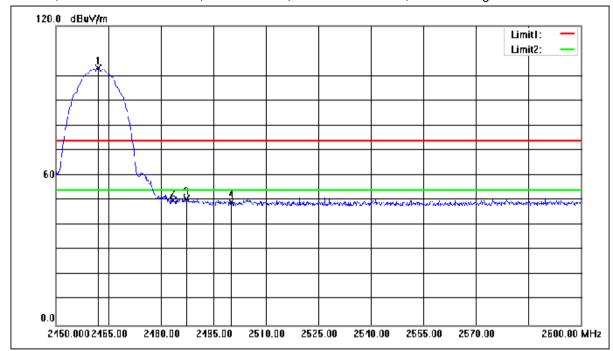
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Mode:a; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2462.000	107.14	-4.06	103.08	74.00	29.08	peak
2	2483.500	53.84	-4.00	49.84	74.00	-24.16	peak
3	2487.350	54.60	-3.99	50.61	74.00	-23.39	peak
4	2500.000	53.19	-3.96	49.23	74.00	-24.77	peak



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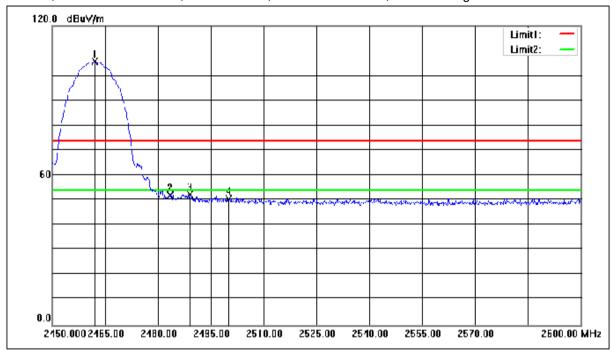
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Mode:a; Polarization: Vertical; Modulation:b; bandwidth: 20MHz; Channel: High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2462.000	109.93	-4.06	105.87	74.00	31.87	peak
2	2483.500	56.02	-4.00	52.02	74.00	-21.98	peak
3	2489.000	56.41	-3.99	52.42	74.00	-21.58	peak
4	2500.000	54.60	-3.96	50.64	74.00	-23.36	peak



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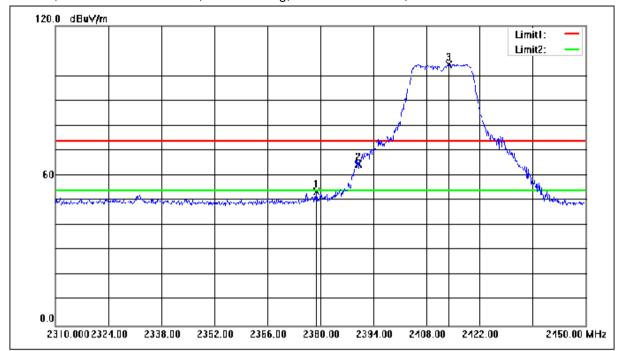
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Mode:a; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2379.020	57.76	-4.27	53.49	74.00	-20.51	peak
2	2390.000	68.76	-4.24	64.52	74.00	-9.48	peak
3	2413.880	108.82	-4.18	104.64	74.00	30.64	peak



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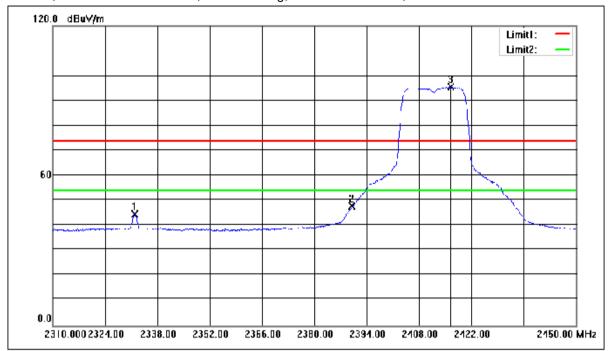
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Mode:a; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2331.980	48.80	-4.39	44.41	54.00	-9.59	AVG
2	2390.000	51.97	-4.24	47.73	54.00	-6.27	AVG
3	2416.540	99.72	-4.18	95.54	54.00	41.54	AVG



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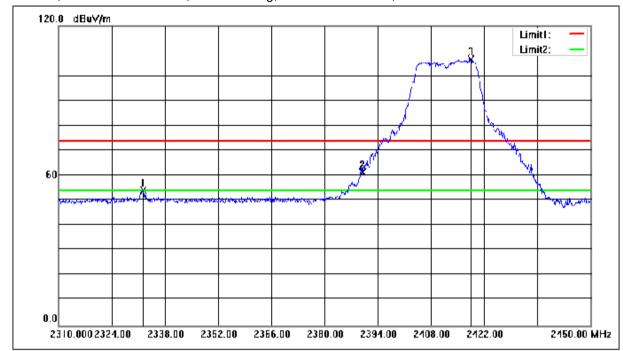
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Mode:a; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2332.260	58.48	-4.39	54.09	74.00	-19.91	peak
2	2390.000	65.54	-4.24	61.30	74.00	-12.70	peak
3	2418.500	110.77	-4.17	106.60	74.00	32.60	peak



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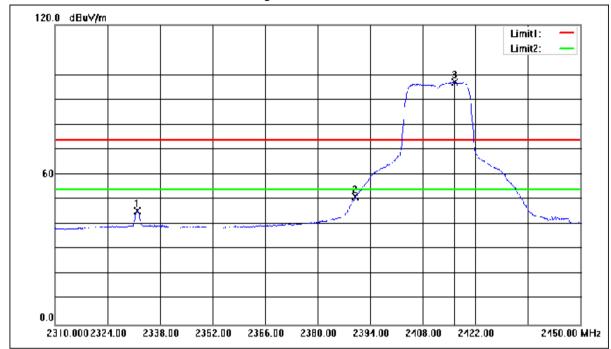
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Mode:a; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2331.840	49.92	-4.39	45.53	54.00	-8.47	AVG
2	2390.000	55.43	-4.24	51.19	54.00	-2.81	AVG
3	2416.400	101.26	-4.18	97.08	54.00	43.08	AVG



