



Electromagnetic Compatibility Test Report

Tests Performed on rf IDEas, Inc.
Wave ID Mobile SP Plus, RFID Reader

Model HP30200

Radiometrics Document RP-9500



Product Detail:		
FCC ID: M9MHP30200		
IC: 6571A-HP30200		
Equipment type: Dual Frequency Card Reader		
Test Standards:		
US CFR Title 47, Chapter I, FCC Part 15 Subpart C		
FCC Part 15 CFR Title 47: 2021		
Canada ISED; RSS-210, Issue 10: 2019 as required for Category I Equipment		
FCC Part 15.209 & 15.225		
Tests Performed For:		Test Facility:
rf IDEas, Inc. 4020 Winnetka Av. Rolling Meadows, IL 60008		Radiometrics Midwest Corporation 12 Devonwood Avenue Romeoville, IL 60446
Test completion Date:		
August 6, 2021		
Document RP-9500 Revisions:		
Rev.	Issue Date	Revised By
0	August 10, 2021	
1	August 12, 2021	Joseph Strzelecki



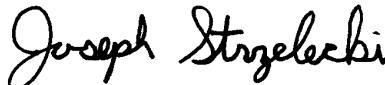
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1.0 ADMINISTRATIVE DATA

<i>Equipment Under Test:</i> An rf IDEas, Inc., Wave ID Mobile SP, RFID Reader Model: HP20300 Product Numbers: RDR-305H1BKU & RDR-30MH1BKU Serial Numbers: BH05000013 & 5001001 These will be referred to as the EUT in this Report	
<i>Date EUT Received at Radiometrics:</i> June 28, 2021	<i>Test Date(s):</i> July 14 to August 6, 2021
<i>Test Report Written and Authorized by:</i>  08/10/2021 Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	<i>Radiometrics' Personnel Responsible for Test:</i> Joseph Strzelecki Senior EMC Engineer Richard L. Tichgelaar EMC Technician Chris E. D'Alessio EMC Technician
<i>Test Witnessed By:</i> The tests were partially witnessed by Shiung Lo of rf IDEas, Inc.	

2.0 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Wave ID Plus RFID Reader, manufactured by rf IDEas, Inc. The detailed test results are presented in a separate section. The following is a summary of the test results.

Emissions Tests Results per RSS-210 & FCC Part 15

Environmental Phenomena	Frequency Range	Test Result
RF Radiated Emissions	30-1000 MHz	Pass
Conducted Emissions, AC Mains	0.15 - 30 MHz	Pass
RF Radiated Emissions H-Field	0.009 – 30 MHz	Pass
Occupied Bandwidth	125 kHz & 13.56 MHz	Pass
Frequency Stability vs Temp & Voltage	None	Pass

2.1 RF Exposure Compliance Requirements

Since the effective power output is less than 1 mW, the EUT meets the FCC requirement for RF exposure and is exempt from RSS-102. There are no power level adjustments, and the antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.



3.0 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a Wave ID Plus, Mobile SP, Dual Frequency, RFID Reader, Model HP30200, manufactured by rf IDEas, Inc. The EUT was in good working condition during the tests, with no known defects.

3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements

The products will not be sold to the general public. rf IDEas or the OEM will be responsible to ensure the proper installation in accordance with RF IDEas requirements.

These two antennas have a unique interface connector to ensure no other OEM antennas can be used. The antenna is internal to the EUT and it is not readily available to be modified by the end user.

3.2 Related Submittals

rf IDEas, Inc. is not submitting any other products simultaneously for equipment authorization related to the EUT.

4.0 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations. Power was supplied at 115 VAC, 60 Hz single-phase to the host computer. The EUT was powered from the USB. The identification for all equipment, plus descriptions of all cables used in the tested system, are:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Product Number	Serial Number
1	Model HP30200 RFID Reader	E	rf IDEas	RDR-305H1BKU	BH05000012
2	Model HP30200 RFID Reader	E	rf IDEas	RDR-30MH1BKU	5001001
3	Latitude Laptop PC	H	HP	Elite x2	5CG545482P
4	Laptop AC-DC power supply	P	HP	854055-002	None

* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

List of Cables

QTY	Length (m)	Cable Description	Shielded?
1	1.8	USB Cable from Reader to Host computer	Yes
1	1.2	AC Cord to AC-DC power supply to host computer	No
1	1.5	DC Cord to Computer	No

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made at Radiometrics in order to meet the requirements listed in this report.



4.4 Part Number List

All part numbers use the same electronic circuitry:

Part Number	Description for the Wave ID Plus; USB Reader
RDR-305H1BKU	Wave ID Mobile SP Plus Keystroke PACK ID Black USB Reader. Tested unit
RDR-305H1BKU-HP	Wave ID Mobile SP Plus Keystroke HP PACK ID Black USB Reader
RDR-305H1BKU-SFT	Wave ID Mobile SP Plus Keystroke Safetrust Black USB Reader
RDR-30MH1BKU	Wave ID Mobile SP Plus Keystroke MIFARE Secure Black USB Reader. Tested unit
RDR-305H3BKU-HP	Wave ID Mobile SP Plus MFP-24 HP PACK ID Black USB Reader

All part numbers use the same board assembly.

5.0 TEST SPECIFICATIONS

Document	Date	Title
FCC CFR Title 47	2021	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
IC RSS-210 Issue 10	2019	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-Gen Issue 5	2019	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)

6.0 TEST PROCEDURE DOCUMENTS

The tests were performed using the procedures from the following specifications:

Document	Date	Title
ANSI C63.4-2014	2014	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	2013	American National Standard for Testing Unlicensed Wireless Devices

7.0 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2017 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber E: Is a custom-made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6-inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.



The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number 3124A with a CAB ID US0224.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance with ANSI/NC SL Z540-1, with traceability to the National Institute of Standards and Technology (NIST).

8.0 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

9.0 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

10.0 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
ANT-53	EMCO	Loop Antenna	6507	1453	1 kHz-30 MHz	24 Mo	02/04/20
ANT-66	ETS-Lindgren	Horn Antenna	3115	62580	1.0-18GHz	24 Mo.	03/11/21
ANT-68	EMCO	Log-Periodic Ant.	93146	9604-4456	200-1000MHz	24 Mo.	01/02/20
ANT-80	AH Systems	Bicon Antenna	SAS-540	294	20-330MHz	24 Mo.	01/05/21
CAB-106A	Teledyne	Coaxial Cable	N/A	1090	DC-2 GHz	24 Mo.	01/29/20
CAB-1090	Teledyne	Coaxial Cable	N/A	1090	DC-18 GHz	24 Mo.	02/06/20
CAB-160B	Teledyne	Coaxial Cable	N/A	1090	DC-18 GHz	24 Mo.	02/05/20
HPF-01	Solar	High Pass Filter	7930-100	HPF-1	0.15-30MHz	24 Mo.	03/02/20
LSN-01	Electrometrics	50 uH LISN	FCC/VDE 50/2	1001	0.01-30MHz	24 Mo.	08/12/19
REC-20	HP / Agilent	Spectrum Analyzer	85460A/84562A	33330A00135 3410A00178	30Hz-6GHz	24 Mo.	08/14/19
REC-21	Agilent	Spectrum Analyzer	E7405A	MY45118341	9kHz-26.5GHz	24 Mo.	01/14/20
REC-31	Agilent	Spectrum Analyzer	E7402A	US41160415	9kHz-3GHz	24 Mo.	05/20/19
TC-01	GS Blue M Electric	Temperature Chamber	ETC-04S-E	0003-ETC-201	-40 to 100 C	24 Mo.	11/08/19
THM-03	Fluke	Temp/Humid Meter	971	95850465	N/A	12 Mo.	06/03/20

Note: All calibrated equipment is subject to periodic checks.

Software Company	Test Software Name	Version	Applicable Tests
Radiometrics	EN550XX0	07.16.19	RF Conducted Emissions (FCC Part 15 & EN 55032)
Radiometrics	REREC11D	07.16.19	RF Radiated Emissions (FCC Part 15 & EN 55032)
Agilent	PSA/ESA-E/L/EMC	2.4.0.42	Bandwidth and screen shots

11.0 TEST SECTIONS

11.1 AC Conducted Emissions

The tests and limits are in accordance with FCC section 15.207 and RSS Gen section 8.8.



A computer-controlled analyzer was used to perform the conducted emissions measurements. The computer recorded the data and then plotted it on a semi-log graph. Adjusting the positions of the cables and orientation of the test system then maximizes the highest emissions.

Mains Conducted emission measurements were performed using a 50 Ohm/50 uH Line Impedance Stabilization Network (LISN) as the pick-up device. Measurements were repeated on both leads within the power cord. If the EUT power cord exceeded 80 cm in length, the excess length of the power cord was made into a 30 to 40 cm bundle near the center of the cord. The LISN was placed on the floor at the base of the test platform and electrically bonded to the ground plane.

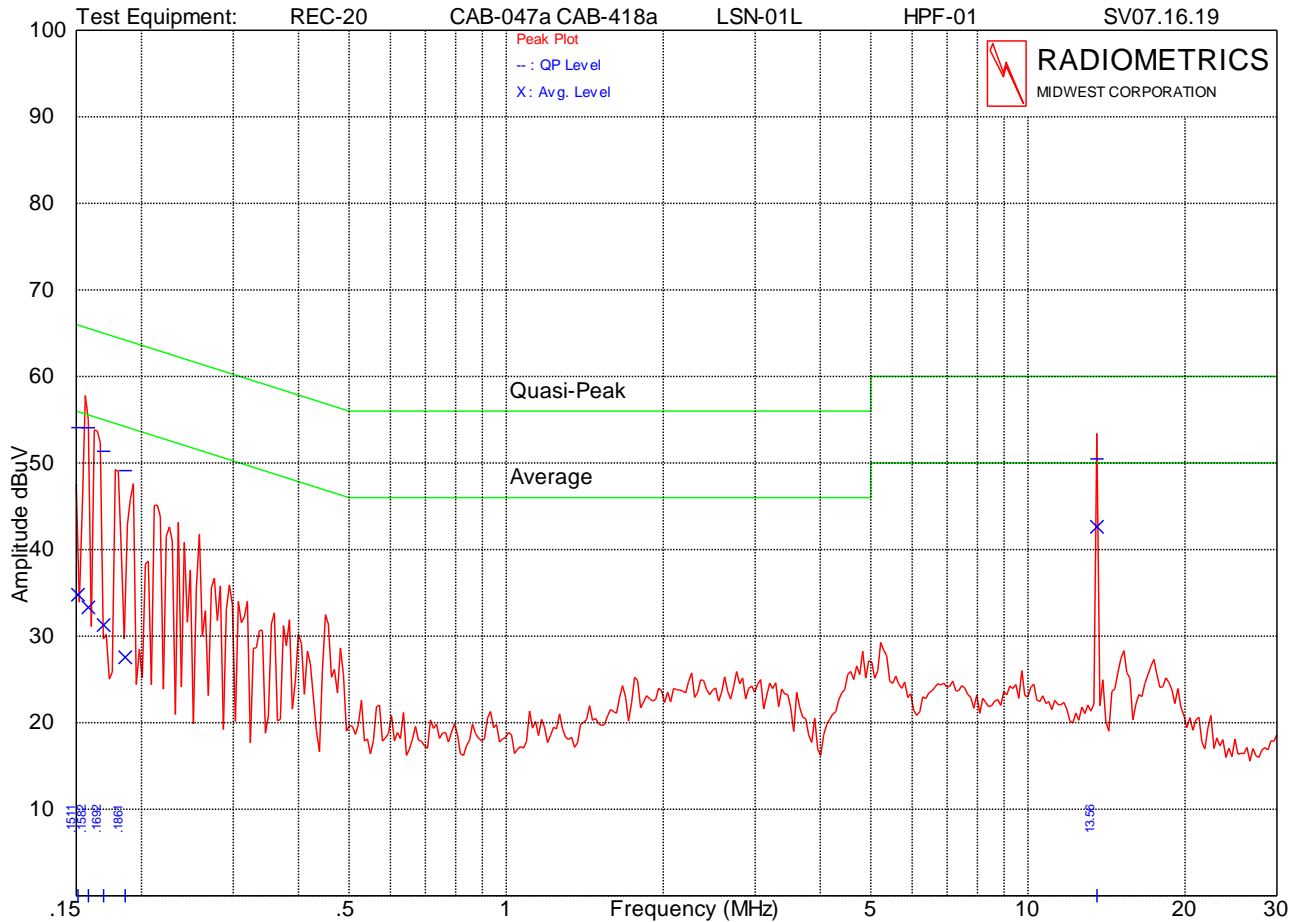
FCC/IC Limits of Conducted Emissions at the AC Mains Ports

Frequency Range (MHz)	Class B Limits (dBUV)	
	Quasi-Peak	Average
0.150 - 0.50*	66 - 56	56 - 46
0.5 - 5.0	56	46
5.0 - 30	60	50
* The limit decreases linearly with the logarithm of the frequency in this range.		

