

FCC Test Report

Product Name : Dual-band Wireless-AC750 Range Extender

Trade Name : ASUS

Model No. : RP-AC52

FCC ID. : MSQ-RPAC52

Applicant : ASUSTeK COMPUTER INC.

Address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt : Jan. 30, 2016

Issued Date : Apr. 07, 2016

Report No. : 1620103R-RFUSP57V00-B

Report Version : V1.0



The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

Test Report Certification

Issued Date : Apr. 07, 2016

Report No. : 1620103R-RFUSP57V00-B

 Quietek

a  DEKRA company

Product Name : Dual-band Wireless-AC750 Range Extender
 Applicant : ASUSTeK COMPUTER INC.
 Address : 4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan
 Manufacturer : ASUSTeK COMPUTER INC.
 Model No. : RP-AC52
 FCC ID. : MSQ-RPAC52
 EUT Voltage : AC 100V~240V, 50-60Hz
 Testing Voltage : AC 120V/60Hz
 Trade Name : ASUS
 Applicable Standard : FCC CFR Title 47 Part 15 Subpart E Section 15.407: 2014
 ANSI C63.10: 2009
 Test Lab : Quietek Hsin Chu Laboratory
 Test Result : Complied

The test results relate only to the samples tested.

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Documented By : 

 (Demi Chang / Senior Engineering Adm. Specialist)

Tested By : 

 (JuBo Shen / Senior Engineer)

Approved By : 

 (Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1530179R-RFUSP27V00	V2.0	Initial issue of report	May 21, 2015
1620103R-RFUSP57V00-B	V1.0	Update WLAN 5GHz Band4 standard to FCC 15.407.	Apr. 07, 2016

Laboratory Information

We, **QuieTek Corporation**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C. : TAF, Accreditation Number: 3024
USA : FCC, Registration Number: 365520
Canada : IC, Submission No: 181665 / IC Registration Number: 4075C-4

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site:<http://www.quietek.com/english/about/certificates.aspx?bval=5>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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TABLE OF CONTENTS

Description	Page
1. General Information.....	6
1.1. EUT DESCRIPTION.....	6
1.2. TEST MODE	11
1.3. TESTED SYSTEM DETAILS.....	12
1.4. CONFIGURATION OF TESTED SYSTEM	12
1.5. EUT EXERCISE SOFTWARE	13
1.6. TEST FACILITY	14
2. Peak Power Spectrum Density.....	15
2.1. TEST EQUIPMENT.....	15
2.2. TEST SETUP	15
2.3. LIMITS	16
2.4. TEST PROCEDURE	16
2.5. UNCERTAINTY	16
2.6. TEST RESULT.....	17
3. Frequency Stability.....	26
3.1. TEST EQUIPMENT.....	26
3.2. TEST SETUP	26
3.3. LIMITS	26
3.4. TEST PROCEDURE	26
3.5. UNCERTAINTY	26
3.6. TEST RESULT.....	27

1. General Information

1.1. EUT Description

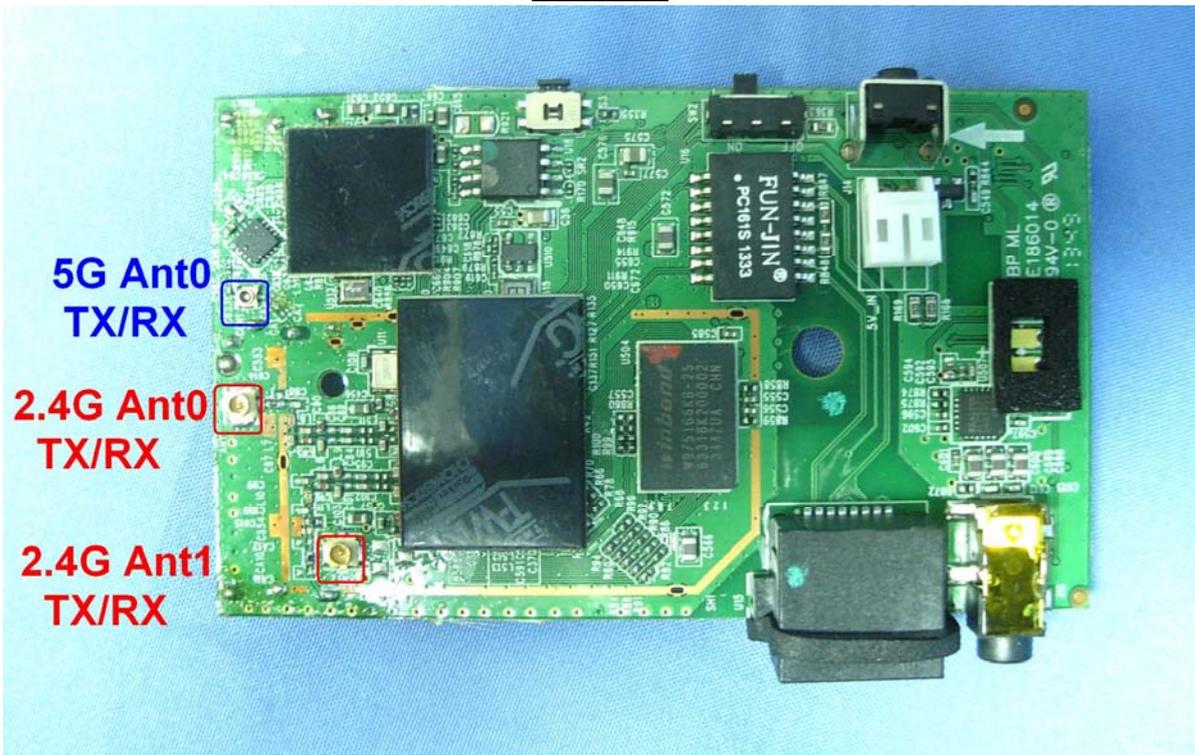
Product Name	Dual-band Wireless-AC750 Range Extender	
Trade Name	ASUS	
Model No.	RP-AC52	
Frequency Range/ Channel Number	IEEE 802.11a/ IEEE 802.11n (20MHz)	5745~5825MHz / 5 Channels
	IEEE 802.11n (40MHz)	5755~5795MHz / 2 Channels
	IEEE 802.11ac (80MHz)	5775~5775MHz / 1 Channel
Type of Modulation	IEEE 802.11a/n/ac	Orthogonal Frequency Division Multiplexing
Data Speed	IEEE 802.11a	6Mbps,9Mbps,12Mbps,18Mbps,24Mbps,36Mbps,48Mbps,54Mbps
	IEEE 802.11n	Support a subset of the combination of GI, MCS 0~MCS 23 and bandwidth defined in 802.11n
	IEEE 802.11ac	Support a subset of the combination of GI, MCS 0~MCS 9 and bandwidth defined in 802.11ac

Antenna Information	
Antenna Type	PIFA Antenna
Antenna Gain	5GHz: 3dBi

ANT-TX / RX & Bandwidth

ANT-TX / RX	TX			RX		
	20MHz	40MHz	80MHz	20MHz	40MHz	80MHz
IEEE802.11a	✓			✓		
IEEE802.11n	✓	✓		✓	✓	
IEEE802.11ac	✓	✓	✓	✓	✓	✓

1TX / 1RX



IEEE 802.11n

MCS Index	Modulation	R	N _{BPSCS}	N _{CBPS}		N _{DBPS}		Data Rate(Mb/s)			
				20MHz	40MHz	20MHz	40MHz	800ns GI		400ns GI	
								20MHz	40MHz	20MHz	40MHz
0	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.2	15.0
1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.4	30.0
2	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.7	45.0
3	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.9	60.0
4	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.3	90.0
5	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.8	120.0
6	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.0	135.0
7	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.2	150.0

Note 1: Support of 400ns GI is optional on transmit and receive.