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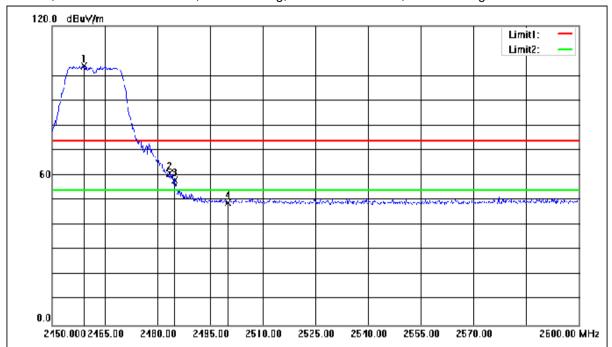
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Mode:a; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2459.150	108.03	-4.07	103.96	74.00	29.96	peak
2	2483.500	64.84	-4.00	60.84	74.00	-13.16	peak
3	2484.950	62.06	-4.00	58.06	74.00	-15.94	peak
4	2500.000	53.12	-3.96	49.16	74.00	-24.84	peak



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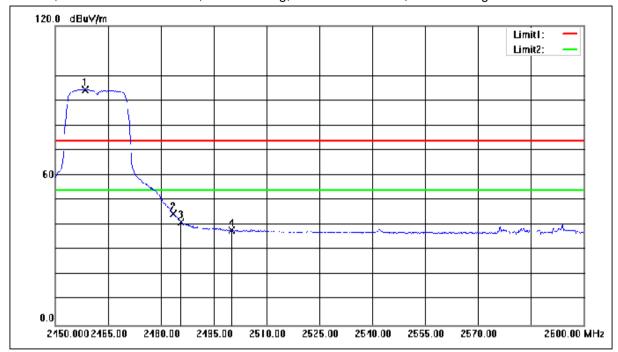
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Mode:a; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2458.550	98.54	-4.07	94.47	54.00	40.47	AVG
2	2483.500	48.46	-4.00	44.46	54.00	-9.54	AVG
3	2485.700	45.33	-4.00	41.33	54.00	-12.67	AVG
4	2500.000	41.77	-3.96	37.81	54.00	-16.19	AVG



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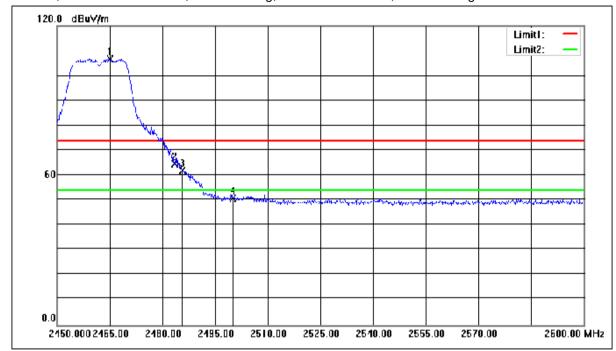
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Mode:a; Polarization: Vertical; Modulation:g; bandwidth: 20MHz; Channel: High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2465.150	110.79	-4.05	106.74	74.00	32.74	peak
2	2483.500	68.79	-4.00	64.79	74.00	-9.21	peak
3	2485.700	65.95	-4.00	61.95	74.00	-12.05	peak
4	2500.000	54.85	-3.96	50.89	74.00	-23.11	peak



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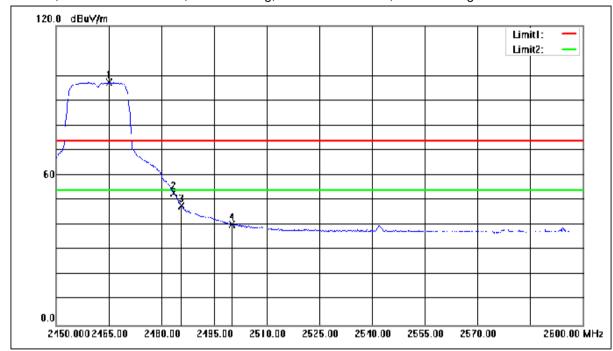
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Mode:a; Polarization: Vertical; Modulation:g; bandwidth: 20MHz; Channel: High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2465.000	101.37	-4.05	97.32	54.00	43.32	AVG
2	2483.500	56.93	-4.00	52.93	54.00	-1.07	AVG
3	2485.700	51.84	-4.00	47.84	54.00	-6.16	AVG
4	2500.000	44.18	-3.96	40.22	54.00	-13.78	AVG



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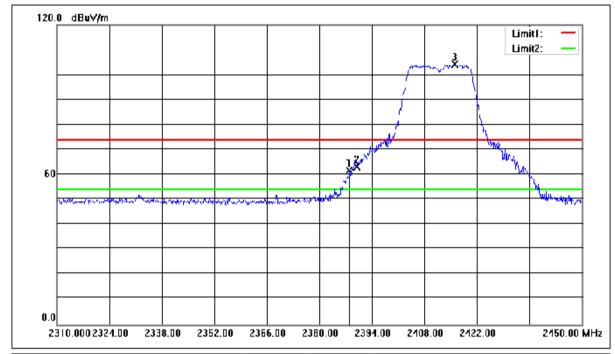
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2387.980	66.00	-4.25	61.75	74.00	-12.25	peak
2	2390.000	67.28	-4.24	63.04	74.00	-10.96	peak
3	2416.120	108.35	-4.18	104.17	74.00	30.17	peak



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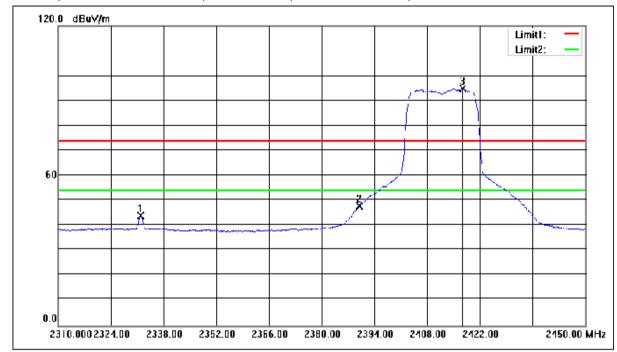
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2331.840	48.34	-4.39	43.95	54.00	-10.05	AVG
2	2390.000	52.17	-4.24	47.93	54.00	-6.07	AVG
3	2417.380	99.06	-4.17	94.89	54.00	40.89	AVG