The initial step in collecting conducted data is a peak detector scan and the plotting of the measurement range. Significant peaks are then marked as shown on the following table, and these signals are then measured with the quasi-peak detector. The following represents the worst case emissions from the host computer (with the EUT connected) power cord, after testing all modes of operation. QP readings are quasi-peak with a 9 kHz bandwidth and no video filter.

Tested by	Dave Jarvis
Test Date	August 6, 2021

The following shows the worst case from the 125 & 13.56 MHz transmitters. The Limit shown in the graphs are the FCC 15.107 and RSS-GEN Table 3.



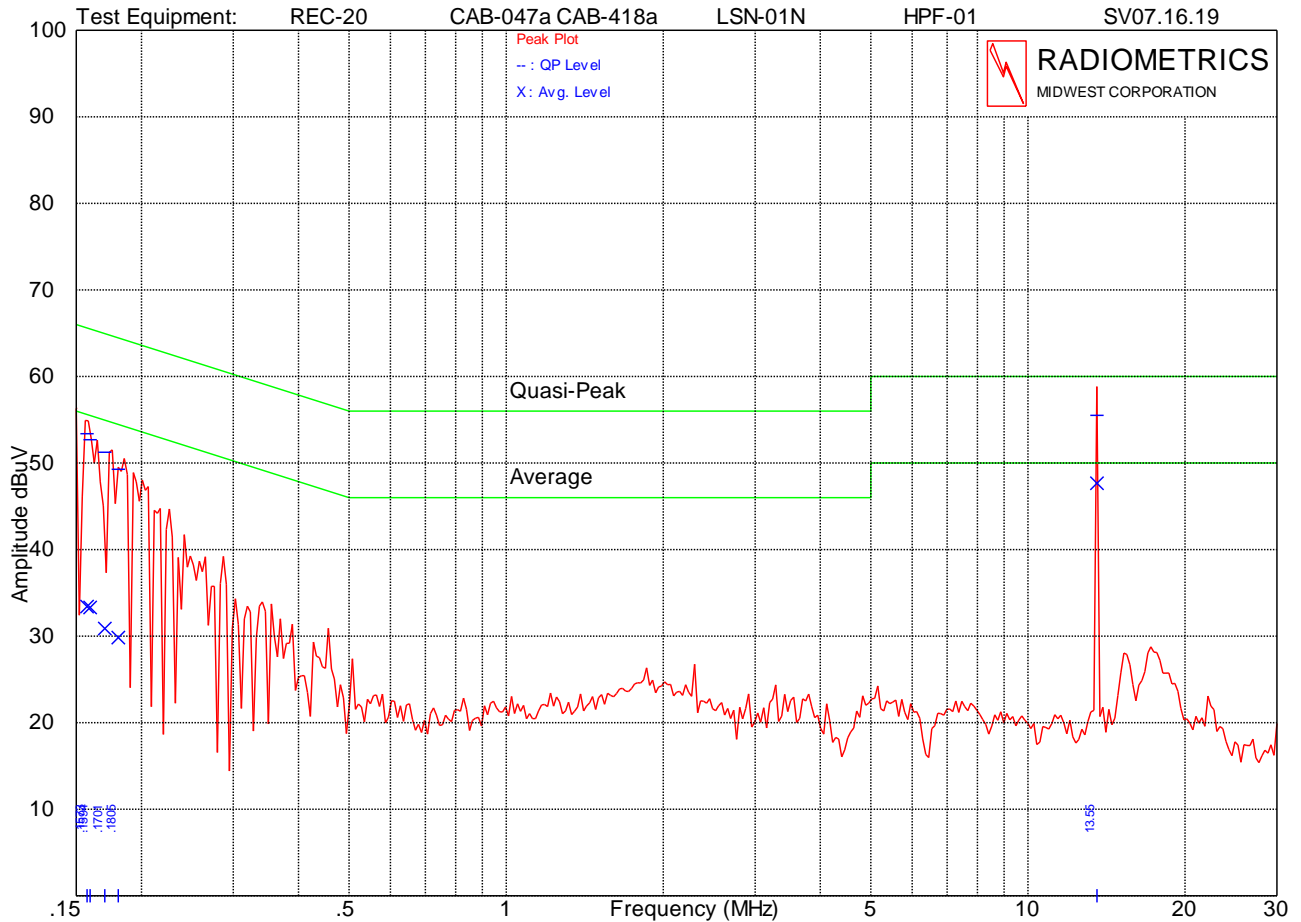
Company: RF Ideas
 Lead Tested: AC Hot 120 VAC
 Notes: Product: RDR-30MH1BKU
 FCC/ICES/EN; Class B Conducted Emissions; Mains Port

Model: HP30200
 S/N : 5001001

Date :08-06-2021
 Time:09:40
 Tested By: DBJ
 RP-9500 | ce30mL1a

Product number: RDR-30MH1BKU

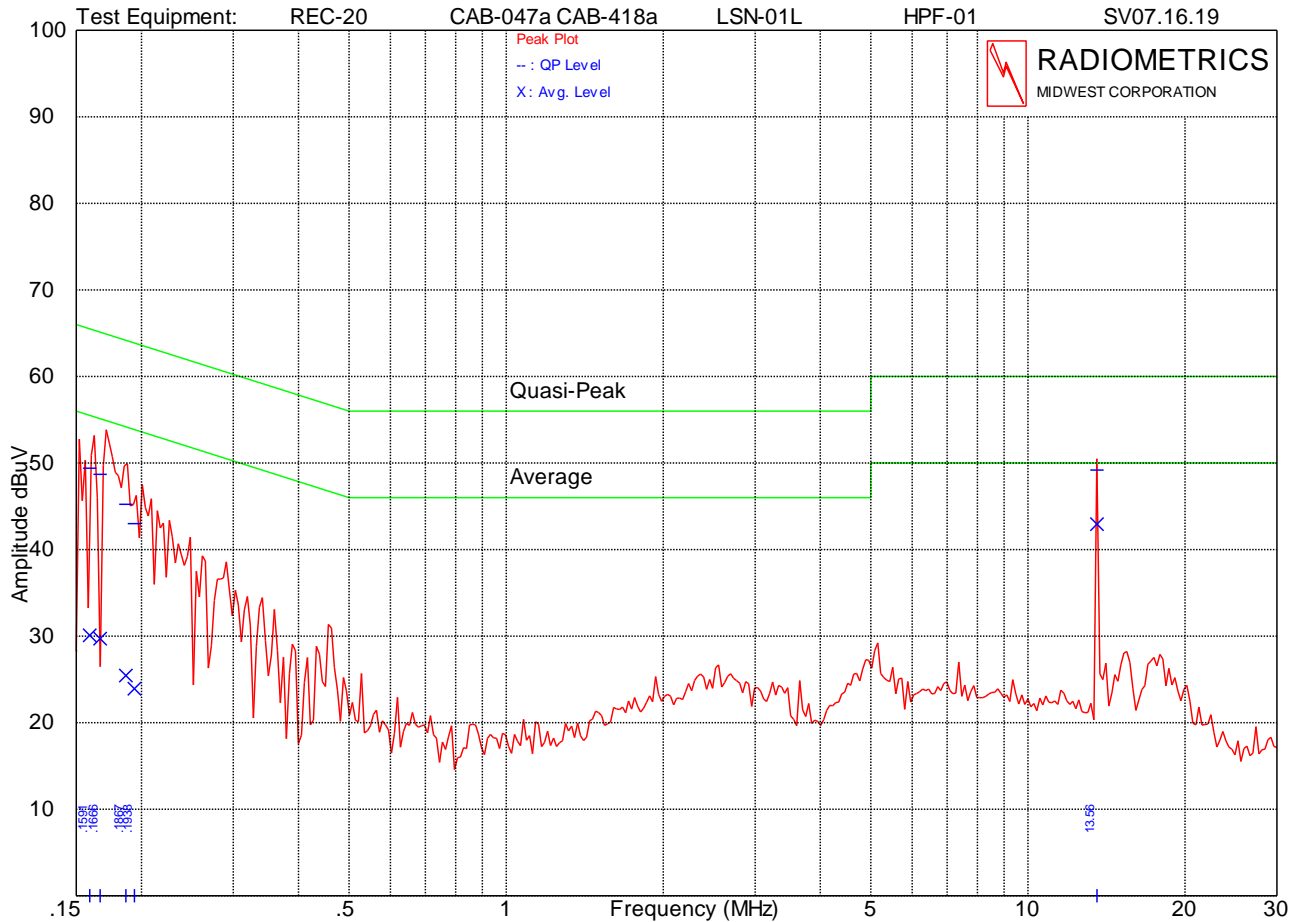
Frequency (MHz)	QP Amp. (dBuV)	QP Limit (dBuV)	Average Amp. (dBuV)	Average Limit (dBuV)	Margin Under Limit (dB)
0.151	54.1	65.9	34.8	55.9	11.8
0.158	54.1	65.6	33.3	55.6	11.5
0.169	51.3	65.0	31.3	55.0	13.6
0.186	49.1	64.2	27.5	54.2	15.1
13.561	50.5	60.0	42.6	50.0	7.4
13.563	48.2	60.0	40.3	50.0	9.7



Company: RF Ideas
 Lead Tested: AC Neutral 120 VAC
 Notes: Product: RDR-30MH1BKU
 FCC/ICES/EN; Class B Conducted Emissions; Mains Port

Product number: RDR-30MH1BKU

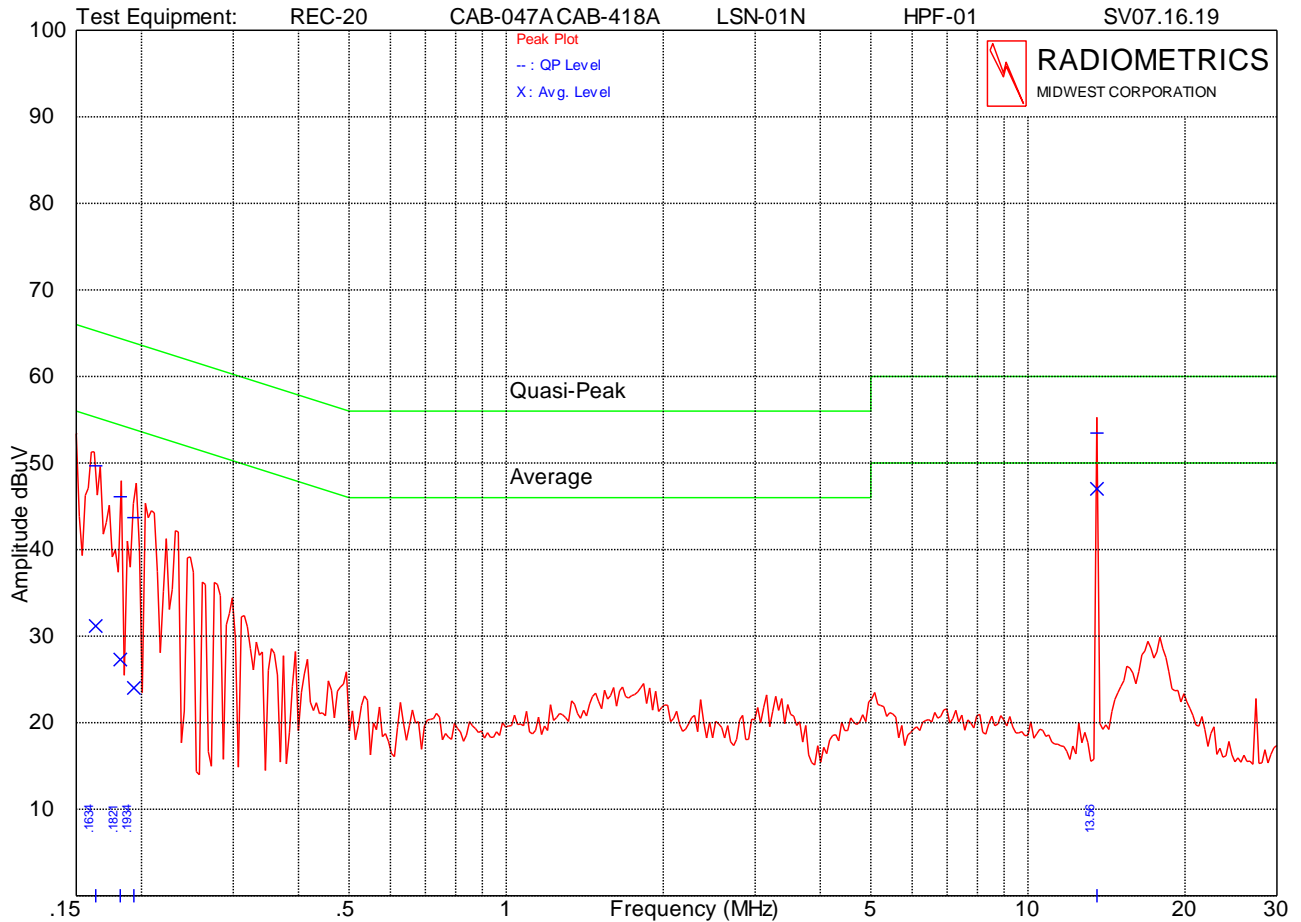
Frequency (MHz)	QP Amp. (dBuV)	QP Limit (dBuV)	Average Amp. (dBuV)	Average Limit (dBuV)	Margin Under Limit (dB)
0.157	53.4	65.6	33.4	55.6	12.2
0.159	52.7	65.5	33.3	55.5	12.8
0.170	51.2	65.0	30.9	55.0	13.7
0.181	49.3	64.5	29.8	54.5	15.2
13.560	55.5	60.0	47.7	50.0	2.3