Table 1 – MCS parameters for TX Antenna number = 1

Symbol	Explanation
R	Code rate
N _{BPSC}	Number of coded bits per single carrier
N _{CBPS}	Number of coded bits per symbol
N _{DBPS}	Number of data bits per symbol
GI	guard interval

IEEE 802.11ac Data Rate

Spatial Streams (Note1)	MCS Index	Modulation type	Coding rate	Data Rate(Mb/s)							
				20 MHz		40 MHz		80 MHz		160 MHz	
				Guard Interval		Guard Interval		Guard Interval		Guard Interval	
				800ns	400ns	800ns	400ns	800ns	400ns	800ns	400ns
1	0	BPSK	1/2	6.5	7.2	13.5	15	29.3	32.5	58.5	65
	1	QPSK	1/2	13	14.4	27	30	58.5	65	117	130
	2	QPSK	3/4	19.5	21.7	40.5	45	87.8	97.5	175.5	195
	3	16-QAM	1/2	26	28.9	54	60	117	130	234	260
	4	16-QAM	3/4	39	43.3	81	90	175.5	195	351	390
	5	64-QAM	2/3	52	57.8	108	120	234	260	468	520
	6	64-QAM	3/4	58.5	65	121.5	135	263.3	292.5	526.5	585
	7	64-QAM	5/6	65	72.2	135	150	292.5	325	585	650
	8	256-QAM	3/4	78	86.7	162	180	351	390	702	780
	9	256-QAM	5/6	N/A	N/A	180	200	390	433.3	780	866.7

IEEE 802.11a & IEEE 802.11n (20MHz) & IEEE 802.11ac (20MHz)

Working Frequency of Each Channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745 MHz	153	5765 MHz	157	5785 MHz	161	5805 MHz
165	5825 MHz						

IEEE 802.11n (40MHz) & IEEE 802.11ac (40MHz)

Working Frequency of Each Channel			
Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

IEEE 802.11ac (80MHz)

Working Frequency of Each Channel	
Channel	Frequency
155	5775 MHz

Note:

1. This device is a Dual-band Wireless-AC750 Range Extender including 2.4GHz b/g/n (2x2) and 5GHz a/n/ac (1x1) transmitting and receiving function.
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart E Paragraph 15.407.
3. Regards to the frequency band operation; the lowest , middle and highest frequency of channel were selected to perform the test, and then shown on this report.
4. The function of the 2.4GHz & 5.2GHz transmitting is measured and makes a test report of the report number: 1530179R-RFUSP27V00 & 1530179R-RFUSP57V00.
5. This device has Ethernet ports, which can be connected to computer. It is a Class B personal computer and peripheral. Its test report number is 1530179R-RFUSP01V00.

1.2. Test Mode

QuieTek has verified the construction and function in typical operation. The preliminary tests were performed in different data rate, and to find the worst condition, which was shown in this test report. The following table is the final test mode.

TX	Mode 1: Transmit
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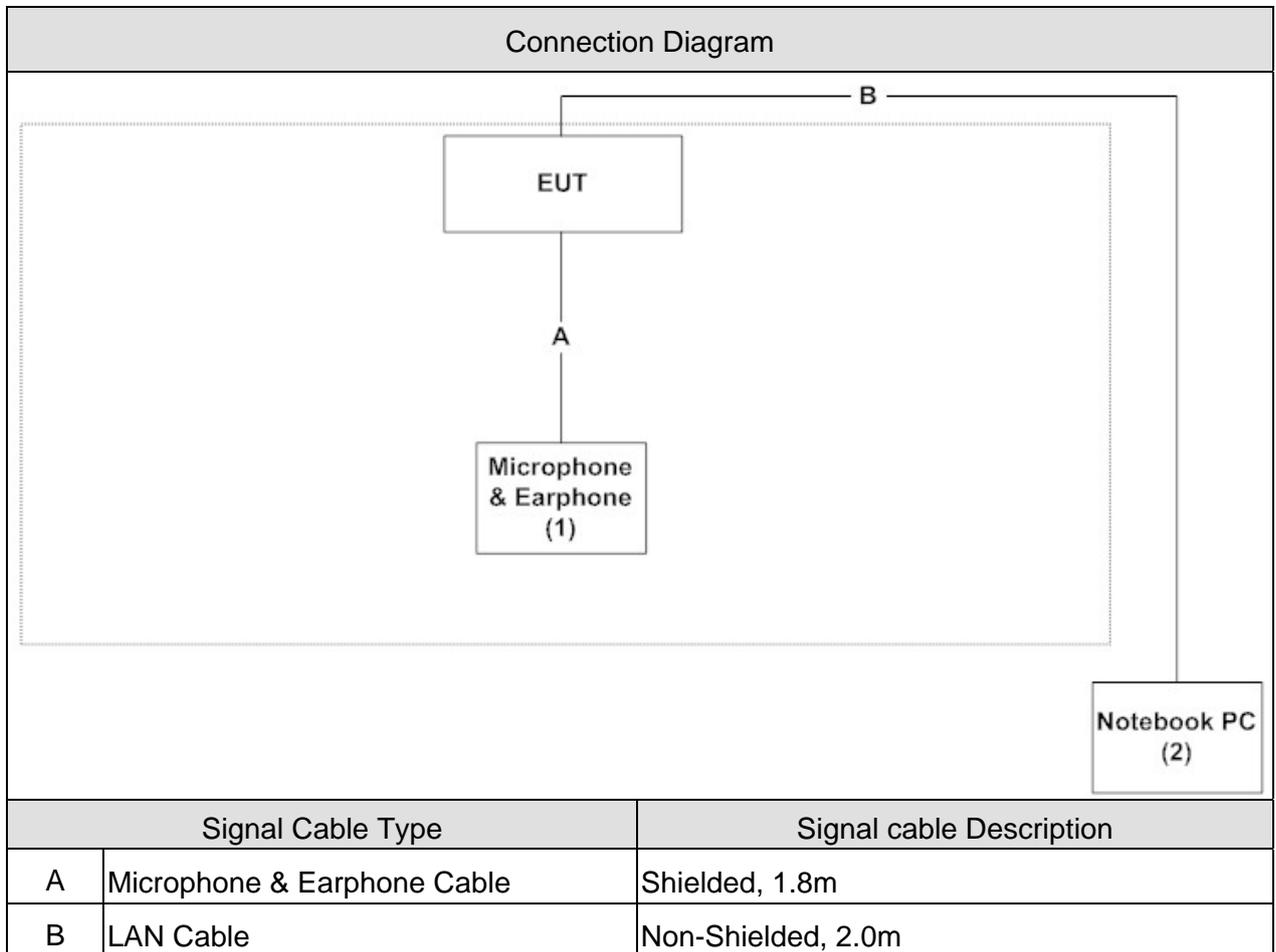
Test Items	Modulation	Channel	Antenna	Result
Peak Power Spectrum Density	11a	149/ 157/ 165	0	Complies
	11n(20MHz)	149/ 157/ 165	0	Complies
	11n(40MHz)	151/ 159	0	Complies
	11ac(80MHz)	155	0	Complies
Frequency Stability	11a	149/ 157/ 165	0	Complies
	11n(20MHz)	149/ 157/ 165	0	Complies
	11n(40MHz)	151/ 159	0	Complies
	11ac(80MHz)	155	0	Complies