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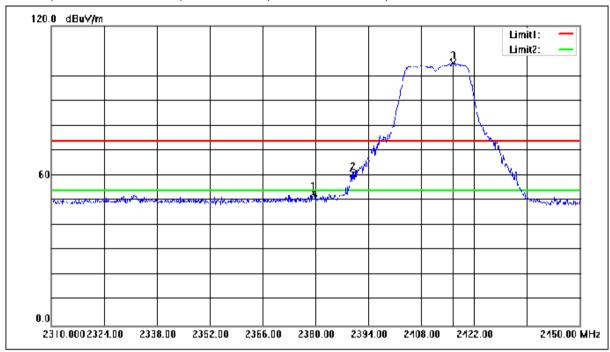
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2379.580	57.22	-4.27	52.95	74.00	-21.05	peak
2	2390.000	64.86	-4.24	60.62	74.00	-13.38	peak
3	2416.540	109.21	-4.18	105.03	74.00	31.03	peak



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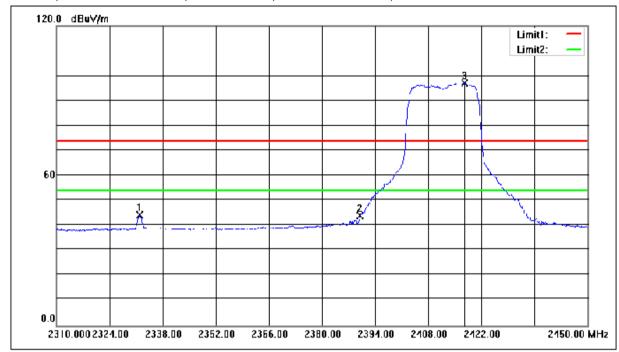
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2331.840	48.63	-4.39	44.24	54.00	-9.76	AVG
2	2390.000	48.27	-4.24	44.03	54.00	-9.97	AVG
3	2417.520	101.33	-4.17	97.16	54.00	43.16	AVG



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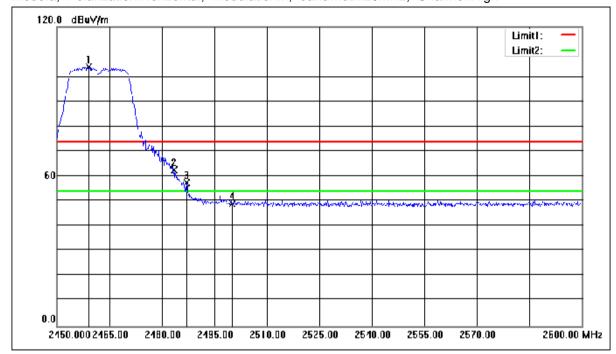
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2459.150	107.95	-4.07	103.88	74.00	29.88	peak
2	2483.500	66.63	-4.00	62.63	74.00	-11.37	peak
3	2487.050	61.33	-3.99	57.34	74.00	-16.66	peak
4	2500.000	53.03	-3.96	49.07	74.00	-24.93	peak



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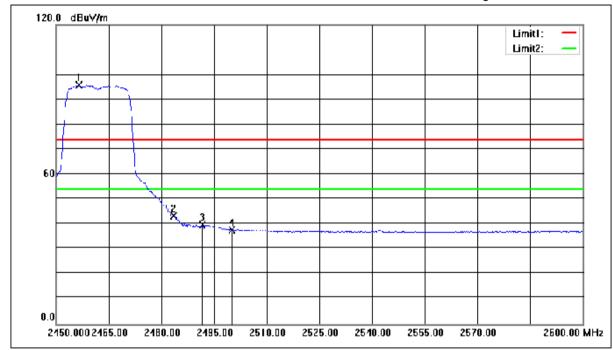
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2456.450	99.85	-4.07	95.78	54.00	41.78	AVG
2	2483.500	47.28	-4.00	43.28	54.00	-10.72	AVG
3	2491.700	43.65	-3.98	39.67	54.00	-14.33	AVG
4	2500.000	41.68	-3.96	37.72	54.00	-16.28	AVG



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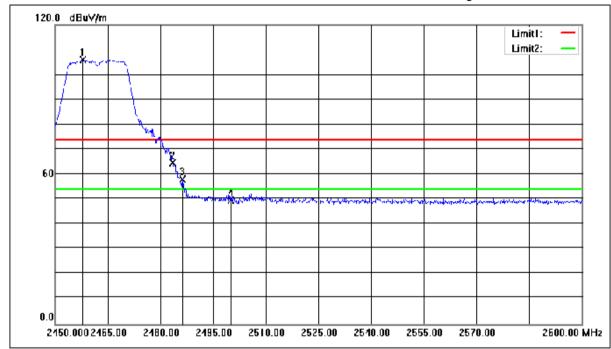
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Mode:a; Polarization: Vertical; Modulation:n; bandwidth: 20MHz; Channel: High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2457.950	110.06	-4.07	105.99	74.00	31.99	peak
2	2483.500	68.67	-4.00	64.67	74.00	-9.33	peak
3	2486.300	61.93	-4.00	57.93	74.00	-16.07	peak
4	2500.000	53.50	-3.96	49.54	74.00	-24.46	peak



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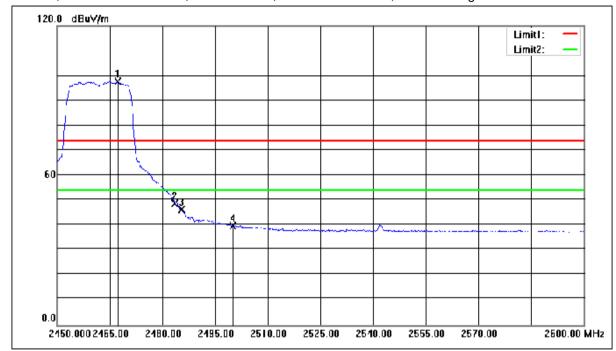
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Mode:a; Polarization: Vertical; Modulation:n; bandwidth: 20MHz; Channel: High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2467.250	101.67	-4.04	97.63	54.00	43.63	AVG
2	2483.500	52.88	-4.00	48.88	54.00	-5.12	AVG
3	2485.550	50.35	-4.00	46.35	54.00	-7.65	AVG
4	2500.000	43.69	-3.96	39.73	54.00	-14.27	AVG