Company: RF Ideas
 Lead Tested: AC Hot 120 VAC
 Notes: Product: RDR-305H1BKU
 FCC/ICES/EN; Class B Conducted Emissions; Mains Port

Product number: RDR-305H1BKU

Frequency (MHz)	QP Amp. (dBuV)	QP Limit (dBuV)	Average Amp. (dBuV)	Average Limit (dBuV)	Margin Under Limit (dB)
0.159	49.4	65.5	30.1	55.5	16.1
0.167	48.7	65.1	29.7	55.1	16.4
0.187	45.2	64.2	25.4	54.2	19.0
0.194	43.0	63.9	23.9	53.9	20.9
13.560	49.2	60.0	42.9	50.0	7.1



Company: RF Ideas
 Lead Tested: AC Neutral 120 VAC
 Notes: Product: RDR-305H1BKU
 FCC/ICES/EN; Class B Conducted Emissions; Mains Port

Model: HP30200
 S/N : BH05000012

Date :08-06-2021
 Time:10:09
 Tested By: DBJ
 RP-9500 | C305ML2A

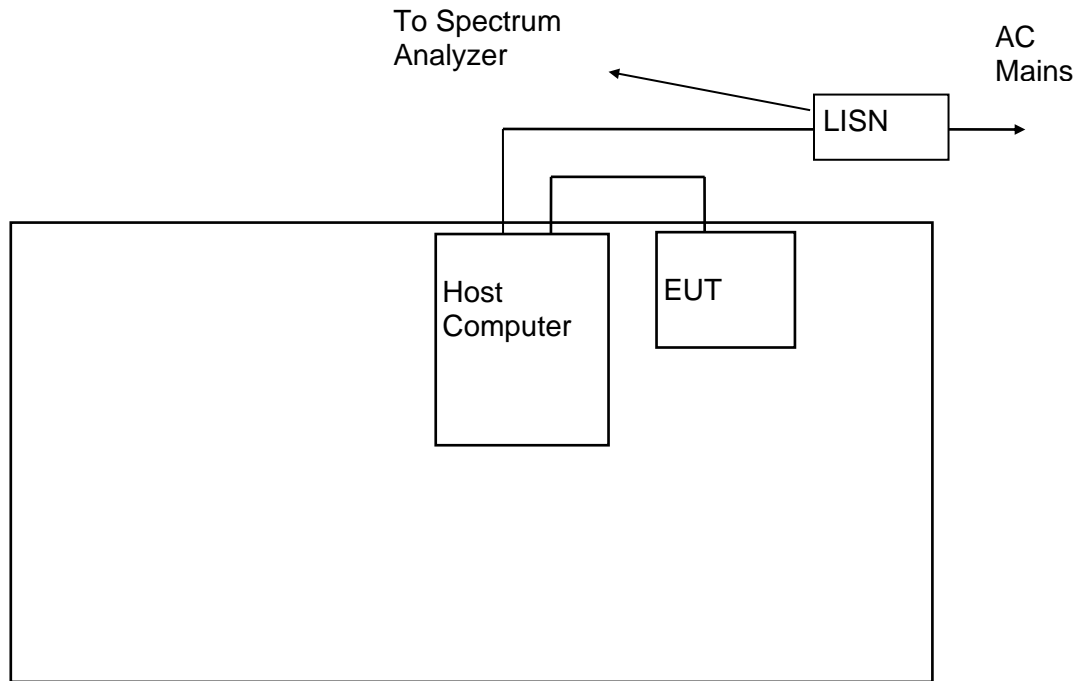
Product number: RDR-305H1BKU

Frequency (MHz)	QP Amp. (dBuV)	QP Limit (dBuV)	Average Amp. (dBuV)	Average Limit (dBuV)	Margin Under Limit (dB)
0.163	49.7	65.3	31.2	55.3	15.6
0.182	46.1	64.4	27.3	54.4	18.3
0.193	43.7	63.9	24.0	53.9	20.2
13.560	53.5	60.0	47.0	50.0	3.0

Judgement Pass by 2.3 dB.



Figure 1. Conducted Emissions Test Setup



Notes:

- LISN's at least 80 cm from EUT chassis
- Vertical conductive plane 40 cm from rear of tabletop
- EUT power cord bundled

1x1.5m surface

11.2 Radiated RF Emissions

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists. Figure 4 herein lists the details of the test equipment used during radiated emissions tests.

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 30 to 1000 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak, average or quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector or average function as required by the specification for final determination of compliance.



The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground. The EUT was rotated through three orthogonal axes as per 5.10.1 of ANSI C63.10 during the radiated tests.

Radiated Emissions Field Strength Limits

Table with 4 columns: Frequency Range (MHz), Test Distance (meters), Class B Limits (uV/m), and Class B Limits (dB(uV/m)). Rows include frequency ranges from 0.009-0.490 MHz to Above 960 MHz.

The emission limits shown in the above table are based on measurements using a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

11.2.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

FS = RA + AF + CF - AG

Where: FS = Field Strength

RA = Receiver Amplitude in dBuV

AF = Antenna Factor in dB/m

CF = Cable Attenuation Factor in dB

AG = Amplifier Gain in dB

11.2.2 Radiated Emissions Test Results

Summary table with 2 columns: Test Dates (July 14, 2021), Test Distance (3 Meters), Specification (FCC Part 15 Subpart C & RSS-210), Abbreviations (P = peak; Q = QP Pol = Antenna Polarization; V = Vertical; H = Horizontal), Tested by (Chris D'Alessio), Note (The following shows the worst case emissions from all transmitters and digital devices).

The 125 kHz and the 13.56 MHz transmitter were both on during the following tests. The following shows the highest emissions during the tests.

Main test results table with 11 columns: FCC & RSS, Product # (RDR-305H1BKU), S/N (BH05000012), Freq. MHz, Meter Reading dBuV, Decet., Ant. Pol., Ant Factor dB/m, Cable Loss dB, Dist Fact dB, EUT dBuV/m, Limit dBuV/m, Margin Under Limit dB, Note.



FCC & RSS		Product #			RDR-305H1BKU			S/N		BH05000012	
Freq. MHz	Meter Reading dBuV	Decet.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note	
95.2	15.9	P	H	10.0	1.0	0.0	26.9	43.5	16.6		
95.7	16.7	P	H	10.1	1.0	0.0	27.8	43.5	15.7		
106.8	12.5	P	H	10.8	1.1	0.0	24.4	43.5	19.1		
108.5	13.8	P	H	10.9	1.1	0.0	25.8	43.5	17.7		
133.3	9.3	P	H	12.3	1.2	0.0	22.8	43.5	20.7		
151.0	14.0	P	H	12.8	1.3	0.0	28.1	43.5	15.4		
162.0	9.9	P	H	13.0	1.4	0.0	24.3	43.5	19.2		
189.7	22.5	P	H	13.9	1.5	0.0	37.9	43.5	5.6		
189.7	20.6	Q	H	13.9	1.5	0.0	36.0	43.5	7.5		
207.4	9.9	P	H	14.6	1.5	0.0	26.0	43.5	17.5		
215.6	10.2	P	H	14.8	1.6	0.0	26.6	43.5	16.9		
231.7	10.0	P	H	15.0	1.7	0.0	26.7	46.0	19.3		
255.2	16.5	P	H	12.0	1.7	0.0	30.2	46.0	15.8		
261.5	16.5	P	H	12.1	1.7	0.0	30.3	46.0	15.7		
264.0	13.4	P	H	12.2	1.8	0.0	27.4	46.0	18.6		
279.7	9.0	P	H	13.0	1.8	0.0	23.8	46.0	22.2		
305.6	15.2	P	H	14.9	1.9	0.0	32.0	46.0	14.0		
308.1	9.5	P	H	15.0	1.9	0.0	26.4	46.0	19.6		
325.7	23.1	P	H	14.0	2.0	0.0	39.1	46.0	6.9		
352.8	25.1	P	H	14.3	2.0	0.0	41.4	46.0	4.6		
379.9	22.1	P	H	14.7	2.1	0.0	38.9	46.0	7.1		
407.0	24.4	P	H	15.4	2.2	0.0	42.0	46.0	4.0		
420.2	15.9	P	H	15.6	2.2	0.0	33.7	46.0	12.3		
434.1	21.2	P	H	16.0	2.3	0.0	39.5	46.0	6.5		
455.5	10.5	P	H	16.7	2.3	0.0	29.5	46.0	16.5		
461.2	14.7	P	H	16.8	2.4	0.0	33.9	46.0	12.1		
485.1	11.0	P	H	17.2	2.4	0.0	30.6	46.0	15.4		
570.0	13.5	P	H	18.3	2.6	0.0	34.4	46.0	11.6		
581.3	18.8	P	H	18.5	2.7	0.0	40.0	46.0	6.0		
597.5	12.9	P	H	18.7	2.7	0.0	34.3	46.0	11.7		
625.0	12.5	P	H	19.0	2.8	0.0	34.3	46.0	11.7		
651.3	11.5	P	H	19.9	2.8	0.0	34.2	46.0	11.8		
673.8	10.0	P	H	20.8	2.9	0.0	33.7	46.0	12.3		
707.5	9.1	P	H	21.1	3.0	0.0	33.2	46.0	12.8		
730.0	8.4	P	H	21.0	3.0	0.0	32.4	46.0	13.6		
780.0	9.6	P	H	21.1	3.1	0.0	33.8	46.0	12.2		
781.3	9.1	P	H	21.1	3.1	0.0	33.3	46.0	12.7		
835.0	9.2	P	H	21.9	3.2	0.0	34.3	46.0	11.7		
895.0	12.8	P	H	22.7	3.3	0.0	38.8	46.0	7.2		
922.5	14.5	P	H	22.9	3.4	0.0	40.8	46.0	5.2		
950.0	16.5	P	H	23.2	3.5	0.0	43.2	46.0	2.8		
950.0	12.4	Q	H	23.2	3.5	0.0	39.1	46.0	6.9		
977.5	16.5	P	H	23.5	3.5	0.0	43.5	54.0	10.5		
977.5	10.5	Q	H	23.5	3.5	0.0	37.5	54.0	16.5		
1030.0	44.5	P	H	23.8	-32.0	0.0	36.3	74.0	37.7	1	
1057.5	42.2	P	H	24.2	-32.0	0.0	34.4	74.0	39.6	1	
1085.0	42.3	P	H	24.5	-32.1	0.0	34.7	74.0	39.3	1	
1112.5	41.1	P	H	24.6	-32.1	0.0	33.6	74.0	40.4	1	
1140.0	40.1	P	H	24.6	-32.1	0.0	32.6	74.0	41.4	1	
1290.0	37.8	P	H	25.1	-32.0	0.0	30.9	74.0	43.1	1	
1500.0	39.0	P	H	24.9	-31.8	0.0	32.1	74.0	41.9	1	
1695.0	37.8	P	H	25.8	-31.7	0.0	31.9	74.0	42.1	1	