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1 Microphone & Earphone	Fujiei	SBZ-38	N/A	DoC	Non-Shielded, 1.8m
2 Notebook PC	DELL	Vostro3400	7F808N1	DoC	Non-Shielded, 1.8m

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Execute the QA Tool on the EUT.
3	Configure the test mode, the test channel, and the data rate.
4	Press “Start TX or RX” to start the continuous transmitting .
5	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC PART 15 E 15.407	15 - 35	25°C
Humidity (%RH)	Peak Power Spectrum	25 - 75	45%RH
Barometric pressure (mbar)	Density	860 - 1060	950-1000
Temperature (°C)	FCC PART 15 E 15.407	15 - 35	25°C
Humidity (%RH)	Frequency Stability	25 - 75	45%RH
Barometric pressure (mbar)		860 - 1060	950-1000

2. Peak Power Spectrum Density

2.1. Test Equipment

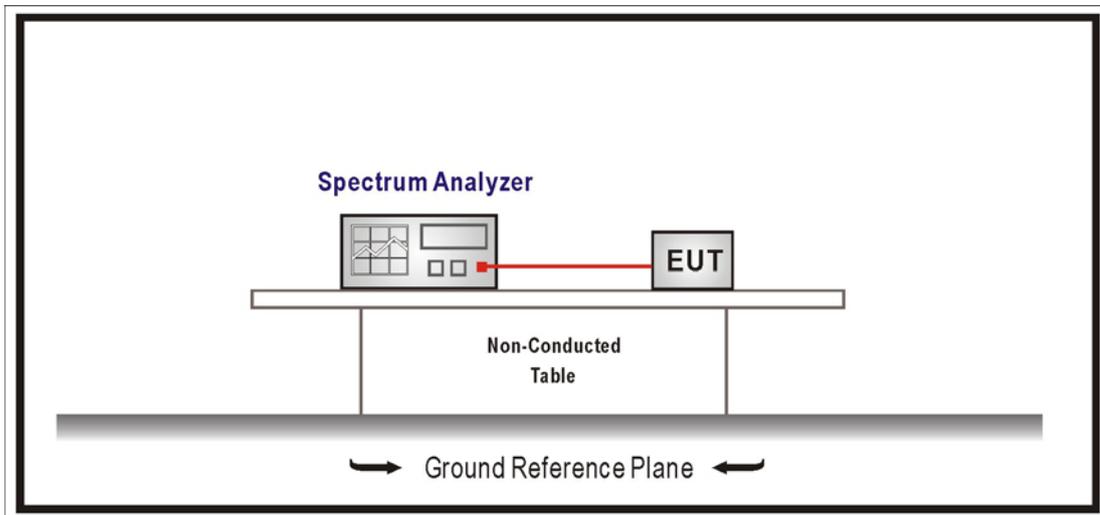
The following test equipments are used during the radiated emission tests:

Peak Power Spectrum Density / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2015/07/14

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

1. For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 17 dBm in any 1MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
2. For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi
3. For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
4. For the band 5.725-5.850 GHz, the peak power spectral density shall not exceed 30 dBm in any 500KHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

2.4. Test Procedure

The EUT was setup to ANSI C63.10:2009; tested to U-NII test procedure of KDB 789033 D02 for compliance to FCC 47CFR Subpart E requirements.

For Band1 : Set RBW=1MHz, VBW=3MHz with RMS detector. The PPSD is the highest level found across the emission in any 1-MHz band after 100 sweeps of averaging.

For Band4 : Set RBW=500KHz, VBW=1.5MHz with RMS detector. The PPSD is the highest level found across the emission in any 500KHz band after 100 sweeps of averaging.

2.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

2.6. Test Result

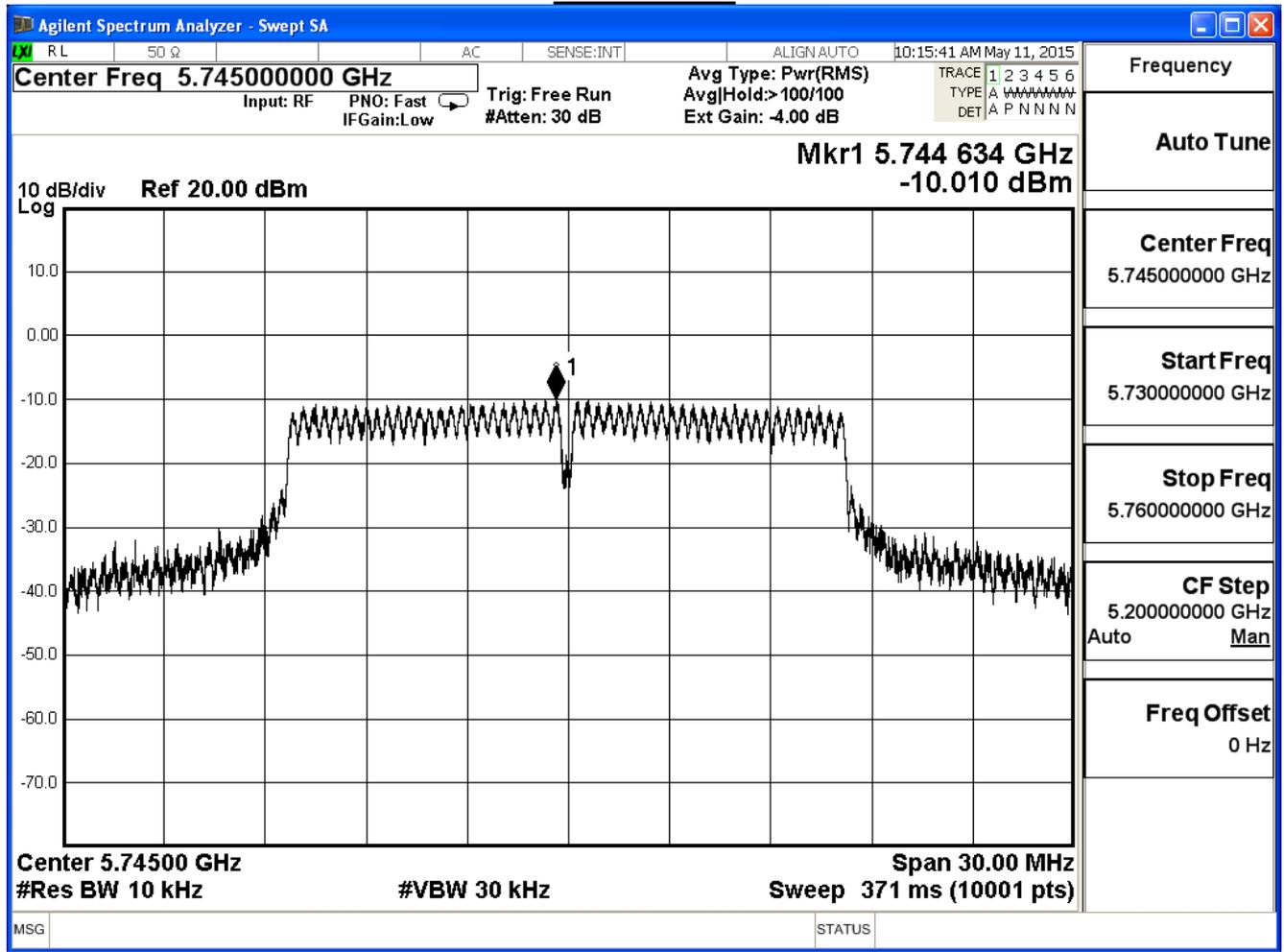
Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Peak Power Spectral Density		
Test Mode	Mode 1: Transmit		
Date of Test	2015/05/20	Test Site	SR7