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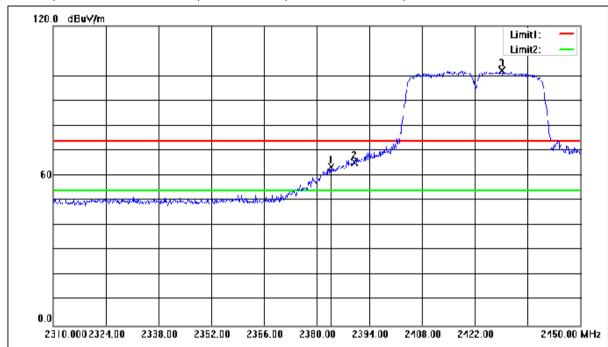
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2383.780	67.72	-4.26	63.46	74.00	-10.54	peak
2	2390.000	69.36	-4.24	65.12	74.00	-8.88	peak
3	2429.140	106.37	-4.14	102.23	74.00	28.23	peak



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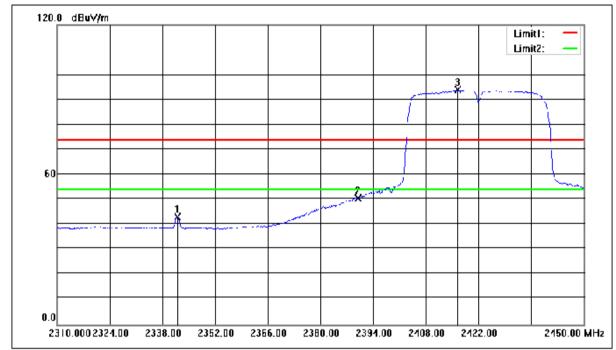
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2341.920	47.54	-4.37	43.17	54.00	-10.83	AVG
2	2390.000	54.91	-4.24	50.67	54.00	-3.33	AVG
3	2416.540	98.12	-4.18	93.94	54.00	39.94	AVG



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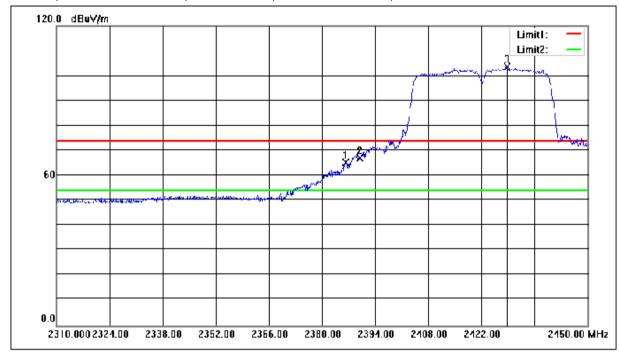
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2386.160	69.59	-4.25	65.34	74.00	-8.66	peak
2	2390.000	71.25	-4.24	67.01	74.00	-6.99	peak
3	2428.860	107.73	-4.14	103.59	74.00	29.59	peak



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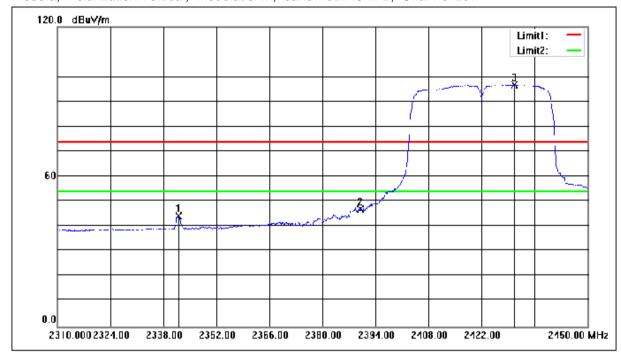
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2341.920	48.48	-4.37	44.11	54.00	-9.89	AVG
2	2390.000	51.05	-4.24	46.81	54.00	-7.19	AVG
3	2430.680	100.94	-4.14	96.80	54.00	42.80	AVG



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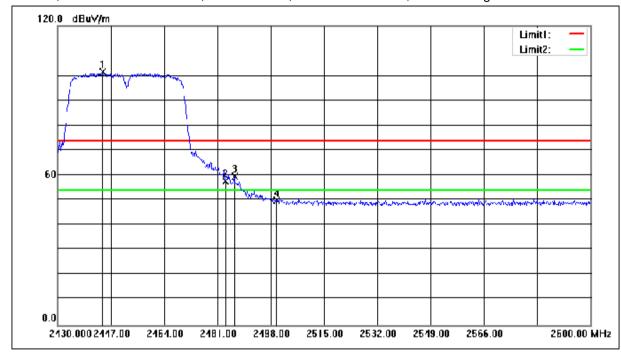
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2444.280	105.62	-4.10	101.52	74.00	27.52	peak
2	2483.500	61.64	-4.00	57.64	74.00	-16.36	peak
3	2486.440	63.44	-3.99	59.45	74.00	-14.55	peak
4	2500.000	53.99	-3.96	50.03	74.00	-23.97	peak



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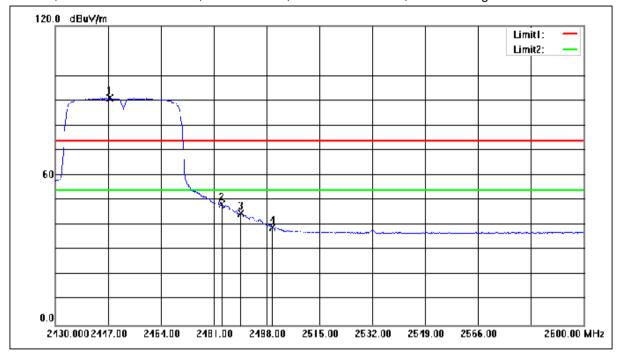
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2447.510	95.14	-4.10	91.04	54.00	37.04	AVG
2	2483.500	52.47	-4.00	48.47	54.00	-5.53	AVG
3	2489.670	48.88	-3.99	44.89	54.00	-9.11	AVG
4	2500.000	43.23	-3.96	39.27	54.00	-14.73	AVG



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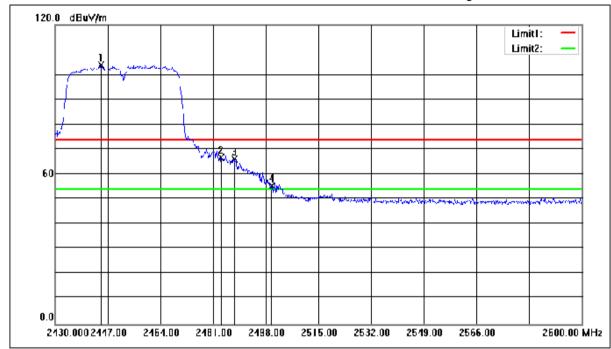
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2444.790	108.18	-4.10	104.08	74.00	30.08	peak
2	2483.500	70.66	-4.00	66.66	74.00	-7.34	peak
3	2487.800	70.22	-3.99	66.23	74.00	-7.77	peak
4	2500.000	59.16	-3.96	55.20	74.00	-18.80	peak



