Test Report Serial Number:	**45461712 R1.0**
Test Report Date:	**2 March 2022**
Project Number:	**1576**

EMC Test Report - New Filing

Applicant:

President Electronics USA
1007 Collier Center Way
Naples, FL, 34110
USA

FCC ID:	IC Registration Number
2AEOCPC209	
Product Model Number / HVIN	Product Name / PMN
RANDY II FCC	**RANDY II FCC**

In Accordance With:

FCC 47 CFR Part 95 Subpart D, Part 15 Subpart B
Licensed Non-Broadcast Station Transmitter (TNB)

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

Test Lab Certificate: 2470.01

IC Registration 3874A

FCC Registration: CA3874

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1.0 DOCUMENT CONTROL

Revision History			
Samples Tested By:	Art Voss, P.Eng., Trevor Whillock	**Date(s) of Evaluation:**	23 - 29 December 2020
Samples Tested By:	Art Voss, P.Eng., Trevor Whillock	**Date(s) of Evaluation:**	13 October 2021
Samples Tested By:	Art Voss, P.Eng.	**Date(s) of Evaluation:**	7 - 21 February, 2022
Report Prepared By:	Art Voss, P.Eng.	**Report Reviewed By:**	Ben Hewson

Report Revision	Description of Revision	Revised Section	Revised By	Revision Date
0.1	Draft	n/a	Art Voss	22 February 2022
1.0	Initial Release	n/a	Art Voss	2 March 2022

2.0 CLIENT AND DUT INFORMATION

Client Information		
Applicant Name (FCC)	**President Electronics USA**	
Applicant Address (FCC)	1007 Collier Center Way	
	Naples, FL, 34110	
	USA	
DUT Information		
Device Identifier(s):	**FCC ID:**	**2AEOCPC209**
	IC ID:	
Device Type:	Portable Handheld & Mobile AM/FM CBRS Transceiver	
Device Model(s) / HVIN:	RANDY II FCC	
Device Marketing Name / PMN:	RANDY II FCC	
Firmware Version ID Number / FVIN:	-	
Host Marketing Name / HMN:	-	
Test Sample Serial No.:	T/A Sample #1	
Equipment Class (FCC):	Licensed Non-Broadcast Transmitter Held to Face (TNF)	
Transmit Frequency Range:	26.965 - 27.405 MHz	
Test Channels:	40	
Manuf. Max. Rated Output Power:	1W & 4W, (30dBm & 36dBm)	
Manuf. Max. Rated BW/Data Rate:	8.0kHz	
Antenna Make and Model:	Detachable Flex or External Whip	
Antenna Type and Gain:	0dBi Typical, 3dBi Max	
Modulation:	AM, FM	
Mode:	Simplex	
Emission Designator:	See Section 8.0	
DUT Power Source:	7.4VDC Rechargeable Li-Ion	
DUT Dimensions [HxWxD] (mm)	152 x 66.5 x 37	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

3.0 SCOPE

Preface:

This Certification Report was prepared on behalf of:

President Electronics USA

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

Device:

The RANDY II FCC is Portable Handheld and Mobile 1W/4W, AM or FM CBRS transceiver. With a detachable antenna, it can be configured as a stand-alone portable handheld device or connected to an external vehicular mounted antenna for mobile applications. This *Equipment* can transmit at a user configurable 1W or 4W transmitter power. The RANDY II FCC is identical in all respects to the RANDY FCC (AM only), FCC ID: 2AEOCPC207 with the exception that the FM transceiver section of the RANDY FCC was not enabled for North American operation. The RANDY FCC was evaluated for EMC and SAR in December of 2020 and the results of those evaluations are incorporated into the EMC and SAR reports for this filing. The RANDY II FCC is also indentical in all respects to the RANDY III (AM and FM) which is the European variant. The RANDY III was evaluated for SAR in October 2021 and the results of that evaluation appear in the SAR report for this filing.

Certification Requirement:

In accordance with FCC 47 CFR Part 2, Subpart J, this *Equipment* is subject to certification to FCC 47 CFR Part 95, Subpart D. In addition, this *Equipment* is subject to a Suppliers Declaration of Conformity (SDoC) in accordance with FCC 47 CFR §15.101.