IEEE 802.11a (ANT 0)				
Channel No.	Frequency (MHz)	Reading Level (dBm)	Measure Level (dBm)	Limit (dBm)
149	5745	-10.010	6.980	≤ 30
157	5785	-6.632	10.358	≤ 30
165	5825	-7.566	9.424	≤ 30

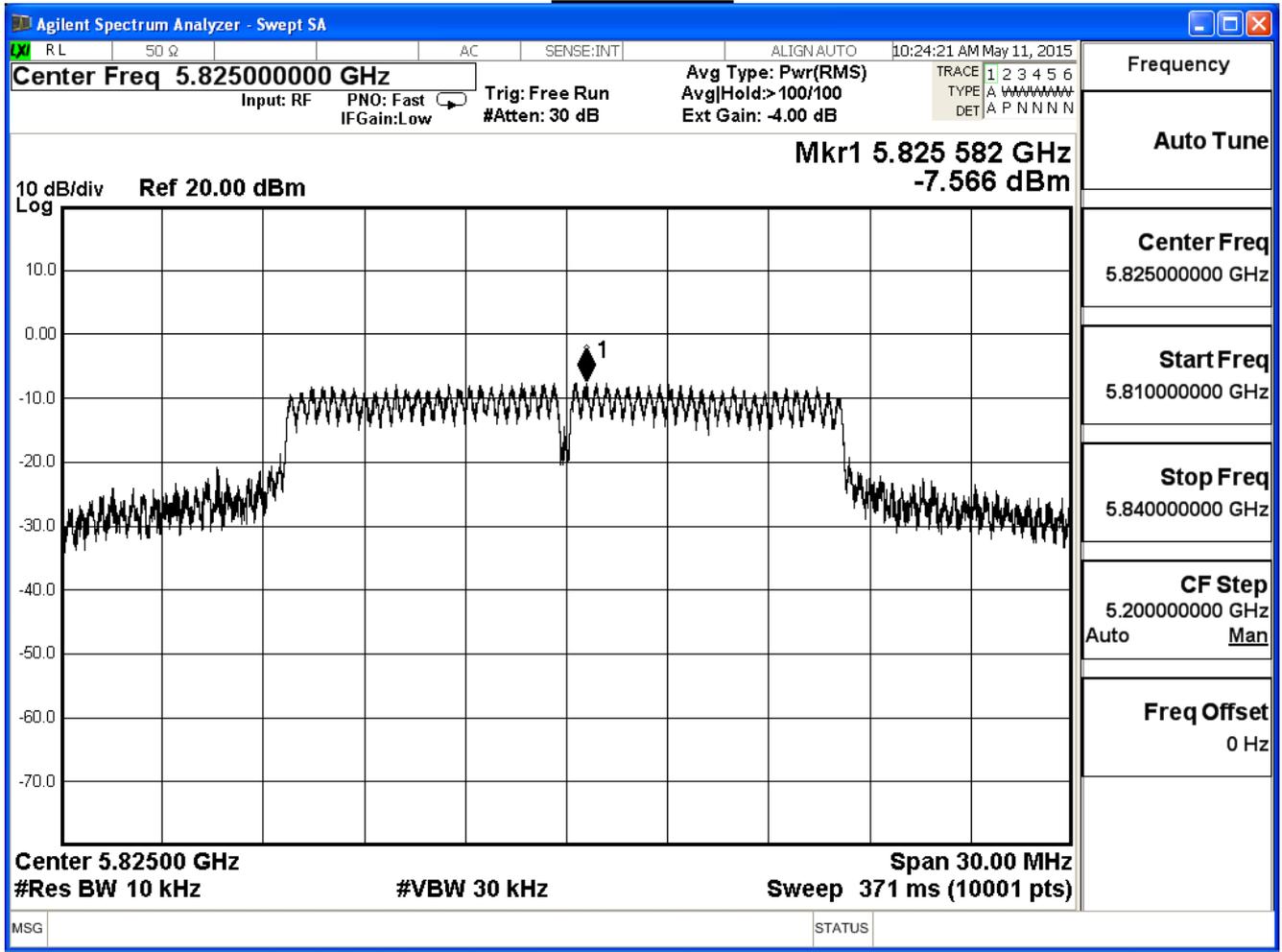
Correct factor = $10 \log(500\text{KHz}/10\text{KHz}) = 16.99 \text{ dB}$

Measure Level= Reading Level+ correct factor

Channel 149



Channel 165



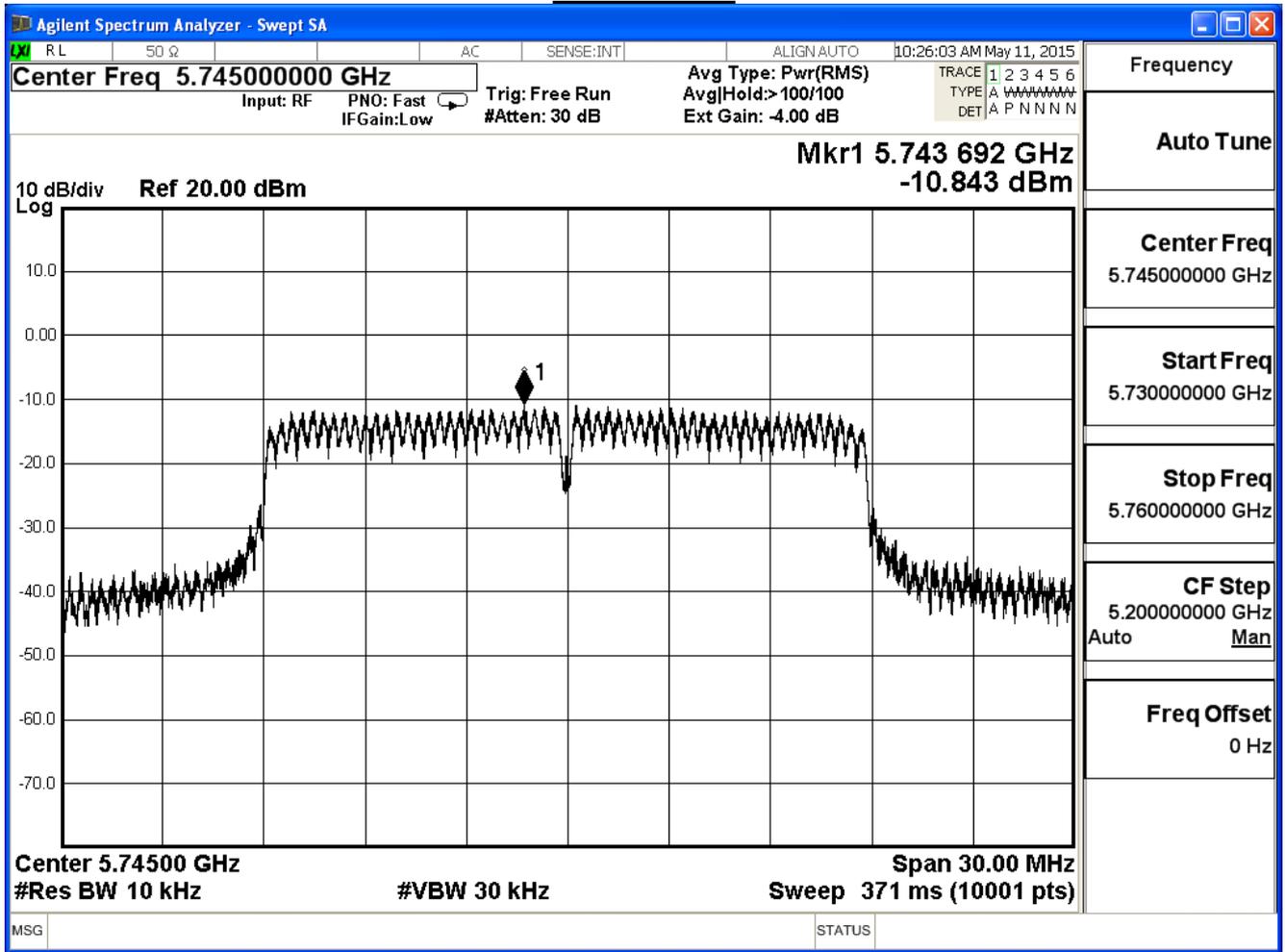
Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Peak Power Spectral Density		
Test Mode	Mode 1: Transmit		
Date of Test	2015/05/20	Test Site	SR7