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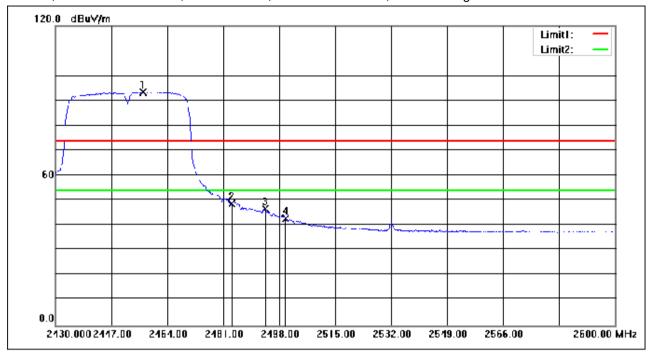
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Mode:a; Polarization: Vertical; Modulation:n; bandwidth: 40MHz; Channel: High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2456.520	97.58	-4.07	93.51	54.00	39.51	AVG
2	2483.500	52.74	-4.00	48.74	54.00	-5.26	AVG
3	2493.750	50.57	-3.98	46.59	54.00	-7.41	AVG
4	2500.000	46.66	-3.96	42.70	54.00	-11.30	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

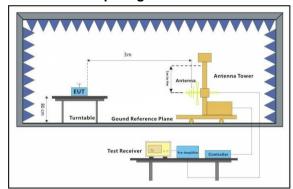
Operating Environment:

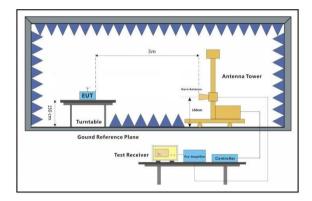
Temperature: 25 °C Humidity: 49 % RH Atmospheric Pressure: 1004 mbar

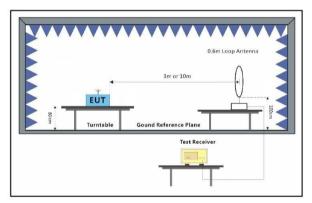
Test mode

a: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









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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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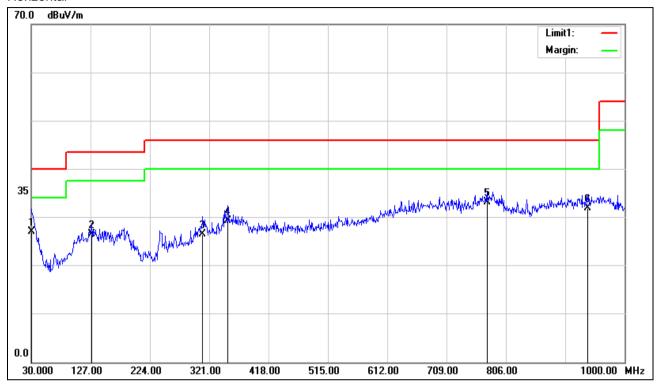




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30MHz-1GHz

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	30.0000	1.19	25.93	27.12	40.00	-12.88	200	236	QP
2	128.9400	7.00	19.45	26.45	43.50	-17.05	100	105	QP
3	310.3300	5.61	20.98	26.59	46.00	-19.41	100	25	QP
4	351.0700	6.94	22.41	29.35	46.00	-16.65	100	56	QP
5	774.9600	5.51	27.65	33.16	46.00	-12.84	400	360	QP
6	939.8600	2.85	29.17	32.02	46.00	-13.98	300	305	QP



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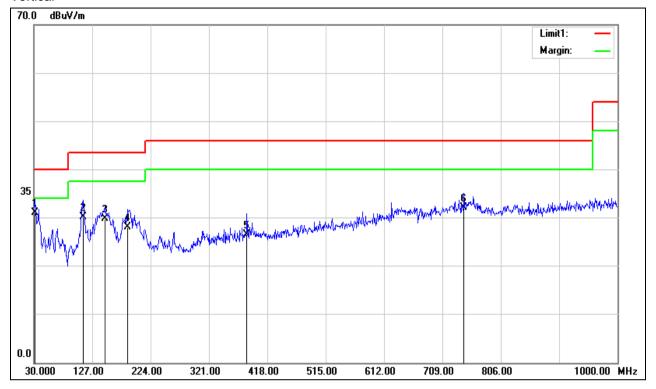
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Vertical

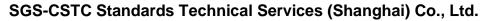


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	31.9400	6.25	24.82	31.07	40.00	-8.93	200	305	QP
2	111.4800	11.24	18.88	30.12	43.50	-13.38	400	228	QP
3	148.3400	9.77	20.09	29.86	43.50	-13.64	300	105	QP
4	186.1700	10.79	17.33	28.12	43.50	-15.38	100	52	QP
5	384.0500	3.25	23.20	26.45	46.00	-19.55	200	92	QP
6	744.8900	4.57	27.48	32.05	46.00	-13.95	100	86	QP



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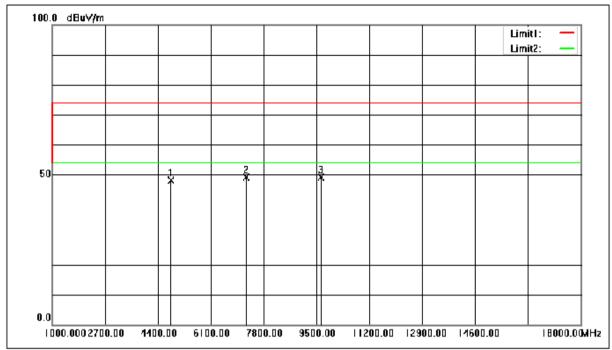




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Above 1GHz

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



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4824.000	58.31	-10.21	48.10	74.00	-25.90	peak
2	7236.000	56.27	-7.05	49.22	74.00	-24.78	peak
3	9648.000	53.82	-4.77	49.05	74.00	-24.95	peak