FCC & RSS		Product #			RDR-305H1BKU			S/N		BH05000012	
Freq. MHz	Meter Reading dBuV	Decet.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note	
1890.0	38.0	P	H	27.5	-31.3	0.0	34.2	74.0	39.8	1	
2115.0	35.3	P	H	27.6	-31.0	0.0	31.9	74.0	42.1	1	
2285.0	35.8	P	H	27.6	-30.8	0.0	32.6	74.0	41.4	1	
2437.5	38.7	P	H	28.3	-30.6	0.0	36.4	74.0	37.6	1	
2690.0	35.8	P	H	28.8	-30.3	0.0	34.3	74.0	39.7	1	
2897.5	38.1	P	H	29.3	-29.6	0.0	37.8	74.0	36.2	1	
3142.5	33.2	P	H	30.9	-29.3	0.0	34.8	74.0	39.2	1	
3220.0	36.1	P	H	31.1	-29.1	0.0	38.1	74.0	35.9	1	
3502.5	33.7	P	H	31.2	-28.7	0.0	36.2	74.0	37.8	1	
3692.5	33.3	P	H	32.1	-28.6	0.0	36.8	74.0	37.2	1	
3925.0	33.2	P	H	32.9	-28.0	0.0	38.1	74.0	35.9	1	
4152.5	31.8	P	H	32.4	-27.8	0.0	36.4	74.0	37.6	1	
4362.5	31.7	P	H	32.7	-27.3	0.0	37.1	74.0	36.9	1	
4510.0	33.0	P	H	32.9	-27.1	0.0	38.8	74.0	35.2	1	
4712.5	31.6	P	H	33.1	-26.6	0.0	38.1	74.0	35.9	1	
4892.5	32.1	P	H	33.3	-26.1	0.0	39.3	74.0	34.7	1	
5230.0	32.8	P	H	33.8	-25.4	0.0	41.2	74.0	32.8	1	
5390.0	31.5	P	H	34.0	-25.4	0.0	40.1	74.0	33.9	1	
5545.0	30.9	P	H	34.0	-24.9	0.0	40.0	74.0	34.0	1	
5745.0	31.7	P	H	33.8	-25.1	0.0	40.4	74.0	33.6	1	
5917.5	30.7	P	H	34.1	-24.7	0.0	40.1	74.0	33.9	1	
6085.0	30.1	P	H	34.5	-24.3	0.0	40.3	74.0	33.7	1	
6300.0	30.3	P	H	34.6	-24.3	0.0	40.6	74.0	33.4	1	
6517.5	30.9	P	H	34.4	-23.9	0.0	41.4	74.0	32.6	1	
6710.0	33.3	P	H	35.1	-23.6	0.0	44.8	74.0	29.2	1	
6920.0	33.8	P	H	35.3	-23.6	0.0	45.5	74.0	28.5	1	
7307.5	33.8	P	H	36.4	-23.4	0.0	46.8	74.0	27.2	1	
7707.5	32.8	P	H	36.3	-22.5	0.0	46.6	74.0	27.4	1	
7905.0	33.5	P	H	36.6	-22.7	0.0	47.4	74.0	26.6	1	
40.5	12.7	P	V	11.1	0.7	0.0	24.5	40.0	15.5		
50.4	19.2	P	V	9.7	0.7	0.0	29.6	40.0	10.4		
54.3	19.8	P	V	9.4	0.8	0.0	30.0	40.0	10.0		
60.4	16.4	P	V	9.2	0.8	0.0	26.4	40.0	13.6		
65.4	16.8	P	V	9.3	0.8	0.0	26.9	40.0	13.1		
78.6	18.8	P	V	9.4	0.9	0.0	29.1	40.0	10.9		
93.0	18.3	P	V	9.9	1.0	0.0	29.2	43.5	14.3		
102.9	16.3	P	V	10.5	1.1	0.0	27.9	43.5	15.6		
106.8	12.8	P	V	10.8	1.1	0.0	24.7	43.5	18.8		
108.5	17.2	P	V	10.9	1.1	0.0	29.2	43.5	14.3		
122.3	12.3	P	V	11.8	1.2	0.0	25.3	43.5	18.2		
139.9	10.4	P	V	12.5	1.3	0.0	24.2	43.5	19.3		
159.3	9.4	P	V	12.9	1.4	0.0	23.7	43.5	19.8		
163.7	9.7	P	V	13.0	1.4	0.0	24.1	43.5	19.4		
178.1	10.1	P	V	13.5	1.4	0.0	25.0	43.5	18.5		
189.7	19.9	P	V	13.9	1.5	0.0	35.3	43.5	8.2		
189.7	17.1	Q	V	13.9	1.5	0.0	32.5	43.5	11.0		
206.8	10.2	P	V	14.6	1.5	0.0	26.3	43.5	17.2		
210.1	10.4	P	V	14.7	1.6	0.0	26.7	43.5	16.8		
226.1	11.4	P	V	14.9	1.6	0.0	27.9	46.0	18.1		
243.8	13.0	P	V	15.3	1.7	0.0	30.0	46.0	16.0		
252.6	19.1	P	V	11.9	1.7	0.0	32.7	46.0	13.3		
267.8	12.8	P	V	12.3	1.8	0.0	26.9	46.0	19.1		

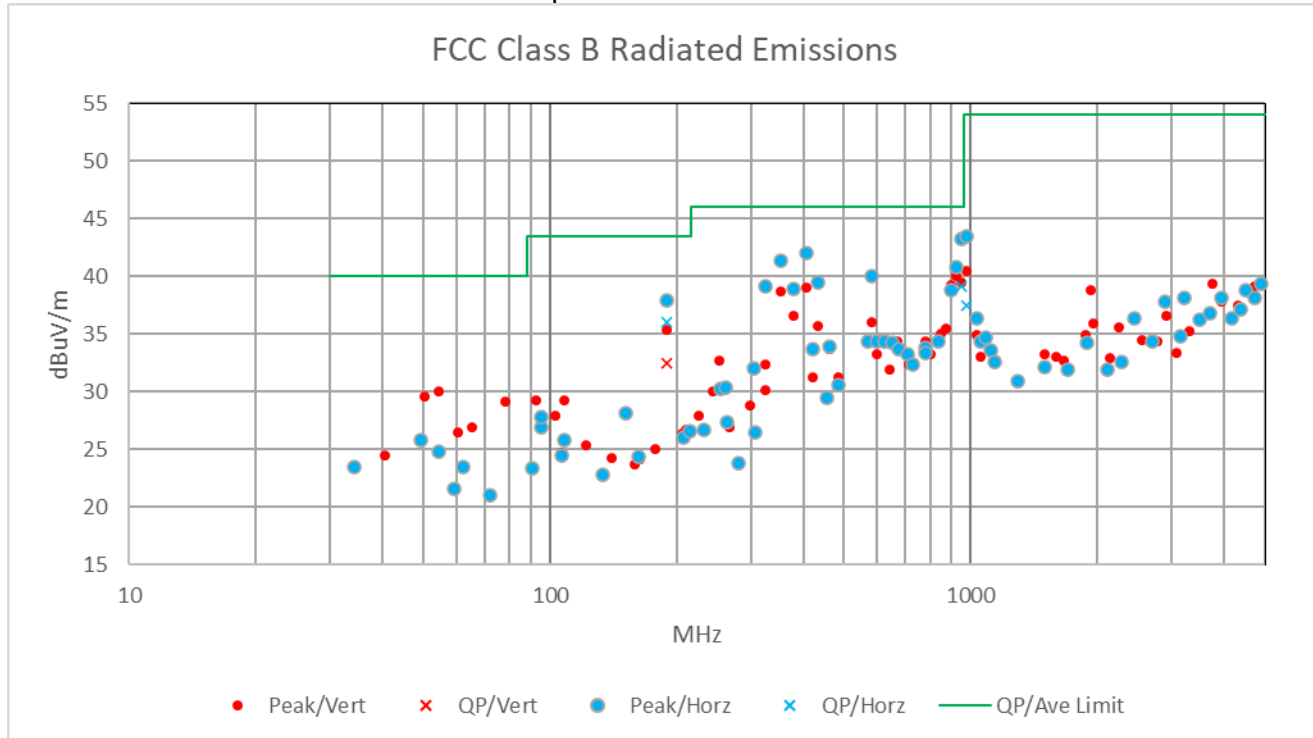


FCC & RSS		Product #			RDR-305H1BKU			S/N		BH05000012	
Freq. MHz	Meter Reading dBuV	Decet.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note	
299.3	12.8	P	V	14.1	1.9	0.0	28.8	46.0	17.2		
325.7	16.4	P	V	14.0	2.0	0.0	32.4	46.0	13.6		
325.7	14.1	P	V	14.0	2.0	0.0	30.1	46.0	15.9		
352.8	22.4	P	V	14.3	2.0	0.0	38.7	46.0	7.3		
379.9	19.8	P	V	14.7	2.1	0.0	36.6	46.0	9.4		
407.0	21.4	P	V	15.4	2.2	0.0	39.0	46.0	7.0		
420.2	13.4	P	V	15.6	2.2	0.0	31.2	46.0	14.8		
434.1	17.4	P	V	16.0	2.3	0.0	35.7	46.0	10.3		
461.2	14.5	P	V	16.8	2.4	0.0	33.7	46.0	12.3		
483.2	11.6	P	V	17.2	2.4	0.0	31.2	46.0	14.8		
581.3	14.8	P	V	18.5	2.7	0.0	36.0	46.0	10.0		
597.5	11.8	P	V	18.7	2.7	0.0	33.2	46.0	12.8		
641.3	9.6	P	V	19.5	2.8	0.0	31.9	46.0	14.1		
667.5	10.8	P	V	20.6	2.9	0.0	34.3	46.0	11.7		
710.0	8.2	P	V	21.2	3.0	0.0	32.4	46.0	13.6		
731.3	8.5	P	V	20.9	3.0	0.0	32.4	46.0	13.6		
780.0	10.2	P	V	21.1	3.1	0.0	34.4	46.0	11.6		
803.8	8.8	P	V	21.2	3.2	0.0	33.2	46.0	12.8		
840.0	9.5	P	V	22.0	3.2	0.0	34.7	46.0	11.3		
851.3	9.5	P	V	22.3	3.2	0.0	35.0	46.0	11.0		
871.3	9.5	P	V	22.7	3.3	0.0	35.5	46.0	10.5		
895.0	13.2	P	V	22.7	3.3	0.0	39.2	46.0	6.8		
922.5	13.7	P	V	22.9	3.4	0.0	40.0	46.0	6.0		
950.0	12.8	P	V	23.2	3.5	0.0	39.5	46.0	6.5		
977.5	13.5	P	V	23.5	3.5	0.0	40.5	54.0	13.5		
1030.0	43.1	P	V	23.8	-32.0	0.0	34.9	74.0	39.1	1	
1057.5	40.8	P	V	24.2	-32.0	0.0	33.0	74.0	41.0	1	
1500.0	40.1	P	V	24.9	-31.8	0.0	33.2	74.0	40.8	1	
1592.5	39.6	P	V	25.1	-31.7	0.0	33.0	74.0	41.0	1	
1660.0	39.0	P	V	25.4	-31.7	0.0	32.7	74.0	41.3	1	
1880.0	38.9	P	V	27.4	-31.4	0.0	34.9	74.0	39.1	1	
1927.5	42.3	P	V	27.6	-31.1	0.0	38.8	74.0	35.2	1	
1950.0	39.5	P	V	27.6	-31.2	0.0	35.9	74.0	38.1	1	
2135.0	36.1	P	V	27.7	-30.9	0.0	32.9	74.0	41.1	1	
2250.0	39.0	P	V	27.5	-30.9	0.0	35.6	74.0	38.4	1	
2550.0	36.0	P	V	28.6	-30.1	0.0	34.5	74.0	39.5	1	
2777.5	35.5	P	V	28.8	-30.0	0.0	34.3	74.0	39.7	1	
2920.0	36.7	P	V	29.5	-29.6	0.0	36.6	74.0	37.4	1	
3090.0	32.2	P	V	30.6	-29.5	0.0	33.3	74.0	40.7	1	
3300.0	33.0	P	V	31.1	-28.9	0.0	35.2	74.0	38.8	1	
3495.0	34.0	P	V	31.1	-28.7	0.0	36.4	74.0	37.6	1	
3752.5	35.2	P	V	32.6	-28.5	0.0	39.3	74.0	34.7	1	
3925.0	32.9	P	V	32.9	-28.0	0.0	37.8	74.0	36.2	1	
4317.5	32.3	P	V	32.6	-27.4	0.0	37.5	74.0	36.5	1	
4510.0	32.9	P	V	32.9	-27.1	0.0	38.7	74.0	35.3	1	
4737.5	32.4	P	V	33.2	-26.5	0.0	39.1	74.0	34.9	1	
5102.5	30.8	P	V	33.7	-25.8	0.0	38.7	74.0	35.3	1	
5327.5	31.1	P	V	33.8	-25.4	0.0	39.5	74.0	34.5	1	
5510.0	30.8	P	V	34.0	-24.9	0.0	39.9	74.0	34.1	1	
5707.5	30.5	P	V	33.9	-25.2	0.0	39.2	74.0	34.8	1	
5892.5	31.3	P	V	34.0	-24.8	0.0	40.5	74.0	33.5	1	
6145.0	30.8	P	V	34.6	-24.3	0.0	41.1	74.0	32.9	1	