IEEE802.11n_20MHz_(ANT 0)				
Channel No.	Frequency (MHz)	Reading Level (dBm)	Measure Level (dBm)	Limit (dBm)
149	5745	-10.843	6.147	≤ 30
157	5785	-6.563	10.427	≤ 30
165	5825	-7.426	9.564	≤ 30

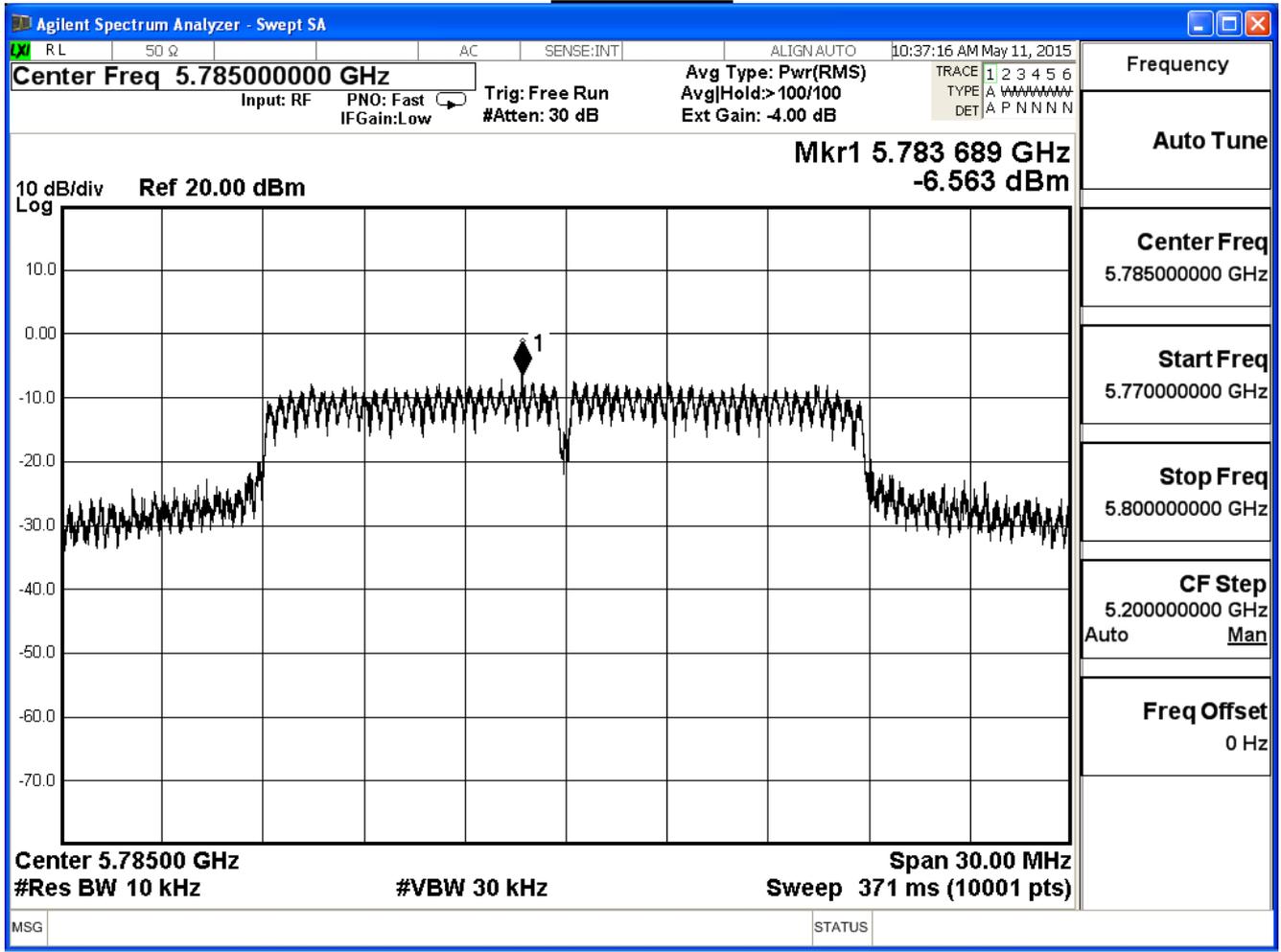
Correct factor = $10 \log(500\text{KHz}/10\text{KHz}) = 16.99 \text{ dB}$