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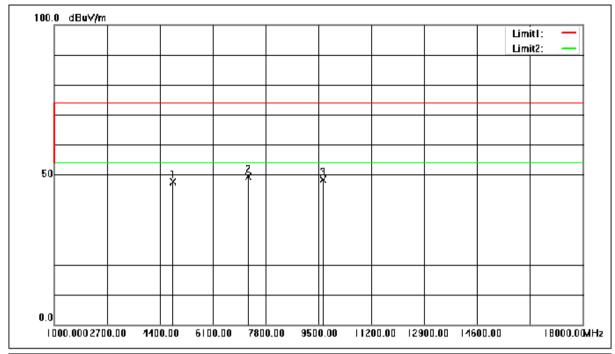
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Mode:a; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4824.000	57.79	-10.21	47.58	74.00	-26.42	peak
2	7236.000	56.33	-7.05	49.28	74.00	-24.72	peak
3	9648.000	53.07	-4.77	48.30	74.00	-25.70	peak



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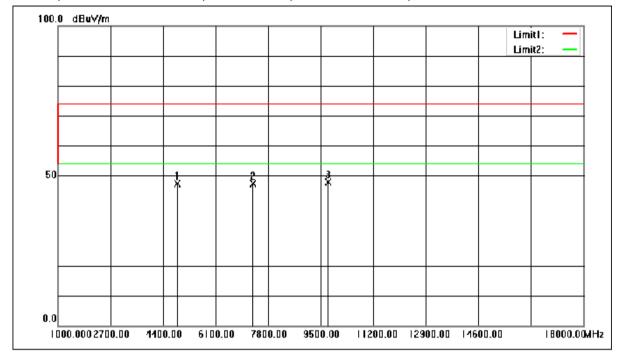
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Mode:a; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:middle



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	57.28	-10.01	47.27	74.00	-26.73	peak
2	7311.000	54.21	-6.93	47.28	74.00	-26.72	peak
3	9748.000	52.15	-4.30	47.85	74.00	-26.15	peak



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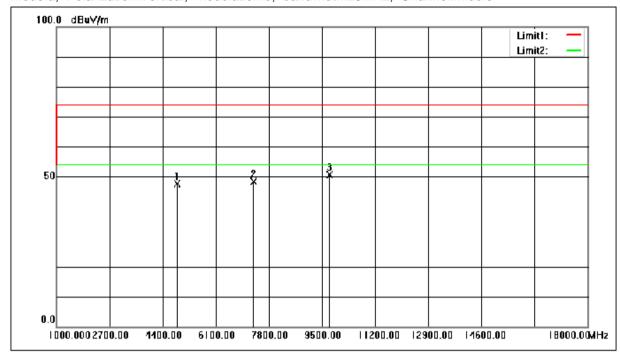
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Mode:a; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:middle



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	57.59	-10.01	47.58	74.00	-26.42	peak
2	7311.000	55.20	-6.93	48.27	74.00	-25.73	peak
3	9748.000	54.81	-4.30	50.51	74.00	-23.49	peak



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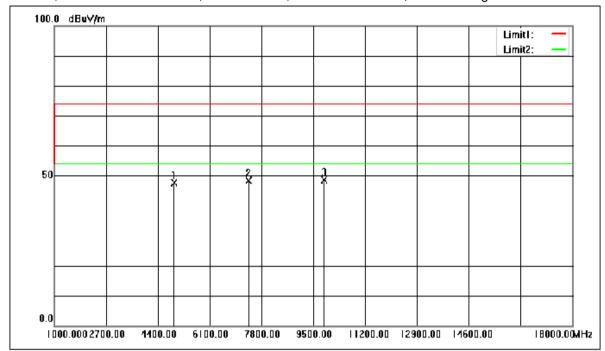
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Mode:a; Polarization:Horizontal; Modulation:b; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4924.000	57.44	-9.82	47.62	74.00	-26.38	peak
2	7386.000	55.13	-6.80	48.33	74.00	-25.67	peak
3	9848.000	52.41	-3.84	48.57	74.00	-25.43	peak



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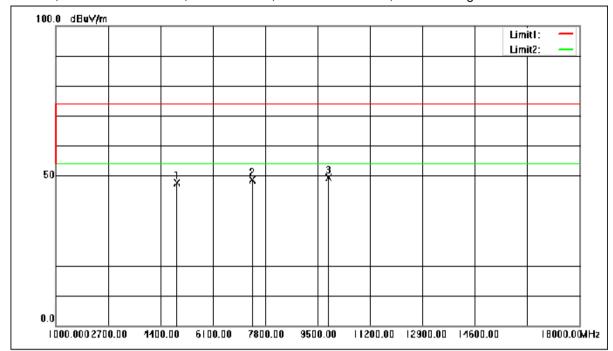
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Mode:a; Polarization:Vertical; Modulation:b; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4924.000	57.40	-9.82	47.58	74.00	-26.42	peak
2	7386.000	55.47	-6.80	48.67	74.00	-25.33	peak
3	9848.000	53.30	-3.84	49.46	74.00	-24.54	peak



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



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4824.000	57.43	-10.21	47.22	74.00	-26.78	peak
2	7236.000	55.62	-7.05	48.57	74.00	-25.43	peak
3	9648.000	54.07	-4.77	49.30	74.00	-24.70	peak



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



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4824.000	57.49	-10.21	47.28	74.00	-26.72	peak
2	7236.000	55.81	-7.05	48.76	74.00	-25.24	peak
3	9648.000	53.10	-4.77	48.33	74.00	-25.67	peak



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



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	57.27	-10.01	47.26	74.00	-26.74	peak
2	7311.000	54.79	-6.93	47.86	74.00	-26.14	peak
3	9748.000	53.26	-4.30	48.96	74.00	-25.04	peak



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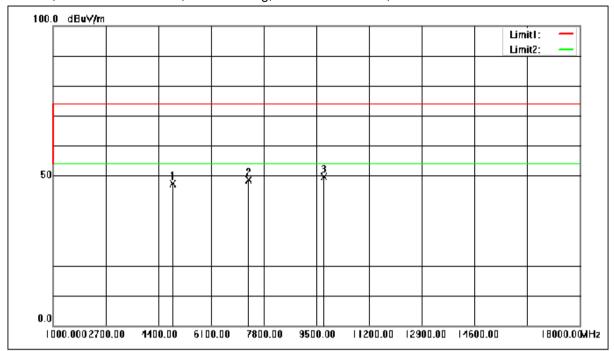
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Mode:a; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:middle



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	57.29	-10.01	47.28	74.00	-26.72	peak
2	7311.000	55.60	-6.93	48.67	74.00	-25.33	peak
3	9748.000	53.97	-4.30	49.67	74.00	-24.33	peak