FCC & RSS		Product # RDR-305H1BKU						S/N	BH05000012	
Freq. MHz	Meter Reading dBuV	Dect.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note
6322.5	31.2	P	V	34.5	-24.3	0.0	41.4	74.0	32.6	1
6717.5	33.2	P	V	35.2	-23.6	0.0	44.8	74.0	29.2	1
6927.5	34.8	P	V	35.3	-23.6	0.0	46.5	74.0	27.5	1
7292.5	33.1	P	V	36.3	-23.4	0.0	46.0	74.0	28.0	1
7492.5	33.7	P	V	36.5	-23.2	0.0	47.0	74.0	27.0	1
7727.5	33.6	P	V	36.3	-22.5	0.0	47.4	74.0	26.6	1

RDR-305H1BKU Radiated Emissions Graph



FCC & RSS		Product # RDR-30MH1BKU						S/N	5001001	
Freq. MHz	Meter Reading dBuV	Dect.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note
33.9	10.5	P	H	12.7	0.6	0.0	23.8	40.0	16.2	
54.3	16.8	P	H	9.4	0.8	0.0	27.0	40.0	13.0	
65.9	8.5	P	H	9.3	0.8	0.0	18.6	40.0	21.4	
79.2	10.5	P	H	9.4	0.9	0.0	20.8	40.0	19.2	
96.3	12.7	P	H	10.1	1.0	0.0	23.8	43.5	19.7	
108.5	16.8	P	H	10.9	1.1	0.0	28.8	43.5	14.7	
135.5	11.2	P	H	12.4	1.3	0.0	24.9	43.5	18.6	
148.8	13.5	P	H	12.7	1.3	0.0	27.5	43.5	16.0	
159.3	15.2	P	H	12.9	1.4	0.0	29.5	43.5	14.0	
168.1	15.9	P	H	13.2	1.4	0.0	30.5	43.5	13.0	
189.7	22.7	P	H	13.9	1.5	0.0	38.1	43.5	5.4	
189.7	21.4	Q	H	13.9	1.5	0.0	36.8	43.5	6.7	
203.5	13.3	P	H	14.5	1.5	0.0	29.3	43.5	14.2	
248.8	15.0	P	H	15.4	1.7	0.0	32.1	46.0	13.9	
257.1	21.6	P	H	12.0	1.7	0.0	35.3	46.0	10.7	



FCC & RSS		Product #			RDR-30MH1BKU			S/N	5001001	
Freq. MHz	Meter Reading dBuV	Decet.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note
282.9	18.3	P	H	13.2	1.8	0.0	33.3	46.0	12.7	
325.7	22.2	P	H	14.0	2.0	0.0	38.2	46.0	7.8	
352.6	22.7	Q	H	14.3	2.0	0.0	39.0	46.0	7.0	
352.6	25.5	P	H	14.3	2.0	0.0	41.8	46.0	4.2	
379.9	21.4	P	H	14.7	2.1	0.0	38.2	46.0	7.8	
407.0	22.6	P	H	15.4	2.2	0.0	40.2	46.0	5.8	
419.0	13.9	P	H	15.6	2.2	0.0	31.7	46.0	14.3	
434.1	21.5	P	H	16.0	2.3	0.0	39.8	46.0	6.2	
461.2	14.0	P	H	16.8	2.4	0.0	33.2	46.0	12.8	
570.0	12.0	P	H	18.3	2.6	0.0	32.9	46.0	13.1	
581.3	20.0	P	H	18.5	2.7	0.0	41.2	46.0	4.8	
597.5	13.4	P	H	18.7	2.7	0.0	34.8	46.0	11.2	
625.0	11.8	P	H	19.0	2.8	0.0	33.6	46.0	12.4	
740.0	8.3	P	H	21.0	3.0	0.0	32.3	46.0	13.7	
798.8	9.5	P	H	21.1	3.2	0.0	33.8	46.0	12.2	
853.8	9.1	P	H	22.3	3.2	0.0	34.6	46.0	11.4	
895.0	12.0	P	H	22.7	3.3	0.0	38.0	46.0	8.0	
922.5	13.5	P	H	22.9	3.4	0.0	39.8	46.0	6.2	
950.0	14.4	P	H	23.2	3.5	0.0	41.1	46.0	4.9	
977.5	16.4	P	H	23.5	3.5	0.0	43.4	54.0	10.6	
977.5	7.5	Q	H	23.5	3.5	0.0	34.5	54.0	19.5	
33.9	10.5	P	H	12.7	0.6	0.0	23.8	40.0	16.2	
54.3	16.8	P	H	9.4	0.8	0.0	27.0	40.0	13.0	
65.9	8.5	P	H	9.3	0.8	0.0	18.6	40.0	21.4	
79.2	10.5	P	H	9.4	0.9	0.0	20.8	40.0	19.2	
96.3	12.7	P	H	10.1	1.0	0.0	23.8	43.5	19.7	
108.5	16.8	P	H	10.9	1.1	0.0	28.8	43.5	14.7	
135.5	11.2	P	H	12.4	1.3	0.0	24.9	43.5	18.6	
148.8	13.5	P	H	12.7	1.3	0.0	27.5	43.5	16.0	
159.3	15.2	P	H	12.9	1.4	0.0	29.5	43.5	14.0	
168.1	15.9	P	H	13.2	1.4	0.0	30.5	43.5	13.0	
189.7	22.7	P	H	13.9	1.5	0.0	38.1	43.5	5.4	
189.7	21.4	Q	H	13.9	1.5	0.0	36.8	43.5	6.7	
203.5	13.3	P	H	14.5	1.5	0.0	29.3	43.5	14.2	
248.8	15.0	P	H	15.4	1.7	0.0	32.1	46.0	13.9	
257.1	21.6	P	H	12.0	1.7	0.0	35.3	46.0	10.7	
282.9	18.3	P	H	13.2	1.8	0.0	33.3	46.0	12.7	
325.7	22.2	P	H	14.0	2.0	0.0	38.2	46.0	7.8	
352.6	22.7	Q	H	14.3	2.0	0.0	39.0	46.0	7.0	
352.6	25.5	P	H	14.3	2.0	0.0	41.8	46.0	4.2	
379.9	21.4	P	H	14.7	2.1	0.0	38.2	46.0	7.8	
407.0	22.6	P	H	15.4	2.2	0.0	40.2	46.0	5.8	
419.0	13.9	P	H	15.6	2.2	0.0	31.7	46.0	14.3	
434.1	21.5	P	H	16.0	2.3	0.0	39.8	46.0	6.2	
461.2	14.0	P	H	16.8	2.4	0.0	33.2	46.0	12.8	
570.0	12.0	P	H	18.3	2.6	0.0	32.9	46.0	13.1	
581.3	20.0	P	H	18.5	2.7	0.0	41.2	46.0	4.8	
597.5	13.4	P	H	18.7	2.7	0.0	34.8	46.0	11.2	
625.0	11.8	P	H	19.0	2.8	0.0	33.6	46.0	12.4	
678.8	8.8	P	H	20.8	2.9	0.0	32.5	46.0	13.5	
740.0	8.3	P	H	21.0	3.0	0.0	32.3	46.0	13.7	
798.8	9.5	P	H	21.1	3.2	0.0	33.8	46.0	12.2	



FCC & RSS		Product #			RDR-30MH1BKU			S/N	5001001	
Freq. MHz	Meter Reading dBuV	Decet.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note
853.8	9.1	P	H	22.3	3.2	0.0	34.6	46.0	11.4	
895.0	12.0	P	H	22.7	3.3	0.0	38.0	46.0	8.0	
922.5	13.5	P	H	22.9	3.4	0.0	39.8	46.0	6.2	
950.0	14.4	P	H	23.2	3.5	0.0	41.1	46.0	4.9	
977.5	16.4	P	H	23.5	3.5	0.0	43.4	54.0	10.6	
977.5	7.5	Q	H	23.5	3.5	0.0	34.5	54.0	19.5	
1030.0	46.1	P	H	23.8	-32.0	0.0	37.9	74.0	36.1	1
1057.5	43.9	P	H	24.2	-32.0	0.0	36.1	74.0	37.9	1
1085.0	43.4	P	H	24.5	-32.1	0.0	35.8	74.0	38.2	1
1112.5	40.3	P	H	24.6	-32.1	0.0	32.8	74.0	41.2	1
1252.5	39.5	P	H	25.2	-32.0	0.0	32.7	74.0	41.3	1
1500.0	39.4	P	H	24.9	-31.8	0.0	32.5	74.0	41.5	1
1800.0	38.8	P	H	26.7	-31.5	0.0	34.0	74.0	40.0	1
1895.0	39.1	P	H	27.5	-31.3	0.0	35.3	74.0	38.7	1
2080.0	37.1	P	H	27.5	-31.1	0.0	33.5	74.0	40.5	1
2552.5	36.1	P	H	28.6	-30.1	0.0	34.6	74.0	39.4	1
2770.0	36.8	P	H	28.8	-30.1	0.0	35.5	74.0	38.5	1
2900.0	37.5	P	H	29.4	-29.6	0.0	37.3	74.0	36.7	1
3137.5	34.6	P	H	30.9	-29.3	0.0	36.2	74.0	37.8	1
3352.5	33.7	P	H	31.1	-28.8	0.0	36.0	74.0	38.0	1
3500.0	33.8	P	H	31.2	-28.7	0.0	36.3	74.0	37.7	1
3702.5	32.9	P	H	32.2	-28.6	0.0	36.5	74.0	37.5	1
3900.0	33.0	P	H	32.9	-28.1	0.0	37.8	74.0	36.2	1
4110.0	33.3	P	H	32.4	-27.8	0.0	37.9	74.0	36.1	1
4505.0	31.7	P	H	32.9	-27.2	0.0	37.4	74.0	36.6	1
4742.5	32.6	P	H	33.2	-26.5	0.0	39.3	74.0	34.7	1
4922.5	32.0	P	H	33.3	-26.1	0.0	39.2	74.0	34.8	1
5162.5	31.3	P	H	33.8	-25.6	0.0	39.5	74.0	34.5	1
5495.0	31.6	P	H	34.1	-24.9	0.0	40.8	74.0	33.2	1
5700.0	33.6	P	H	33.9	-25.1	0.0	42.4	74.0	31.6	1
5922.5	30.7	P	H	34.1	-24.7	0.0	40.1	74.0	33.9	1
6180.0	30.2	P	H	34.7	-24.2	0.0	40.7	74.0	33.3	1
6415.0	30.4	P	H	34.3	-24.1	0.0	40.6	74.0	33.4	1
6552.5	31.0	P	H	34.5	-23.8	0.0	41.7	74.0	32.3	1
6797.5	34.9	P	H	35.3	-23.6	0.0	46.6	74.0	27.4	1
6925.0	34.5	P	H	35.3	-23.6	0.0	46.2	74.0	27.8	1
7080.0	35.2	P	H	35.4	-23.6	0.0	47.0	74.0	27.0	1
40.5	13.4	P	V	11.1	0.7	0.0	25.2	40.0	14.8	
46.6	19.1	P	V	10.1	0.7	0.0	29.9	40.0	10.1	
52.1	23.0	P	V	9.5	0.8	0.0	33.3	40.0	6.7	
57.6	15.7	P	V	9.3	0.8	0.0	25.8	40.0	14.2	
64.3	12.0	P	V	9.2	0.8	0.0	22.0	40.0	18.0	
77.5	15.2	P	V	9.3	0.9	0.0	25.4	40.0	14.6	
84.1	13.7	P	V	9.5	1.0	0.0	24.2	40.0	15.8	
95.2	12.4	P	V	10.0	1.0	0.0	23.4	43.5	20.1	
108.5	18.2	P	V	10.9	1.1	0.0	30.2	43.5	13.3	
131.7	9.0	P	V	12.2	1.2	0.0	22.4	43.5	21.1	
163.7	9.6	P	V	13.0	1.4	0.0	24.0	43.5	19.5	
189.7	20.7	P	V	13.9	1.5	0.0	36.1	43.5	7.4	
202.9	9.4	P	V	14.4	1.5	0.0	25.3	43.5	18.2	
227.8	10.2	P	V	15.0	1.6	0.0	26.8	46.0	19.2	
189.8	16.8	Q	V	13.9	1.5	0.0	32.2	43.5	11.3	