RF Exposure Requirement:

As per FCC 47 CFR §2.1091, §2.1093, RF Exposure evaluations (SAR - Portable, MPE - Mobile) are required for this *Equipment*. This *Equipment* is capable of Voice Activated Transmission (VOX), a 75% transmit duty factor applies.

Application:

This is an application for a new FCC certification.

4.0 TEST RESULT SUMMARY

TEST SUMMARY

Section	Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Test Date	Result
7.0	Conducted Power (Fundamental)	ANSI/TIA/EIA-382-A ANSI C63.26-2015 ANSI/TIA-603-E	§2.1046 §2.1033(c)(8) §95.967	23 Dec 2020 7 Feb 2022	Complies
8.0	Modulation Response	ANSI/TIA/EIA-382-A ANSI C63.26-2015 ANSI/TIA-603-E	§2.1047 §95.975 §95.977	23 Dec 2020 7 Feb 2022	Complies
9.0	Occupied Bandwidth	ANSI/TIA/EIA-382-A ANSI C63.26-2015 ANSI/TIA-603-E	§2.1049 §95.973	24 Dec 2020 7 Feb 2022	Complies
	Emission Mask	ANSI/TIA/EIA-382-A ANSI C63.26-2015 ANSI/TIA-603-E	§2.1049 §95.979	24 Dec 2020 7 Feb 2022	Complies
10.0	Conducted TX Spurious Emissions	ANSI/TIA/EIA-382-A ANSI C63.26-2015 ANSI/TIA-603-E	§2.1051 §95.979	24 Dec 2020 7 Feb 2022	Complies
11.0	Radiated TX Spurious Emissions	ANSI/TIA/EIA-382-A ANSI C63.26-2015 ANSI C63.4:2014 ANSI C63.26-2015	§2.1053 §95.979	24 Dec 2020 21 Feb 2022	Complies
12.0	Radiated Receiver Emissions	ANSI/TIA/EIA-382-A ANSI C63.4:2014 ANSI C63.26-2015 ANSI/TIA-603-E	 §15 Subpart B §15.109(d)	23 Dec 2020 21 Feb 2022	Complies
13.0	Frequency Stability	ANSI/TIA/EIA-382-A ANSI C63.26-2015 ANSI/TIA-603-E	§2.1055 §95.965	29 Dec 2020 15 Feb 2022	Complies

Test Station Day Log					
Date	Ambient Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Test Station	Tests Performed Section(s)
23 Dec 2020	22.0	17	103.9	**EMC**	**7, 8**
23 Dec 2020	-6.0	93	103.9	**OATS**	**11, 12**
24 Dec 2020	21.0	17	103.1	**EMC**	**9, 10**
29 Dec 2020	19.0	21	102.8	**TC**	**13**
7 Feb 2022	22.0	17	102.3	**EMC**	**7,8,9,10,**
21 Feb 2022	-4.0	59	102.1	**OATS**	**11, 12**
29 Dec 2020	15.2	26	101.3	**TC**	**13**

EMC - EMC Test Bench
OATS - Open Area Test Site
LISN - LISN Test Area
IMM - Immunity Test Area
SAC - Semi-Anechoic Chamber
TC - Temperature Chamber
ESD - ESD Test Bench
RI - Radiated Immunity Chamber