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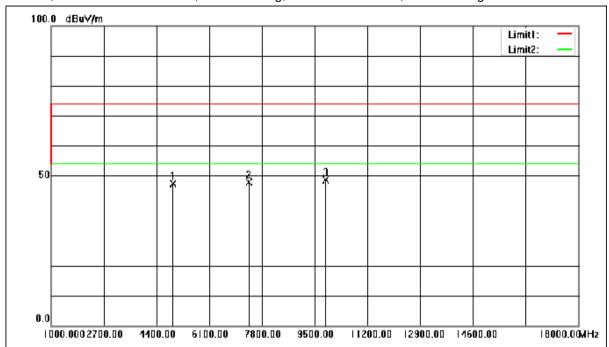
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Mode:a; Polarization:Horizontal; Modulation:g; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4924.000	57.15	-9.82	47.33	74.00	-26.67	peak
2	7386.000	54.57	-6.80	47.77	74.00	-26.23	peak
3	9848.000	52.51	-3.84	48.67	74.00	-25.33	peak



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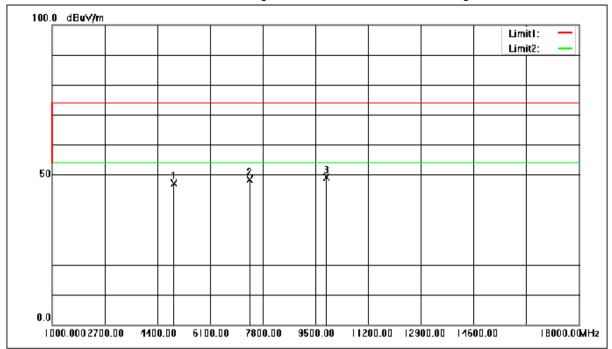
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Mode:a; Polarization:Vertical; Modulation:g; bandwidth:20MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4924.000	56.83	-9.82	47.01	74.00	-26.99	peak
2	7386.000	55.13	-6.80	48.33	74.00	-25.67	peak
3	9848.000	53.06	-3.84	49.22	74.00	-24.78	peak



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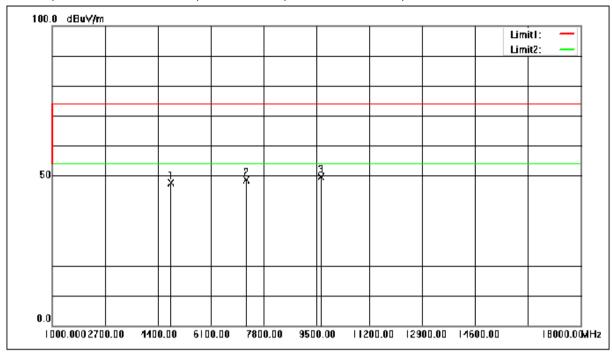
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4824.000	57.73	-10.21	47.52	74.00	-26.48	peak
2	7236.000	55.72	-7.05	48.67	74.00	-25.33	peak
3	9648.000	54.30	-4.77	49.53	74.00	-24.47	peak



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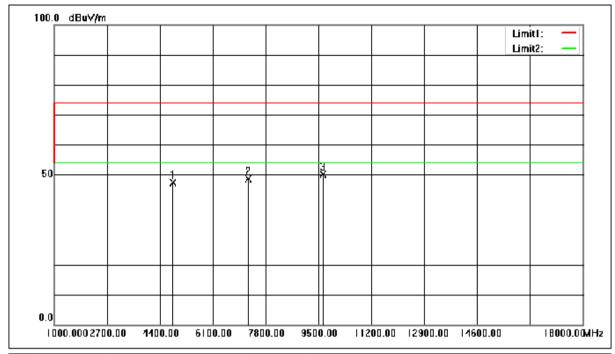
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4824.000	57.49	-10.21	47.28	74.00	-26.72	peak
2	7236.000	55.60	-7.05	48.55	74.00	-25.45	peak
3	9648.000	54.91	-4.77	50.14	74.00	-23.86	peak



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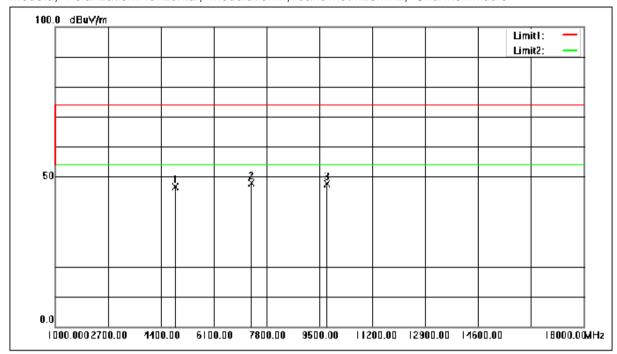
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:middle

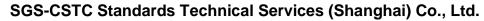


No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	56.58	-10.01	46.57	74.00	-27.43	peak
2	7311.000	54.72	-6.93	47.79	74.00	-26.21	peak
3	9748.000	51.89	-4.30	47.59	74.00	-26.41	peak



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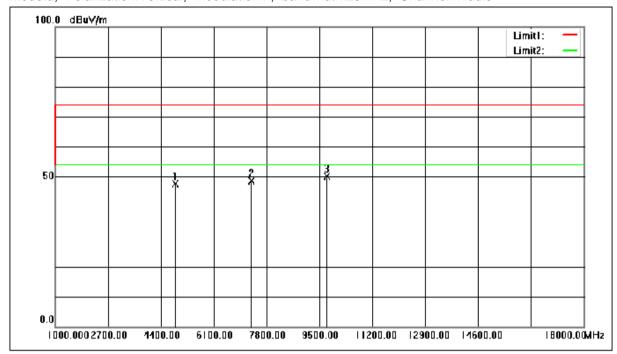
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:middle



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	57.59	-10.01	47.58	74.00	-26.42	peak
2	7311.000	55.60	-6.93	48.67	74.00	-25.33	peak
3	9748.000	54.54	-4.30	50.24	74.00	-23.76	peak



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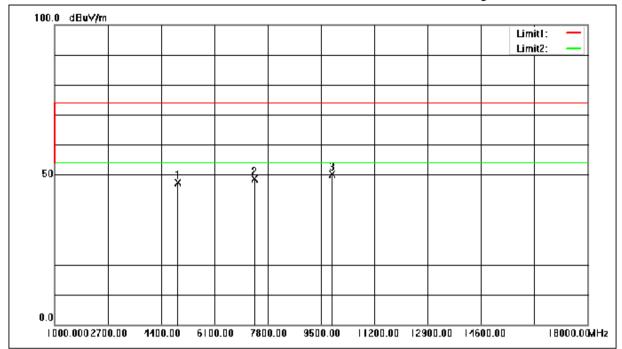
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High