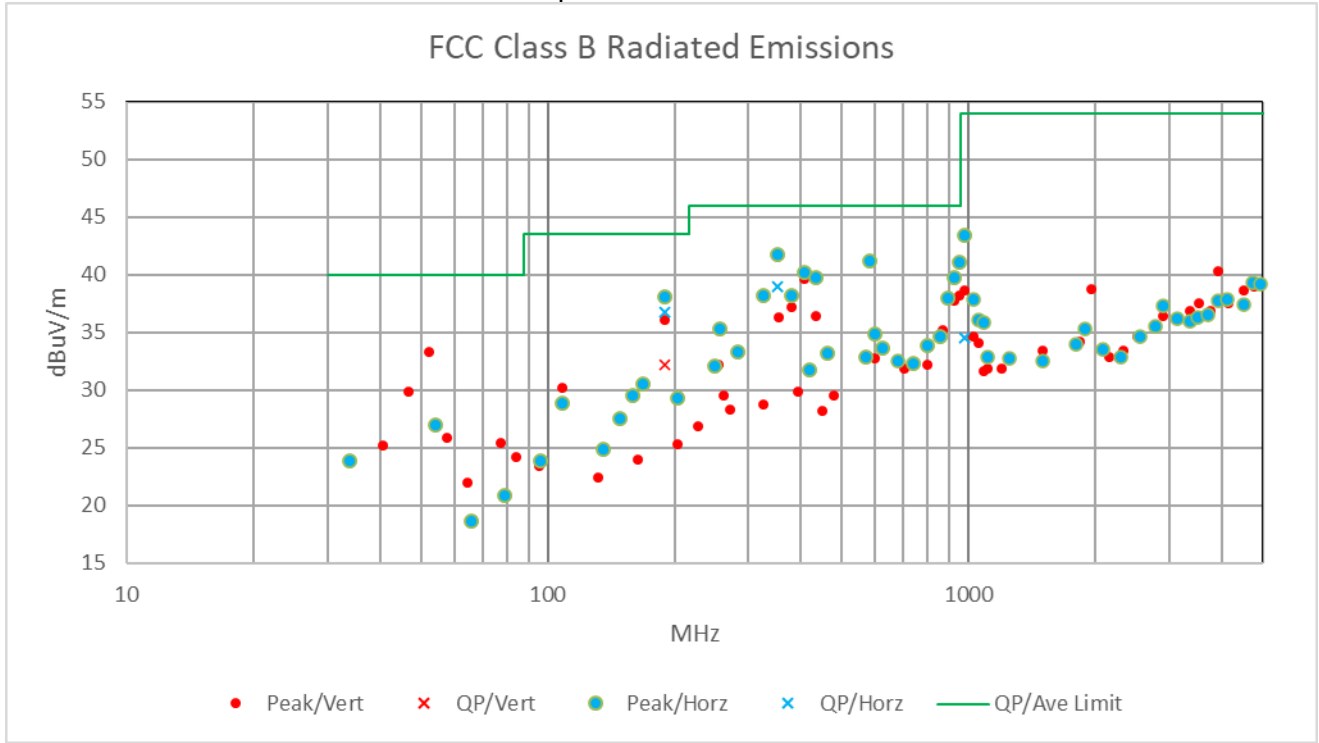


FCC & RSS		Product #			RDR-30MH1BKU			S/N		5001001	
Freq. MHz	Meter Reading dBuV	Decet.	Ant. Pol.	Ant Factor dB/m	Cable Loss dB	Dist Fact dB	EUT dBuV/m	Limit dBuV/m	Margin Under Limit dB	Note	
255.2	18.5	P	V	12.0	1.7	0.0	32.2	46.0	13.8		
261.5	15.7	P	V	12.1	1.7	0.0	29.5	46.0	16.5		
270.3	14.1	P	V	12.4	1.8	0.0	28.3	46.0	17.7		
325.7	12.7	P	V	14.0	2.0	0.0	28.7	46.0	17.3		
352.8	20.0	P	V	14.3	2.0	0.0	36.3	46.0	9.7		
379.9	20.4	P	V	14.7	2.1	0.0	37.2	46.0	8.8		
393.1	12.4	P	V	15.3	2.2	0.0	29.9	46.0	16.1		
407.0	22.0	P	V	15.4	2.2	0.0	39.6	46.0	6.4		
434.1	18.1	P	V	16.0	2.3	0.0	36.4	46.0	9.6		
449.8	9.4	P	V	16.5	2.3	0.0	28.2	46.0	17.8		
478.2	9.9	P	V	17.2	2.4	0.0	29.5	46.0	16.5		
597.5	11.3	P	V	18.7	2.7	0.0	32.7	46.0	13.3		
705.0	7.8	P	V	21.1	2.9	0.0	31.8	46.0	14.2		
795.0	8.2	P	V	20.9	3.1	0.0	32.2	46.0	13.8		
866.3	9.3	P	V	22.6	3.3	0.0	35.2	46.0	10.8		
922.5	11.5	P	V	22.9	3.4	0.0	37.8	46.0	8.2		
950.0	11.5	P	V	23.2	3.5	0.0	38.2	46.0	7.8		
977.5	11.6	P	V	23.5	3.5	0.0	38.6	54.0	15.4		
1030.0	42.8	P	V	23.8	-32.0	0.0	34.6	74.0	39.4	1	
1057.5	41.9	P	V	24.2	-32.0	0.0	34.1	74.0	39.9	1	
1085.0	39.2	P	V	24.5	-32.1	0.0	31.6	74.0	42.4	1	
1112.5	39.4	P	V	24.6	-32.1	0.0	31.9	74.0	42.1	1	
1200.0	38.9	P	V	24.9	-32.0	0.0	31.8	74.0	42.2	1	
1500.0	40.3	P	V	24.9	-31.8	0.0	33.4	74.0	40.6	1	
1842.5	38.5	P	V	27.1	-31.4	0.0	34.2	74.0	39.8	1	
1950.0	42.4	P	V	27.6	-31.2	0.0	38.8	74.0	35.2	1	
2335.0	36.0	P	V	28.1	-30.7	0.0	33.4	74.0	40.6	1	
2525.0	36.2	P	V	28.6	-30.2	0.0	34.6	74.0	39.4	1	
2895.0	36.7	P	V	29.3	-29.6	0.0	36.4	74.0	37.6	1	
3135.0	34.7	P	V	30.9	-29.3	0.0	36.3	74.0	37.7	1	
3350.0	34.6	P	V	31.1	-28.8	0.0	36.9	74.0	37.1	1	
3532.5	35.1	P	V	31.2	-28.8	0.0	37.5	74.0	36.5	1	
3750.0	32.8	P	V	32.6	-28.5	0.0	36.9	74.0	37.1	1	
3920.0	35.4	P	V	32.9	-28.0	0.0	40.3	74.0	33.7	1	
4152.5	32.9	P	V	32.4	-27.8	0.0	37.5	74.0	36.5	1	
4517.5	32.8	P	V	32.9	-27.1	0.0	38.6	74.0	35.4	1	
4745.0	32.3	P	V	33.2	-26.5	0.0	39.0	74.0	35.0	1	
4947.5	32.0	P	V	33.4	-26.1	0.0	39.3	74.0	34.7	1	
5315.0	33.1	P	V	33.8	-25.4	0.0	41.5	74.0	32.5	1	
5930.0	33.6	P	V	34.1	-24.6	0.0	43.1	74.0	30.9	1	
6142.5	29.3	P	V	34.6	-24.3	0.0	39.6	74.0	34.4	1	
6337.5	31.4	P	V	34.5	-24.2	0.0	41.7	74.0	32.3	1	
6505.0	30.0	P	V	34.3	-23.9	0.0	40.4	74.0	33.6	1	
6745.0	33.1	P	V	35.3	-23.6	0.0	44.8	74.0	29.2	1	
6915.0	35.0	P	V	35.3	-23.6	0.0	46.7	74.0	27.3	1	
7177.5	32.9	P	V	35.8	-23.5	0.0	45.2	74.0	28.8	1	
7320.0	33.5	P	V	36.4	-23.4	0.0	46.5	74.0	27.5	1	
7490.0	33.8	P	V	36.5	-23.2	0.0	47.1	74.0	26.9	1	
7900.0	32.7	P	V	36.6	-22.7	0.0	46.6	74.0	27.4	1	

Note 1: The Peak data is under the Average limit, therefore Average measurement not performed.



RDR-30MH1BKU Radiated Emissions Graph

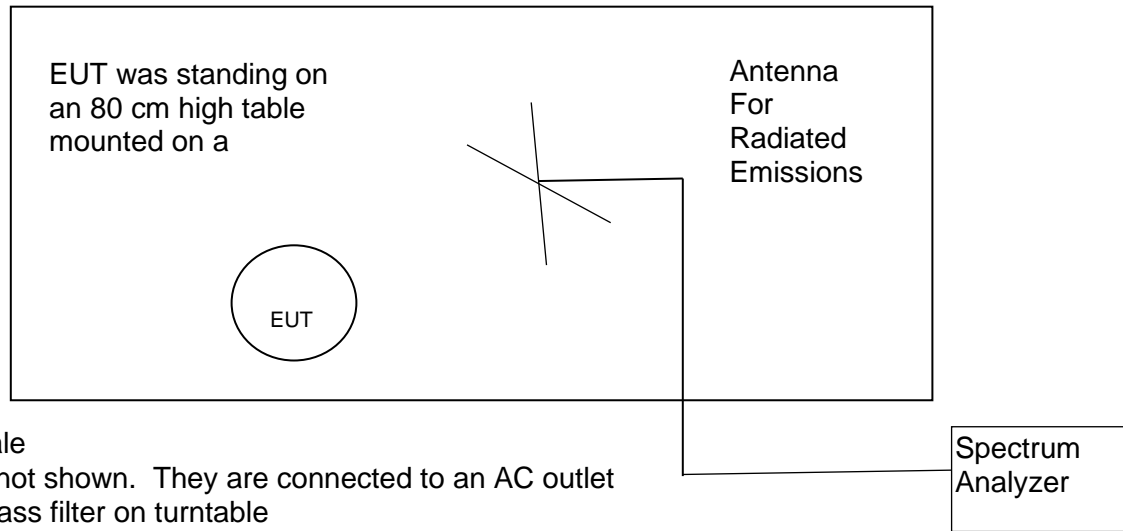


Judgment: Passed by 4.8 dB; Where both peak data and quasi-peak data is performed, the quasi-peak is the final determination of compliance.



Figure 2. Drawing of Radiated Emissions Test Setup

Chamber E, anechoic

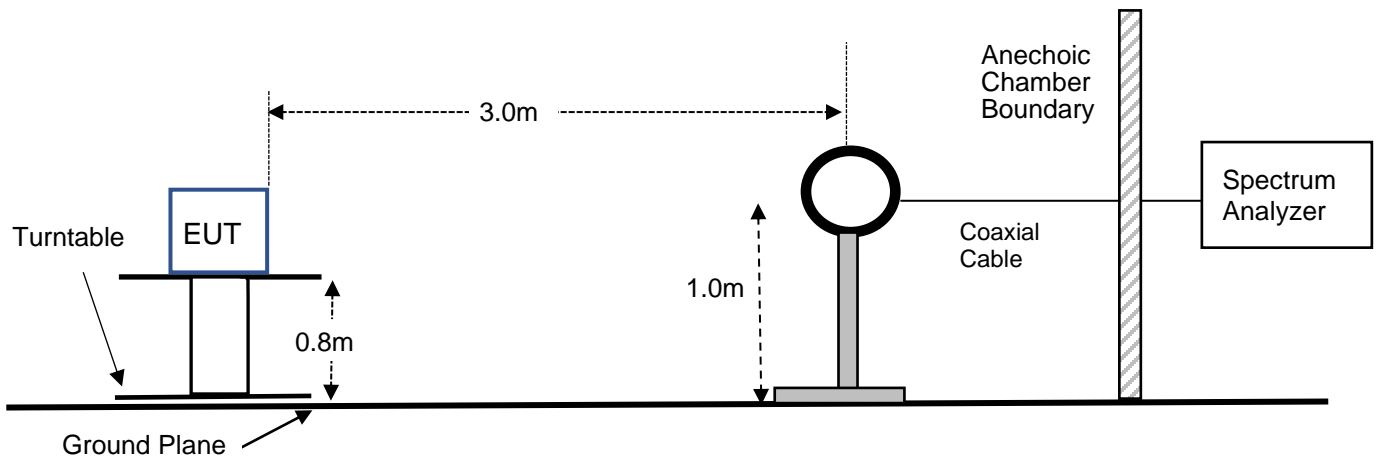


Notes:

- Not to Scale
- AC cords not shown. They are connected to an AC outlet with low-pass filter on turntable

Frequency Range	Receive Antenna	Spectrum Analyzer
0.01 to 30 MHz	ANT-53	REC-11
30 to 200 MHz	ANT-80	REC-11
200 to 1000 MHz	ANT-68	REC-11

Radiated Emissions Test Setup for Frequencies Below 30MHz (Side View)