Measure Level = Reading Level + correct factor

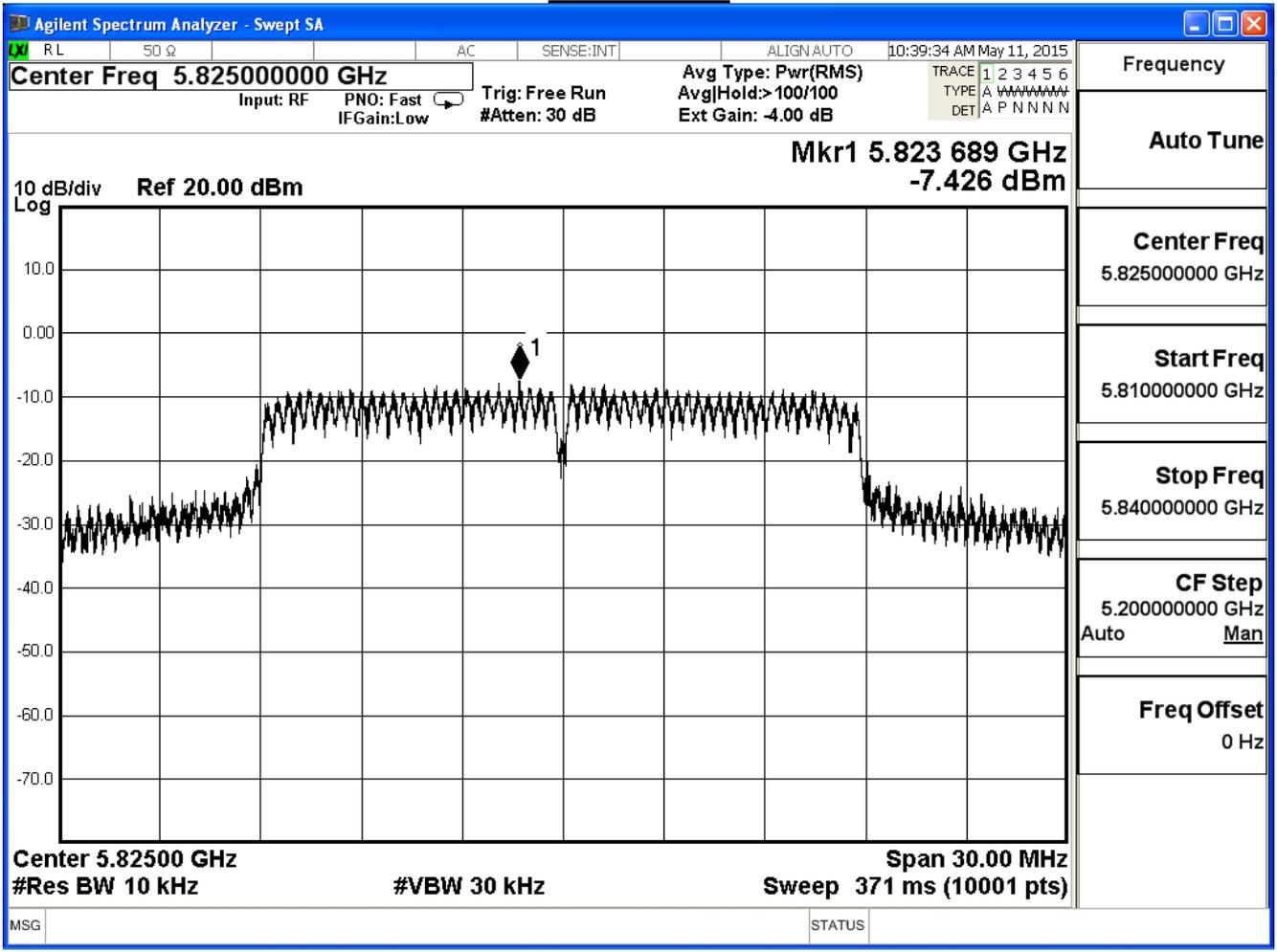
Channel 149



Channel 157



Channel 165



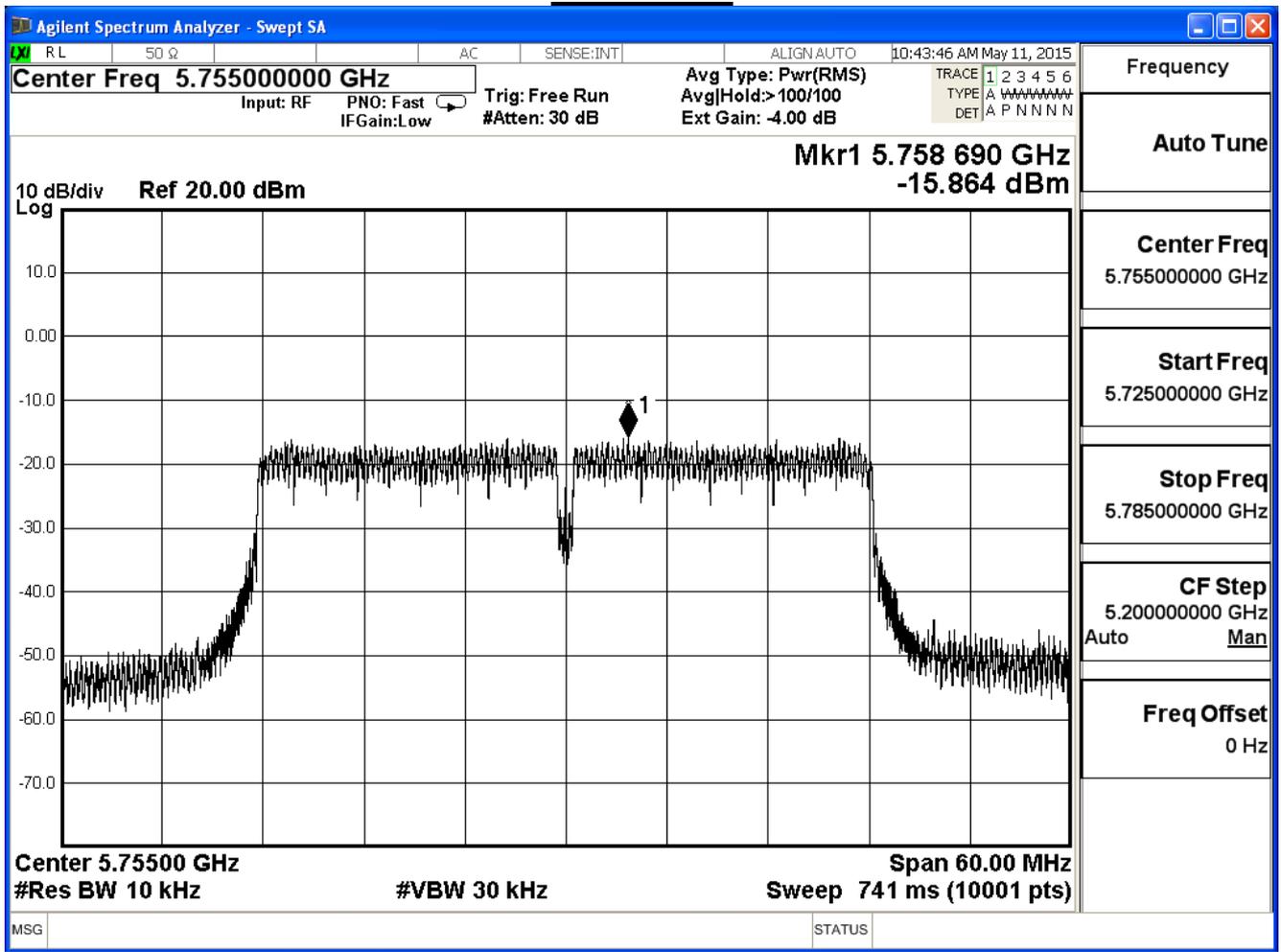
Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Peak Power Spectral Density		
Test Mode	Mode 1: Transmit		
Date of Test	2015/05/20	Test Site	SR7

IEEE 802.11n_40MHz (ANT 0)				
Channel No.	Frequency (MHz)	Reading Level (dBm)	Measure Level (dBm)	Limit (dBm)
151	5755	-15.864	1.126	≤ 30
159	5795	-10.603	6.387	≤ 30