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

22 February 2022
Date

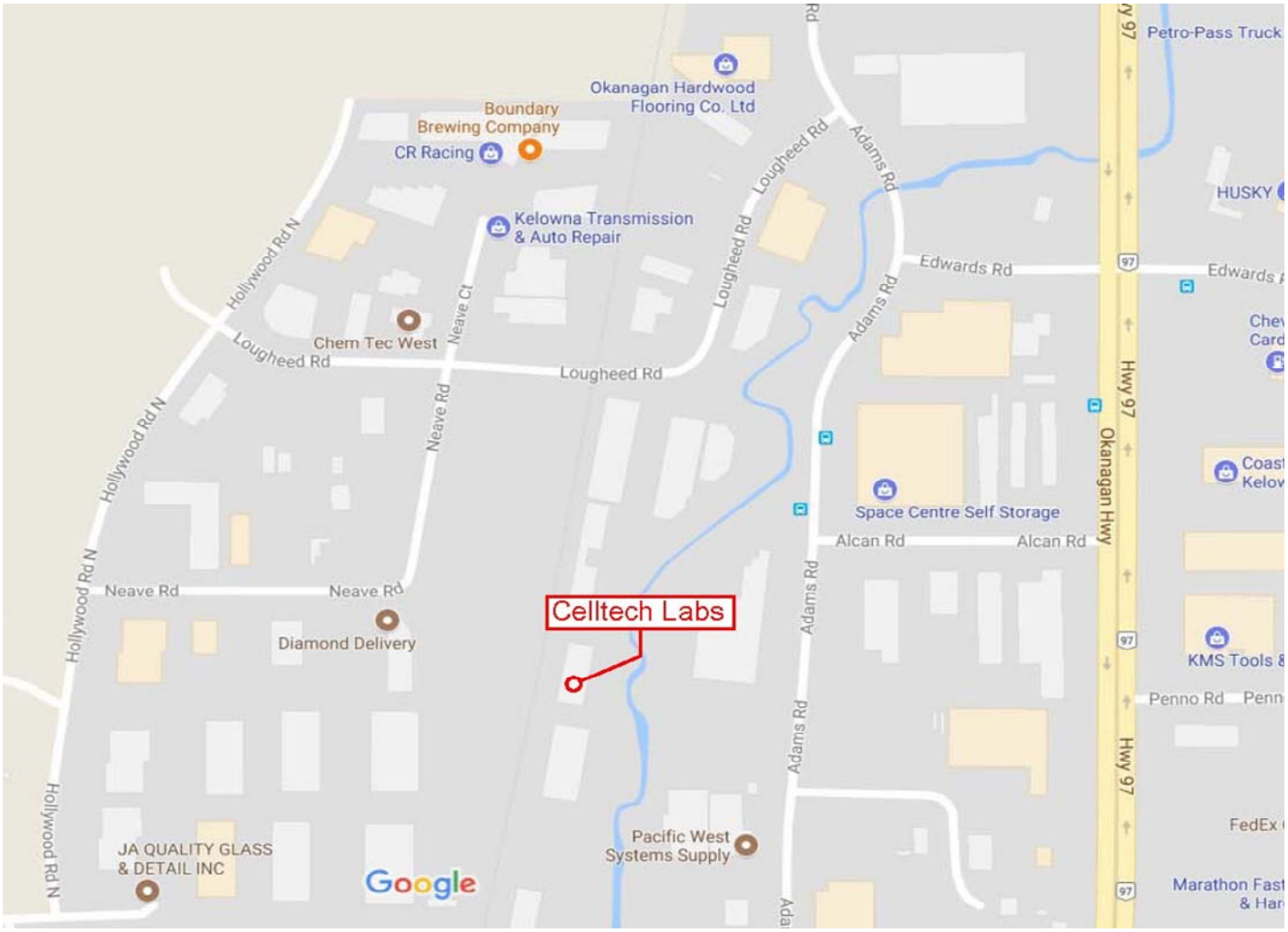
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.4-2014	American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz
ANSI C63.26-2015	American National Standard of Procedures for Compliance Testing of Transmitters Used in Licensed Radio Services
ANSI/TIA-382-A	Minimum Standards - Citizens Band Radio Service Amplitude Modulated (AM) Transceivers Operating in the 27 MHz Band (Revision of EIA-382)
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (Revision of TIA-603-D)
CFR Title 47: Part 2:	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47: Part 15: Subpart B:	Code of Federal Regulations Telecommunication Radio Frequency Devices Unintentional Radiators
CFR Title 47: Part 95: Subpart D:	Code of Federal Regulations Telecommunication Personal Radio Service Citizens Band Radio Service (CBRS)

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874A and Industry Canada under Test Site File Number IC 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 CONDUCTED POWER

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §2.1033(c)(8), §95.967 EIA/TIA-382-A, EIA/TIA-603-E

Limits	
47 CFR §95.967	Each CBRS transmitter type must be designed such that the transmitter power can not exceed the following limits: (1) 4 W Carrier power when transmitting emission type A1D or A3E;

General Procedure	
EIA/TIA-382-A	**19. TRANSMITTER CARRIER POWER OUTPUT** Transmitter Carrier Power Output for this service is the power (rms) available at the output terminals of the transmitter when the output terminals are connected to a standard output load. This measurement shall be performed without modulation, at standard test. conditions.