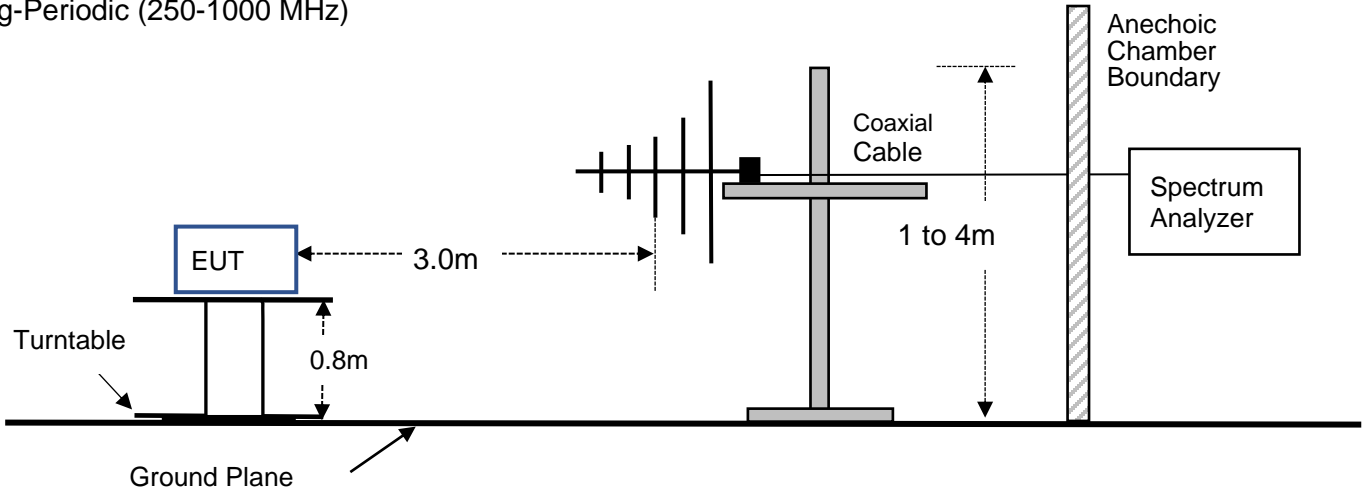




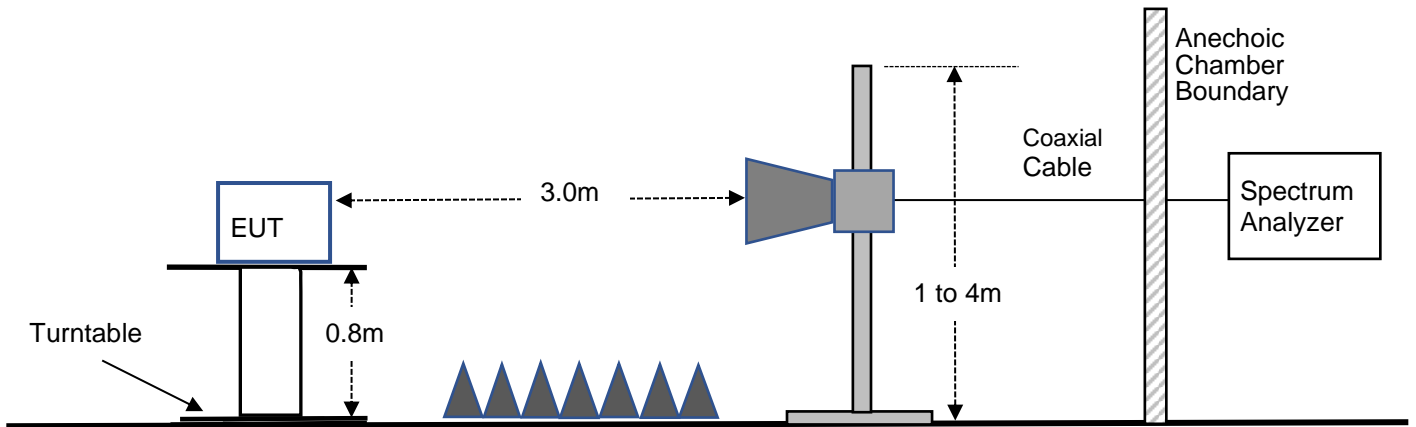
Radiated Emissions Test Setup for Frequencies from 30MHz to 1000MHz (Side View)

Biconical antenna (30-250 MHz)

Log-Periodic (250-1000 MHz)



Radiated Emissions Test Setup for Frequencies over 1000MHz (Side View)



11.3 Magnetic Field Measurements and Decay Factor Calculations

Radiated emission measurements are performed with an EMCO shielded loop antenna. The antenna was rotated in order to find the maximize readings.

The distance correction factor is calculated as follows:

The distance factor in (dB) = $DE \cdot 20 \cdot \log(TD/SD)$

Where: DE = Decay Exponent (2.0 is used for this)

TD = Test distance in meters. This is 3 meters

SD = Specification Distance in meters

From 9 to 490 kHz, the SD = 300m, therefore the distance factor is $2 \cdot 20 \cdot \log(300/3) = 80$ dB.

From 0.49 to 30 MHz, the SD = 30m, therefore the distance factor is $2 \cdot 20 \cdot \log(30/3) = 40$ dB.



11.3.1 Magnetic Field Radiated Emissions Results (0.009 to 30 MHz)

Test Date	July 14, 2021
EUT	Model HP20300; Product Number RDR-305H1BKU; S/N: BH05000012 EUT #1 Model HP20300; Product Number RDR-30MH1BKU; S/N: 5001001 EUT #2
Test Distance	3 Meters
Specification	FCC 15 & RSS-GEN
Notes	A shielded Loop Antenna was used for this test. Test were performed with a 0.8 meter table
Tested by	Chris D'Alessio

Freq (kHz)	Peak reading dBuV	Loop Ant Factor dB/m	Test Dist. (m)	Decay exp	Cable Loss dB	FCC Distance factor dB	Field Strength dBuV/m	RSS & FCC Limit dBuV/m	Margin under limit	Notes
125.0	62.1	18.9	3.0	2.0	0.1	-80.0	1.1	25.7	24.6	EUT #1
250.0	35.3	18.6	3.0	2.0	0.1	-80.0	-26.0	19.6	45.6	EUT #1
375.0	32.8	18.4	3.0	2.0	0.1	-80.0	-28.7	16.1	44.8	EUT #1
500.0	26.9	18.3	3.0	2.0	0.1	-40.0	5.3	33.6	28.3	EUT #1
13560	54.6	16.0	3.0	2.0	0.4	-40.0	31.0	40.5	9.5	EUT #1
27120	21.1	15.3	3.0	2.0	0.5	-40.0	-3.1	29.5	32.6	EUT #1
125.0	61.8	18.9	3.0	2.0	0.1	-80.0	0.8	25.7	24.9	EUT #2
250.0	35.2	18.6	3.0	2.0	0.1	-80.0	-26.1	19.6	45.7	EUT #2
375.0	32.7	18.4	3.0	2.0	0.1	-80.0	-28.8	16.1	44.9	EUT #2
500.0	25.9	18.3	3.0	2.0	0.1	-40.0	4.3	33.6	29.3	EUT #2
13560	55.5	16.0	3.0	2.0	0.4	-40.0	31.9	40.5	8.6	EUT #2
27120	20.3	15.3	3.0	2.0	0.5	-40.0	-3.9	29.5	33.4	EUT #2
Column numbers										
1	2	3	4	5	6	7	8	9	10	11

Notes on Columns:

- Column #1. Frequency of Tested Emission.
- Column #2. Uncorrected readings from the spectrum analyzer (Peak)
- Column #3. Antenna factor converts dBuV to dBuV/m
- Column #4. Test Distance in meters
- Column #5. Decay Exponent
- Column #6. Cable Loss
- Column #7. Distance factor (dB) = (Decay Exponent)*20*Log(Test Distance/Specification Distance)
- Column #8. Total field strength. This = Columns 2 + 3 + 6 + 7
- Column #9. FCC and Canada Limit in dBuV/m
- Column #10. This is the margin under the limit for that row.

The limit shown at 13.56 MHz in the above table is the most stringent limit from 15.225 sections (a), (b) and (c) and RSS-210 section B.6 (a) i, ii or iii. This limit (40.5 dBuV/m) was used for all frequencies from 13.110-14.010 MHz. Therefore it met all 15.225 limits.

All other limits are general limits of FCC 15.209 or the RSS-Gen.

The emissions were scanned from 10 kHz to 30 MHz, including 13.11 and 14.01 MHz.

No other emissions were detected from 10 kHz to 30 MHz within 10 dB of the 15.209 or the RSS-GEN limits.

Judgement: Passed by **8.6** dB.



11.4 Occupied Bandwidth Data

The occupied bandwidth of the RF output was measured using a spectrum analyzer using a peak detector function and a narrow resolution bandwidth. A broadband antenna was used to receive the modulated signal. The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The spectrum analyzer display was digitized and plotted. The plots of the occupied bandwidth for the EUT are supplied on the following page.

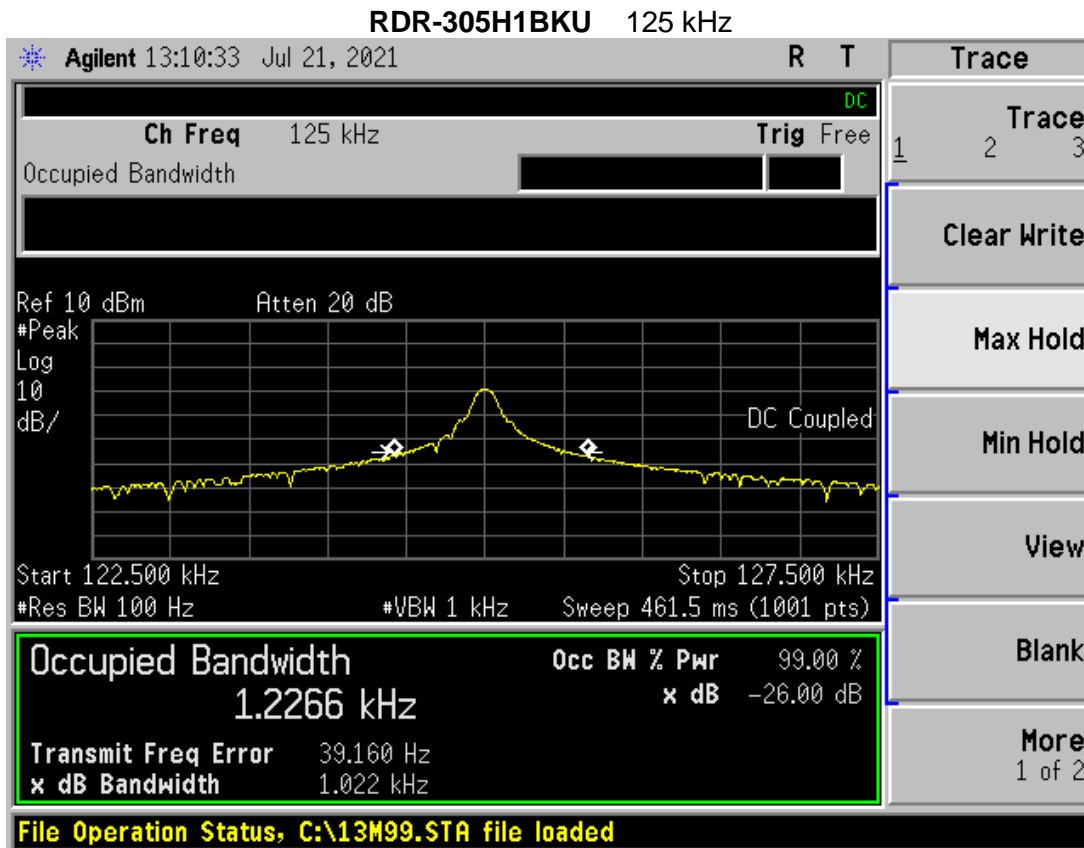
Model Number	HP30200		
Part Numbers	RDR-305H1BKU RDR-30MH1BKU	Specification	FCC Part 15.225 RSS-210
Serial Numbers	BH05000012 5001001	Test Date	07/05/2021
Test Personnel	Joseph Strzelecki, Dave Jarvis	Equipment	REC-43

RDR-305H1BKU: 99% OBW = 1.226 kHz at 125 kHz
RDR-305H1BKU: 99% OBW = 2.3459 kHz at 13.56 MHz

RDR-30MH1BKU: 99% OBW = 1.1215 kHz at 125 kHz
RDR-30mH1BKU: 99% OBW = 1.9010 kHz at 13.56 MHz