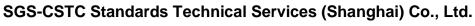


No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4924.000	57.27	-9.82	47.45	74.00	-26.55	peak
2	7386.000	55.37	-6.80	48.57	74.00	-25.43	peak
3	9848.000	53.94	-3.84	50.10	74.00	-23.90	peak



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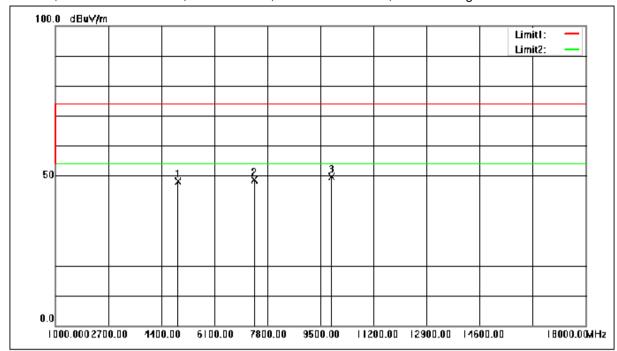
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Mode:a; Polarization: Vertical; Modulation:n; bandwidth: 20MHz; Channel: High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4924.000	58.04	-9.82	48.22	74.00	-25.78	peak
2	7386.000	55.47	-6.80	48.67	74.00	-25.33	peak
3	9848.000	53.46	-3.84	49.62	74.00	-24.38	peak



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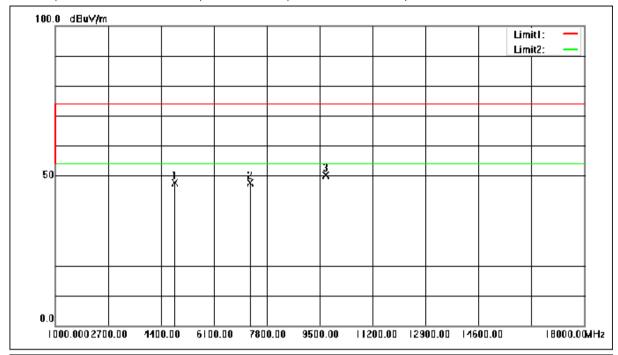
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low



No	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4844.000	57.81	-10.13	47.68	74.00	-26.32	peak
2	7266.000	54.68	-7.00	47.68	74.00	-26.32	peak
3	9688.000	54.61	-4.58	50.03	74.00	-23.97	peak



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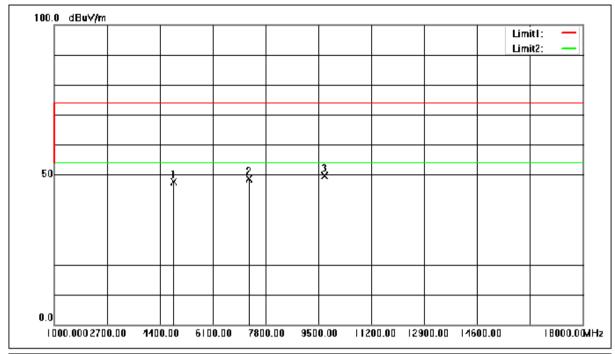
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Mode:a; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low

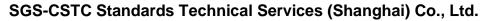


No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4844.000	57.65	-10.13	47.52	74.00	-26.48	peak
2	7266.000	55.67	-7.00	48.67	74.00	-25.33	peak
3	9688.000	54.27	-4.58	49.69	74.00	-24.31	peak



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

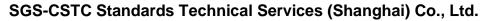


No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	57.04	-10.01	47.03	74.00	-26.97	peak
2	7311.000	53.92	-6.93	46.99	74.00	-27.01	peak
3	9748.000	52.98	-4.30	48.68	74.00	-25.32	peak



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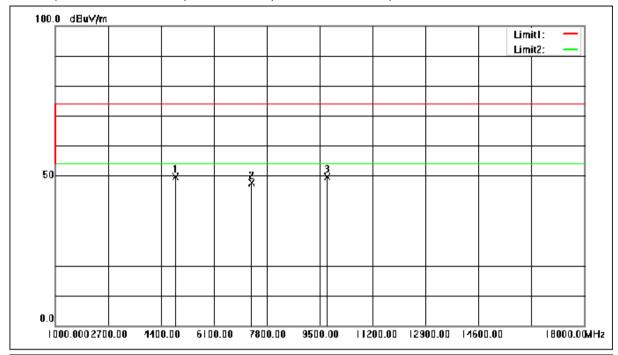
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Mode:a; Polarization: Vertical; Modulation:n; bandwidth: 40MHz; Channel: middle



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4874.000	59.69	-10.01	49.68	74.00	-24.32	peak
2	7311.000	54.68	-6.93	47.75	74.00	-26.25	peak
3	9748.000	53.98	-4.30	49.68	74.00	-24.32	peak



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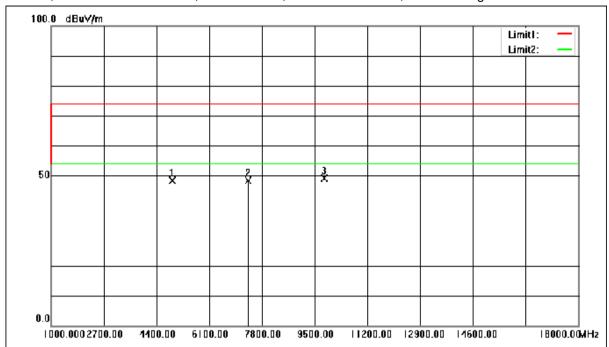
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Mode:a; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4904.000	58.24	-9.89	48.35	74.00	-25.65	peak
2	7356.000	55.18	-6.85	48.33	74.00	-25.67	peak
3	9808.000	53.24	-4.02	49.22	74.00	-24.78	peak



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SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

Report No.: SHEM210200106001

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



No.	Frequency	Reading	Correction	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4904.000	58.26	-9.89	48.37	74.00	-25.63	peak
2	7356.000	56.62	-6.85	49.77	74.00	-24.23	peak
3	9808.000	52.98	-4.02	48.96	74.00	-25.04	peak



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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 -



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