Test Setup	Appendix A - Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as above using the Automatic 6dB Cursor Bandwidth measurement. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The DUT was set to transmit at its maximum Duty Cycle.

See Appendix D for Measurement Plots

Table 7.1 – Summary of Conducted Power Measurements (RMS)

Conducted Power Measurement Results:								
Channel Number	Frequency (MHz)	Power Setting	Modulation	Measured Power [P_{Meas}] (dBm)	Measured Power [P_{Meas}] (W)	Limit [P_{Lim}] (dBm)	Limit [P_{Lim}] (W)	Margin (dB)
1	26.97	1W	AM	29.850	0.97	36	4.0	6.2
19	27.19			29.990	1.00			6.0
40	27.41			30.080	1.02			5.9
1	26.97		FM	29.530	0.90			6.5
19	27.19			29.710	0.94			6.3
40	27.41			29.940	0.99			6.1
1	26.97	4W	AM	35.300	3.39			0.7
19	27.19			35.460	3.52			0.5
40	27.41			35.540	3.58			0.5
1	26.97		FM	35.700	3.72			0.3
19	27.19			35.860	3.85			0.1
40	27.41			36.000	3.98			0.0
					Result:			Complies

Conducted Margin = P_{Limit} - P_{Meas}

Table 7.2 – Compliance to §2.1033(c)(8) – AM

FCC CFR 47 §2.1033(c)(8): Power to Transmitter (AM - 1W):	
Measured Receiver Current:	IRx = 0.12A
Measured Total Current:	ITx = 0.37A
Transmitter Current (ITx - IRx):	IXmitter = 0.25A
Power to Transmitter:	(13.8DC)(0.25) = 3.45W
Result:	Complies

FCC CFR 47 §2.1033(c)(8): Power to Transmitter (AM - 4W):	
Measured Receiver Current:	IRx = 0.12A
Measured Total Current:	ITx = 0.76A
Transmitter Current (ITx - IRx):	IXmitter = 0.64A
Power to Transmitter:	(13.8DC)(0.64) = 8.8W
Result:	Complies

Table 7.3 – Compliance to §2.1033(c)(8) – FM

FCC CFR 47 §2.1033(c)(8): Power to Transmitter (FM - 1W):	
Measured Receiver Current:	IRx = 0.12A
Measured Total Current:	ITx = 0.39A
Transmitter Current (ITx - IRx):	IXmitter = 0.27A
Power to Transmitter:	(13.8VDC)(0.27) = 3.72W
Result:	Complies

FCC CFR 47 §2.1033(c)(8): Power to Transmitter (FM - 4W):	
Measured Receiver Current:	IRx = 0.12A
Measured Total Current:	ITx = 0.79A
Transmitter Current (ITx - IRx):	IXmitter = 0.67A
Power to Transmitter:	(13.8DC)(0.57) = 9.2W
Result:	Complies

8.0 MODULATION RESPONSE

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1047, §95.975**

Limits	
47 CFR §2.1047	a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.
47 CFR §95.975	Each CBRS transmitter type must be designed such that the modulation characteristics are in compliance with the rules in this section. (a) When emission type A3E is transmitted with voice modulation, the modulation percentage must be at least 85%, but not more than 100%. (b) When emission type A3E is transmitted by a CBRS transmitter having a transmitter output power of more than 2.5 W, the transmitter must contain a circuit that automatically prevents the modulation percentage from exceeding 100%.

Measurement Procedure

TIA 382 25.2 Transmitter Audio Frequency Response

Operate the transmitter under standard test conditions and monitor the output with a modulation monitor or calibrated test receiver. The audio input signal applied through a suitable impedance matching network, as specified by the manufacturer, shall be adjusted to obtain 50% modulation at the maximum audio frequency response of the transmitter, and this point shall be taken as the 0 dB reference level. Vary the modulating frequency from 100 Hz to 10,000 Hz and record the input levels necessary to maintain a constant 50% modulation.

Graph the audio level in dB relative to the 0 dB reference level as a function of the modulating frequency. Record any audio frequency where it is impossible to perform the measurement.