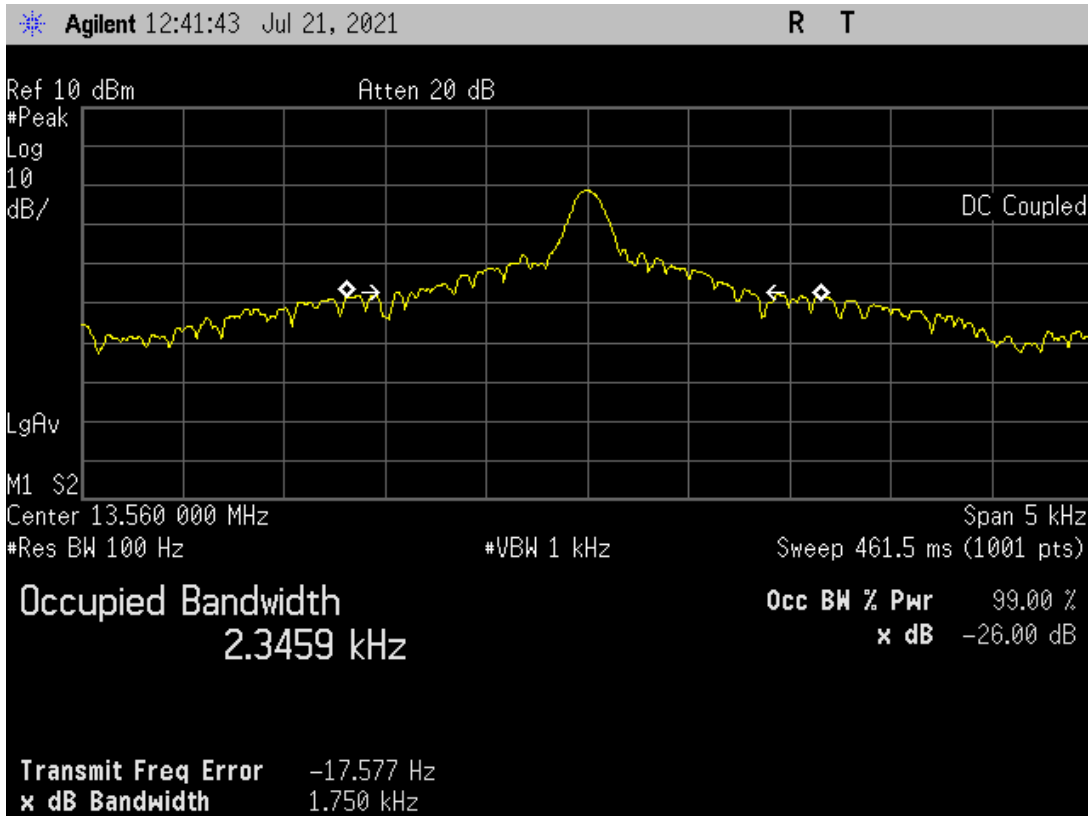
Judgement: Pass

Figure 3. Occupied Bandwidth Plots

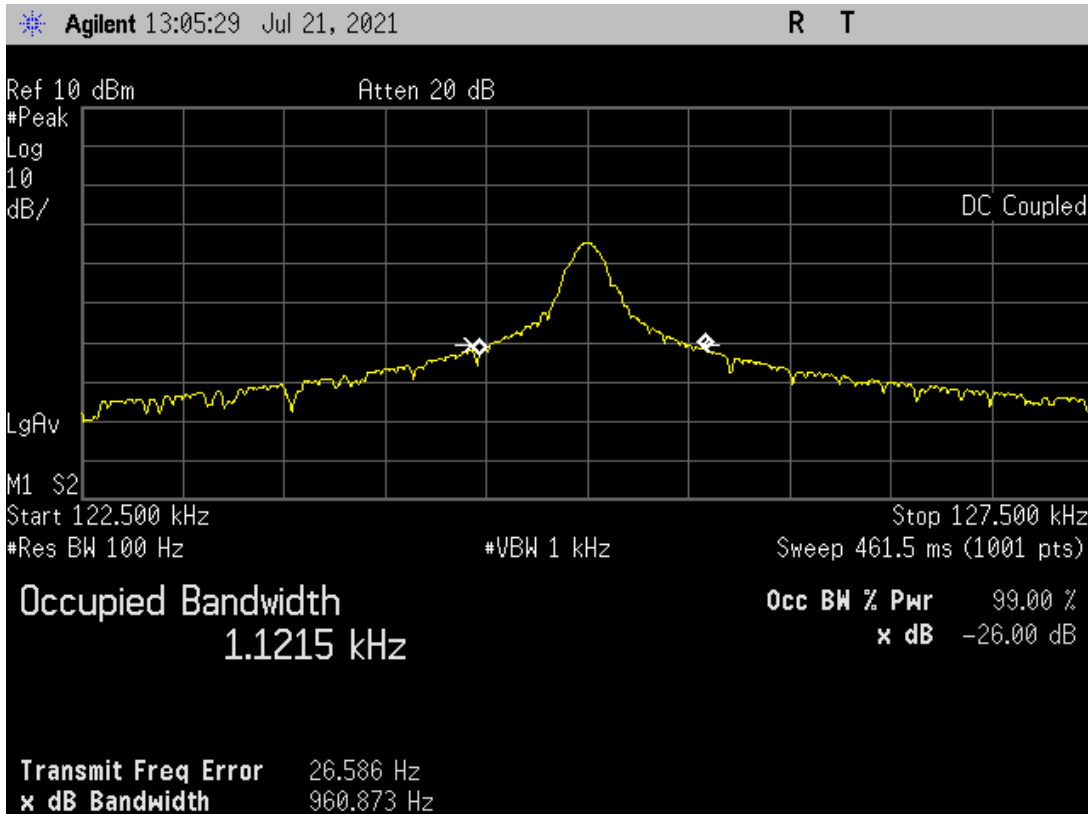


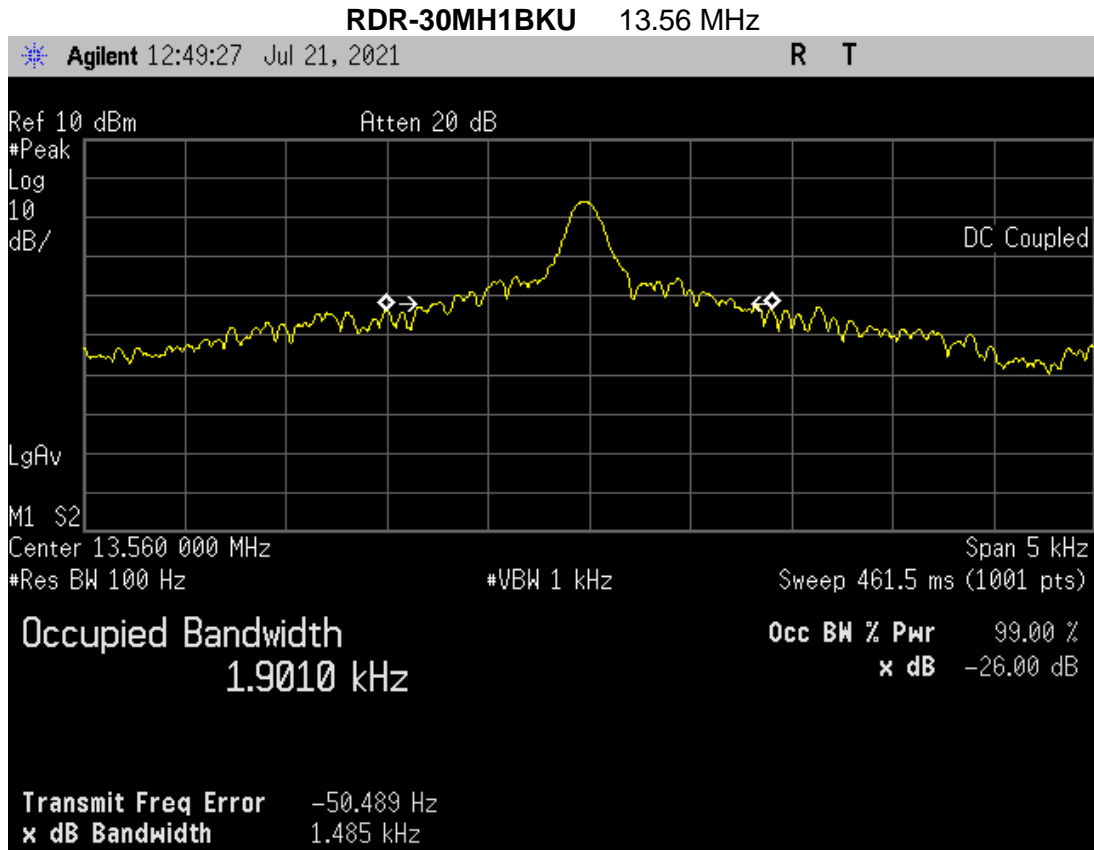


RDR-305H1BKU 13.56 MHz



RDR-30MH1BKU 125 kHz





11.5 Frequency Stability

The tests were in accordance with FCC 15.225 and RSS-210 Section A2.6. Since the product is USB powered, a desktop PC was used to power the device. The input power to the desktop PC was varied by 15%, using a variable AC supply.

11.5.1 Test Results for Frequency Stability

Specification	FCC Part 15.225 RSS-210 Section A2.6	Test Date	July 15, 2021
Test Personnel	Richard Tichelaar	Test Location	Chamber B
Test Equipment	Spectrum Analyzer (REC-21); Temperature Chamber TC-01 Power Supply (PSA-02)		
Notes	10 minutes at each Temperature; 1 min at each voltage		

Part Number: RDR-305H1BKU; S/N: BH05000012

Nominal Frequency	13.560035 MHz
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Volts VAC	Freq. (MHz)	Deviation %	PPM
102.0	13.560001	-0.00025	-2.51
120.0	13.560002	-0.00024	-2.43
138.0	13.560004	-0.00023	-2.29

Max deviation is 2.51 ppm



Temp. Deg C	Freq. (@0min.)	Freq. (@2min.)	Freq. (@5min.)	Freq. (@10min.)	Change from Nominal			
	(MHz)	(MHz)	(MHz)	(MHz)	% 0 min.	% 2 min.	% 5 min	% 10 min.
50	13.559955	13.559950	13.559882	13.559902	-0.00059	-0.00063	-0.00113	-0.00098
40	13.559990	13.559952	13.559950	13.559952	-0.00033	-0.00061	-0.00063	-0.00061
30	13.560010	13.559990	13.559987	13.559985	-0.00018	-0.00033	-0.00035	-0.00037
20	13.560035	13.560015	13.560007	13.559997	0.00000	-0.00015	-0.00021	-0.00028
10	13.560052	13.560042	13.560020	13.560022	0.00013	0.00005	-0.00011	-0.00010
0	13.560057	13.560055	13.560052	13.560047	0.00016	0.00015	0.00013	0.00009
-10	13.560050	13.560052	13.560055	13.560056	0.00011	0.00013	0.00015	0.00015
-20	13.560025	13.560042	13.560045	13.560047	-0.00007	0.00005	0.00007	0.00009

Max deviation is 11.28 ppm

Part Number: RDR-30MH1BKU; S/N: 5001001

Nominal Frequency	13.560002 MHz
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Volts VAC	Freq. (MHz)	Deviation %	PPM
102.0	13.560030	0.00021	2.06
120.0	13.560020	0.00013	1.33
138.0	13.559992	-0.00007	-0.74

Max deviation is 2.06 ppm

Temp. Deg C	Freq. (@0min.)	Freq. (@2min.)	Freq. (@5min.)	Freq. (@10min.)	Change from Nominal			
	(MHz)	(MHz)	(MHz)	(MHz)	% 0 min.	% 2 min.	% 5 min	% 10 min.
50	13.559925	13.559922	13.559922	13.559872	-0.00057	-0.00059	-0.00059	-0.00096
40	13.559935	13.559927	13.559925	13.559925	-0.00049	-0.00055	-0.00057	-0.00057
30	13.559990	13.559950	13.559945	13.559947	-0.00009	-0.00038	-0.00042	-0.00041
20	13.560002	13.559995	13.559985	13.559950	0.00000	-0.00005	-0.00013	-0.00038
10	13.560015	13.560010	13.560007	13.560002	0.00010	0.00006	0.00004	0.00000
0	13.560035	13.560035	13.560035	13.560030	0.00024	0.00024	0.00024	0.00021
-10	13.560045	13.560052	13.560042	13.560030	0.00032	0.00037	0.00029	0.00021
-20	13.559992	13.560005	13.560017	13.560022	-0.00007	0.00002	0.00011	0.00015

Max deviation is 9.59 ppm

Overall Maximum deviation is 11.28 ppm

Test Requirements: Limit is 100 ppm or 0.01% deviation.

Judgement: Pass



12.0 MEASUREMENT INSTRUMENTATION UNCERTAINTY

The uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2 in accordance with CISPR 16-4-2.

Measurement	Uncertainty
Conducted Emissions, LISN method, 150 kHz to 30 MHz	2.7 dB
Radiated Emissions, H-field, 3 meters, 9 kHz to 30 MHz	2.7 dB
Radiated Emissions, E-field, 3 meters, 30 to 200 MHz	3.3 dB
Radiated Emissions, E-field, 3 meters, 200 to 1000 MHz	4.9 dB
Frequency counter at 13.56 MHz	136 Hz
99% Occupied Bandwidth	1% of frequency span
Temperature THM-03	0.6 Deg C

13.0 REVISION HISTORY

RP-9500 Revisions:			
Rev.	Affected Sections	Description	Rationale
1	2.0	Delete mention of repeated tests	EUT is original certification