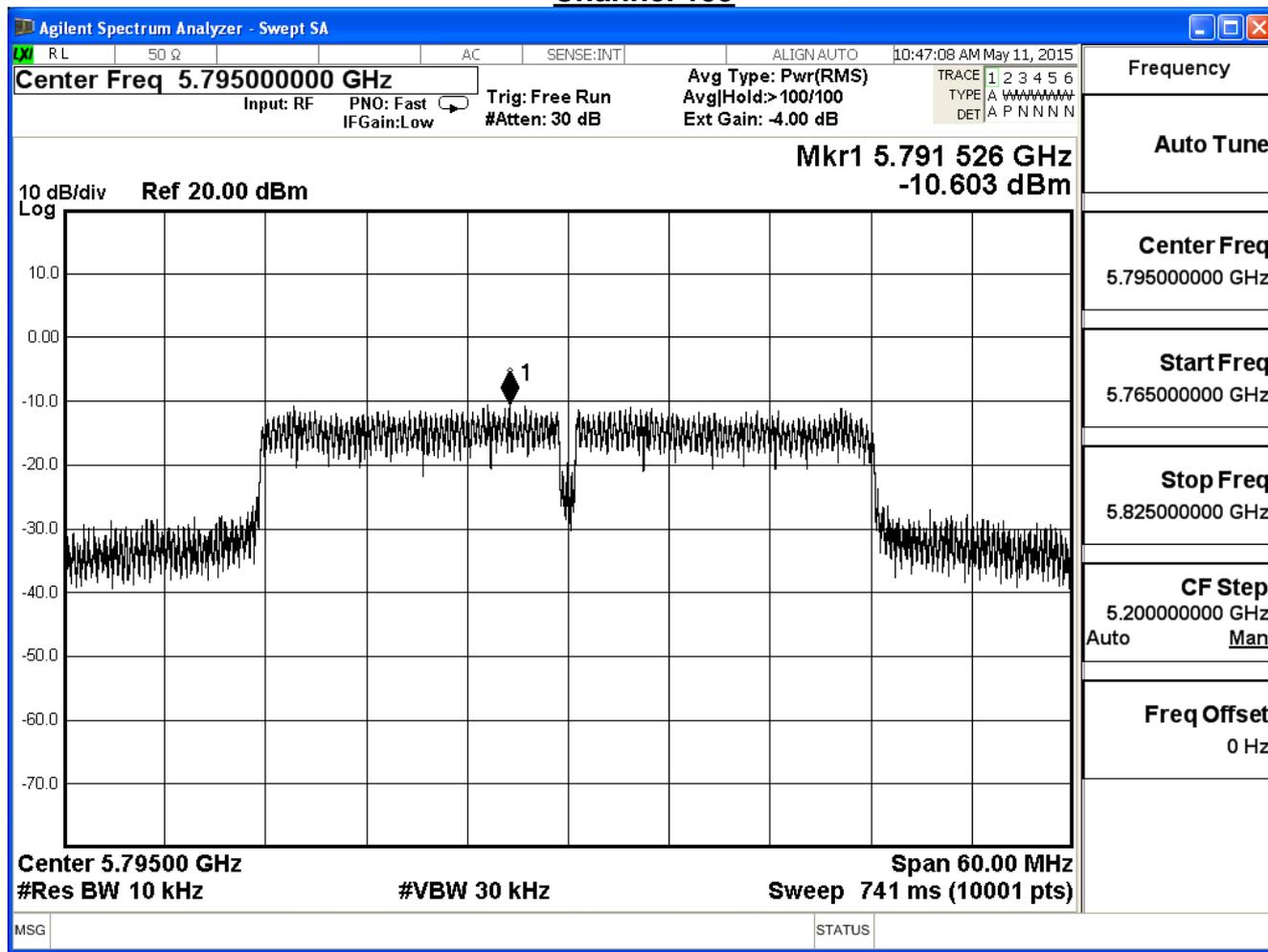
Correct factor = $10 \log(500\text{kHz}/10\text{kHz}) = 16.99 \text{ dB}$

Measure Level = Reading Level + correct factor

Channel 151



Channel 159



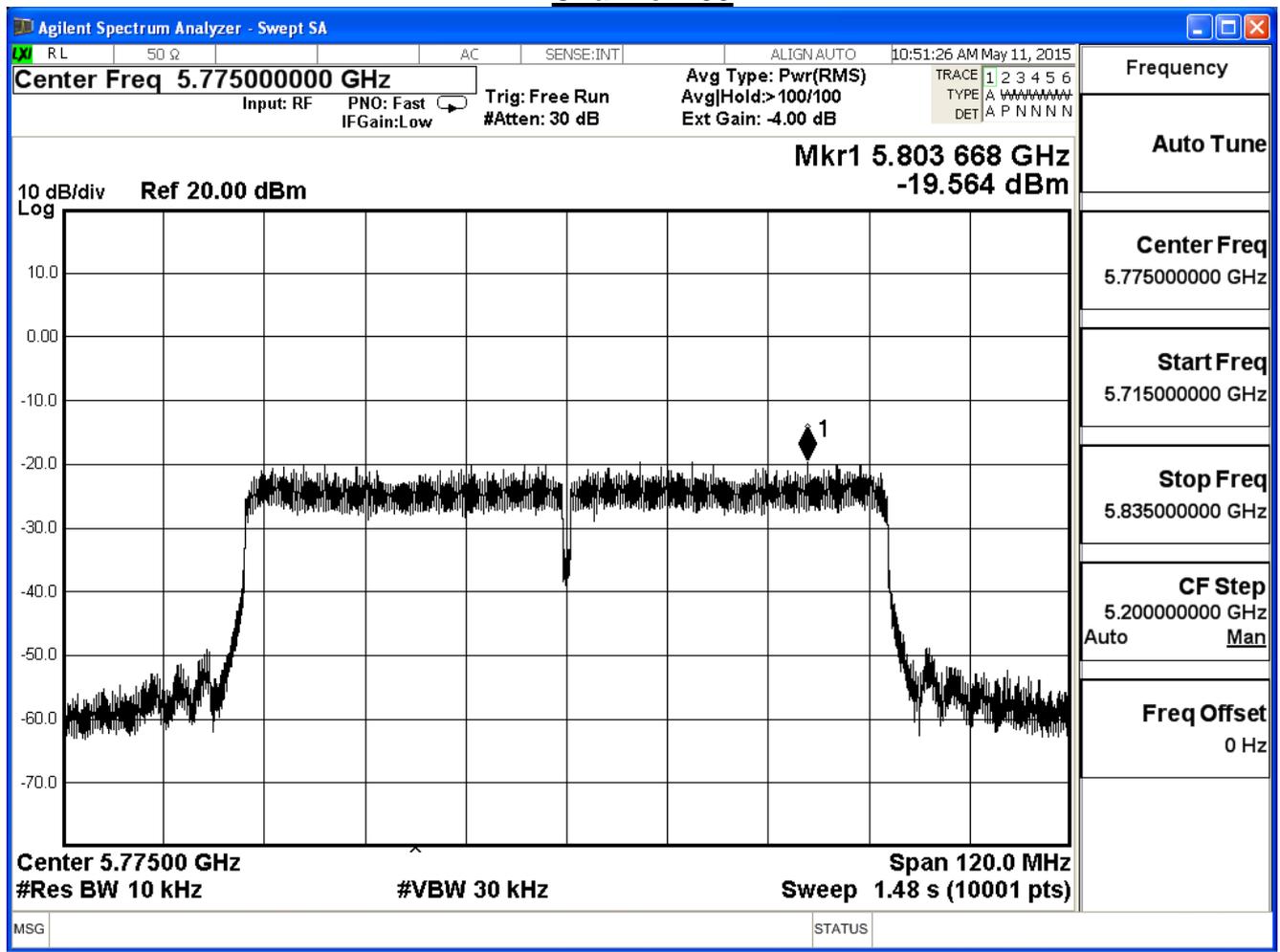
Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Peak Power Spectral Density		
Test Mode	Mode 1: Transmit		
Date of Test	2015/05/20	Test Site	SR7