TIA 382 24.2.2 Transmitter Modulation Limiting

The transmitter is modulated by a sinusoidal audio signal applied to the microphone input jack. First the audio input frequency is adjusted to deliver 50% modulation at the audio frequency that produces the maximum modulation level. Record the modulation input level (mV) and use this level as 0 dB for plotting modulation limiting. Increment the audio signal level to 40 dB above the reference level. Record the modulation level (%). Repeat the measurements using a 400 Hz and a 2500 Hz sinusoidal audio signal. Record the modulation level (%). Perform for both positive and negative modulation.

Test Setup	Appendix A Figure A.2

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1047, §95.975**

Limits	
47 CFR §2.1047	a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.
47 CFR §95.975	Each CBRS transmitter type must be designed such that the modulation characteristics are in compliance with the rules in this section. (a) When emission type A3E is transmitted with voice modulation, the modulation percentage must be at least 85%, but not more than 100%. (b) When emission type A3E is transmitted by a CBRS transmitter having a transmitter output power of more than 2.5 W, the transmitter must contain a circuit that automatically prevents the modulation percentage from exceeding 100%. (c) When emission type F3E is transmitted the peak frequency deviation shall not exceed ±2 kHz.

Measurement Procedure	
TIA-603-E	**2.2.6 Audio Frequency Response** 2.2.6.2.1 Constant deviation test method (300 Hz to 3000 Hz) a) Connect the equipment as illustrated. b) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤50 Hz to ≥15,000 Hz. Turn the de-emphasis function off. c) Set the DMM to measure rms voltage. d) Adjust the transmitter per the manufacturer's procedure for full rated system deviation. e) Apply a 1000 Hz tone and adjust the audio frequency generator to produce 20% of the rated system deviation. f) Set the test receiver to measure rms deviation and record the deviation reading. g) Record the DMM reading as V_{REF} . h) Set the audio frequency generator to the desired test frequency between 300 Hz and 3000 Hz. i) Vary the audio frequency generator output level until the deviation reading that was recorded in step f) is obtained. j) Record the DMM reading as V_{FREQ} . k) Calculate the audio frequency response at the present frequency as: audio frequency response= $20\text{Log}(V_{FREQ}/V_{REF})$

Statement - Compliance to §95.977

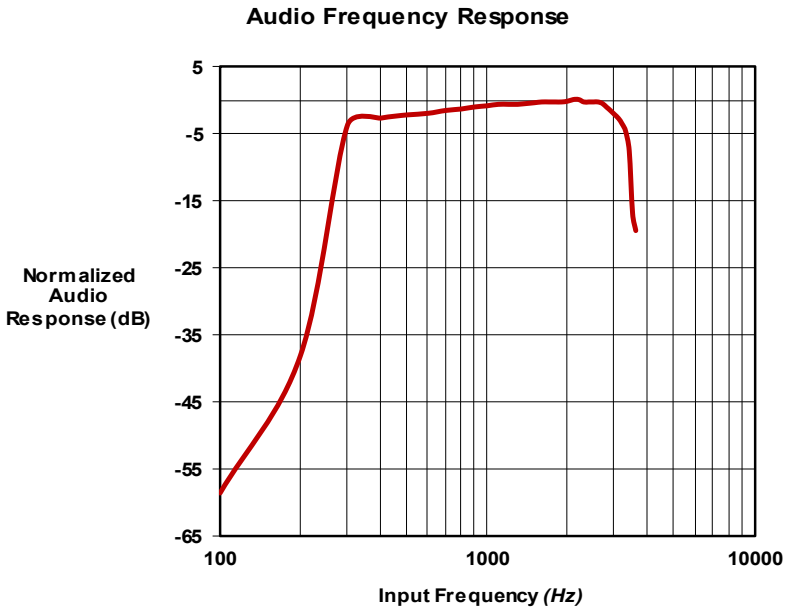
§95.977 CBRS tone transmissions.
In addition to the tones permitted under §95.377, CBRS transmitter types may be designed to transmit brief tones to indicate the beginning or end of a transmission.

This device is capable of transmitting a brief (less than one second) audio tone, “Roger Beep”, when the PTT button is released on the microphone indicating end of transmission. This function is user selectable and complies with the requirements of §95.377. See User’s Manual page 11.