IEEE 802.11ac_80MHz (ANT 0)				
Channel No.	Frequency (MHz)	Reading Level (dBm)	Measure Level (dBm)	Limit (dBm)
155	5775	-19.564	-2.574	≤ 30

Correct factor = $10 \log(500\text{KHz}/10\text{KHz}) = 16.99 \text{ dB}$

Measure Level = Reading Level + correct factor

Channel 155



3. Frequency Stability

3.1. Test Equipment

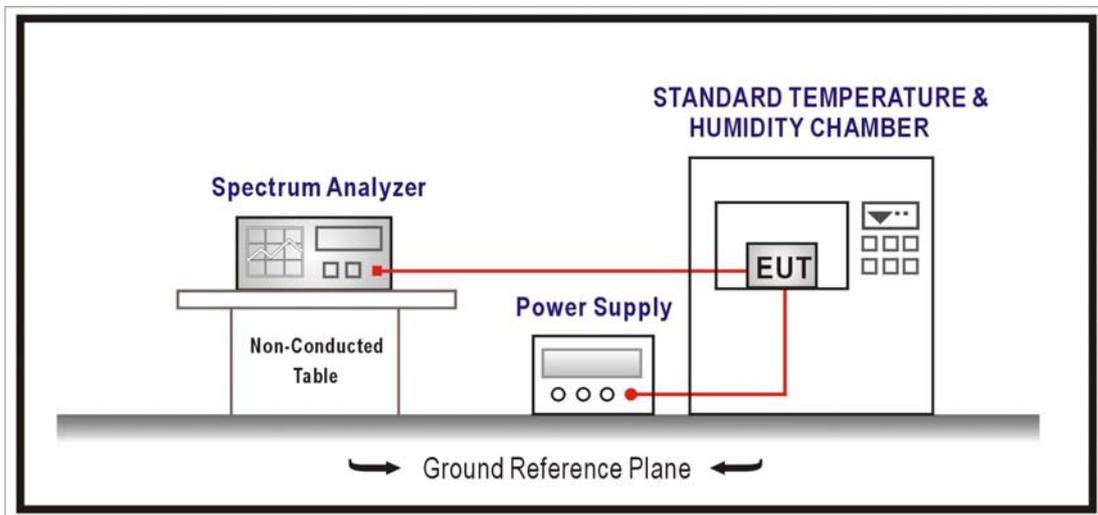
The following test equipments are used during the radiated emission tests:

Frequency Stability / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A-EXA	US47140172	2016/08/23
Temperature & Humidity Chamber	WIT	TH-1S-B	1082101	2017/01/18

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup



3.3. Limits

Manufactures of all devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified

3.4. Test Procedure

The EUT was setup to ANSI C63.10:2009; tested to U-NII test procedure of KDB 789033 D02 for compliance to FCC 47CFR Subpart E requirements.

3.5. Uncertainty

The measurement uncertainty is defined as ± 150 Hz

3.6. Test Result

Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit - 802.11a - 5745MHz(ANT 0)		
Date of Test	2016/03/29	Test Site	SR7

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-20	120	5745.0168	2.9251	PASS
-10		5745.0113	1.9755	PASS
0		5744.9988	-0.2088	PASS
10		5744.9952	-0.8367	PASS
20		5744.9872	-2.2213	PASS
30		5744.9908	-1.6069	PASS
40		5744.9650	-6.0940	PASS
50		5744.9554	-7.7644	PASS

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	102	5744.9978	-0.3879	PASS
	120	5744.9831	-2.9454	PASS
	138	5745.0003	0.0578	PASS

Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit - 802.11a - 5825MH(ANT 0)		
Date of Test	2016/03/29	Test Site	SR7

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-20	120	5825.0063	1.0809	PASS
-10		5825.0103	1.7613	PASS
0		5824.9748	-4.3234	PASS
10		5824.9701	-5.1277	PASS
20		5824.9982	-0.3175	PASS
30		5824.9971	-0.4953	PASS
40		5824.9747	-4.3499	PASS
50		5824.9979	-0.3531	PASS

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	102	5824.9954	-0.7948	PASS
	120	5824.9933	-1.1440	PASS
	138	5825.0005	0.0875	PASS

Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit - 802.11n_20M - 5745MHz(ANT 0)		
Date of Test	2016/03/29	Test Site	SR7

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-20	120	5745.0253	4.4075	PASS
-10		5745.0198	3.4389	PASS
0		5744.9879	-2.1071	PASS
10		5744.9891	-1.9039	PASS
20		5744.9951	-0.8451	PASS
30		5744.9874	-2.1943	PASS
40		5744.9773	-3.9479	PASS
50		5744.9898	-1.7823	PASS

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	102	5745.0015	0.2599	PASS
	120	5744.9853	-2.5601	PASS
	138	5745.0043	0.7510	PASS

Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit - 802.11n_20M - 5825MHz(ANT 0)		
Date of Test	2016/03/29	Test Site	SR7

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-20	120	5825.0087	1.5009	PASS
-10		5825.0084	1.4483	PASS
0		5824.9704	-5.0886	PASS
10		5824.9687	-5.3733	PASS
20		5824.9938	-1.0672	PASS
30		5824.9773	-3.8939	PASS
40		5824.9970	-0.5232	PASS
50		5824.9848	-2.6073	PASS

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	102	5825.0040	0.6830	PASS
	120	5824.9916	-1.4457	PASS
	138	5824.9982	-0.3043	PASS

Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit - 802.11n_40M - 5755MHz(ANT 0)		
Date of Test	2016/03/29	Test Site	SR7

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-20	120	5755.0284	4.9382	PASS
-10		5755.0134	2.3276	PASS
0		5754.9813	-3.2495	PASS
10		5754.9900	-1.7381	PASS
20		5754.9702	-5.1861	PASS
30		5754.9918	-1.4263	PASS
40		5754.9683	-5.5151	PASS
50		5754.9718	-4.9061	PASS

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	102	5754.9932	-1.1769	PASS
	120	5754.9884	-2.0105	PASS
	138	5755.0044	0.7632	PASS

Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit - 802.11n_40M - 5795MHz(ANT 0)		
Date of Test	2016/03/29	Test Site	SR7

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-20	120	5795.0232	4.0076	PASS
-10		5795.0173	2.9776	PASS
0		5794.9706	-5.0762	PASS
10		5794.9836	-2.8360	PASS
20		5794.9990	-0.1794	PASS
30		5794.9795	-3.5345	PASS
40		5794.9833	-2.8862	PASS
50		5794.9984	-0.2844	PASS

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	102	5795.0024	0.4081	PASS
	120	5794.9980	-0.3473	PASS
	138	5794.9971	-0.4974	PASS

Product	Dual-band Wireless-AC750 Range Extender		
Test Item	Frequency Stability		
Test Mode	Mode 1: Transmit - 802.11ac_80M-5775MHz(ANT 0)		
Date of Test	2016/03/29	Test Site	SR7

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
-20	120	5775.0283	4.8947	PASS
-10		5775.0075	1.2925	PASS
0		5774.9941	-1.0189	PASS
10		5774.9996	-0.0727	PASS
20		5774.9742	-4.4677	PASS
30		5774.9854	-2.5337	PASS
40		5774.9688	-5.3952	PASS
50		5774.9712	-4.9860	PASS

Temperature Interval (°C)	AC Voltage (V)	Frequency (MHz)	Deviation (ppm)	Result
25	102	5775.0020	0.3503	PASS
	120	5775.0004	0.0757	PASS
	138	5775.0007	0.1278	PASS