Plot 8.1 – Audio Frequency and Low Pass Filter Response - AM

Audio Frequency and Low Pass Filter Response (AM)

Measured Audio Response		
Freq (Hz)	Audio Response (@ 50% MI) (mV)	(dB)*
100	6000.00	-58.538 **
200	570.00	-38.092
300	11.00	-3.803
400	9.75	-2.755
500	9.25	-2.298
600	9.00	-2.060
700	8.55	-1.614
800	8.35	-1.409
900	8.05	-1.091
1000	7.90	-0.927
1100	7.70	-0.705
1200	7.70	-0.705
1300	7.70	-0.705
1400	7.60	-0.591
1500	7.50	-0.476
1600	7.40	-0.359
1700	7.40	-0.359
1800	7.40	-0.359
1900	7.40	-0.359
2000	7.30	-0.241
2100	7.10	0.000
2200	7.10	0.000
2300	7.40	-0.359
2400	7.40	-0.359
2500	7.40	-0.359
2600	7.40	-0.359
2700	7.60	-0.591
2800	8.10	-1.145
2900	8.60	-1.665
3000	9.20	-2.251
3100	9.80	-2.799
3200	10.80	-3.643
3300	12.30	-4.773
3400	17.05	-7.609
3500	50.00	-16.954
3600	67.00	-19.496
3700	367.00	-34.268
3800	6000.00	-58.538 **
10000	6000.00	-58.538 **
* Normalize to 2100Hz		



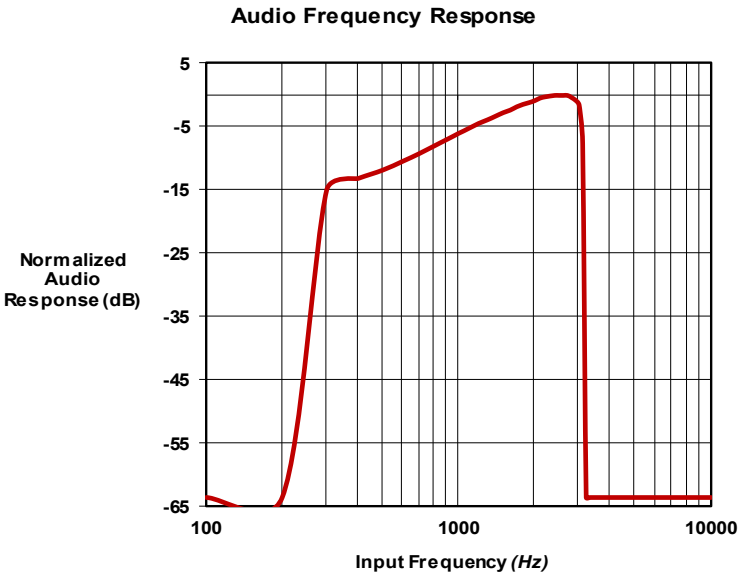
** Note: 50% MI could not be achieved below 200Hz or above 3700Hz.

Audio Frequency at -6dB Attenuation:	3350Hz
Result:	Complies

Plot 8.2 – Audio Frequency and Low Pass Filter Response - FM

Audio Frequency and Low Pass Filter Response (FM)

Measured Audio Response		
Freq	Audio Response (@ 20% Deviation)	
(Hz)	*(mV)*	*(dB)**
100	6000.00	-63.742
200	6000.00	-63.742
300	22.00	-15.027
400	17.75	-13.163
500	15.25	-11.844
600	13.00	-10.458
700	11.25	-9.202
800	9.80	-8.003
900	8.70	-6.969
1000	7.80	-6.021
1100	7.10	-5.204
1200	6.50	-4.437
1300	6.10	-3.885
1400	5.70	-3.296
1500	5.35	-2.746
1600	5.10	-2.330
1700	4.80	-1.804
1800	4.60	-1.434
1900	4.45	-1.146
2000	4.30	-0.848
2100	4.10	-0.434
2200	4.00	-0.220
2300	3.95	-0.111
2400	3.90	0.000
2500	3.90	0.000
2600	3.90	0.000
2700	3.90	0.000
2800	4.05	-0.328
2900	4.25	-0.746
3000	4.65	-1.528
3100	9.40	-7.641
3200	6000.00	-63.742
3300	6000.00	-63.742
3400	6000.00	-63.742
3500	6000.00	-63.742
3600	6000.00	-63.742
3700	6000.00	-63.742
3800	6000.00	-63.742
3900	6000.00	-63.742
4000	6000.00	-63.742
10000	6000.00	-63.742
*** Normalize to 2500Hz**		

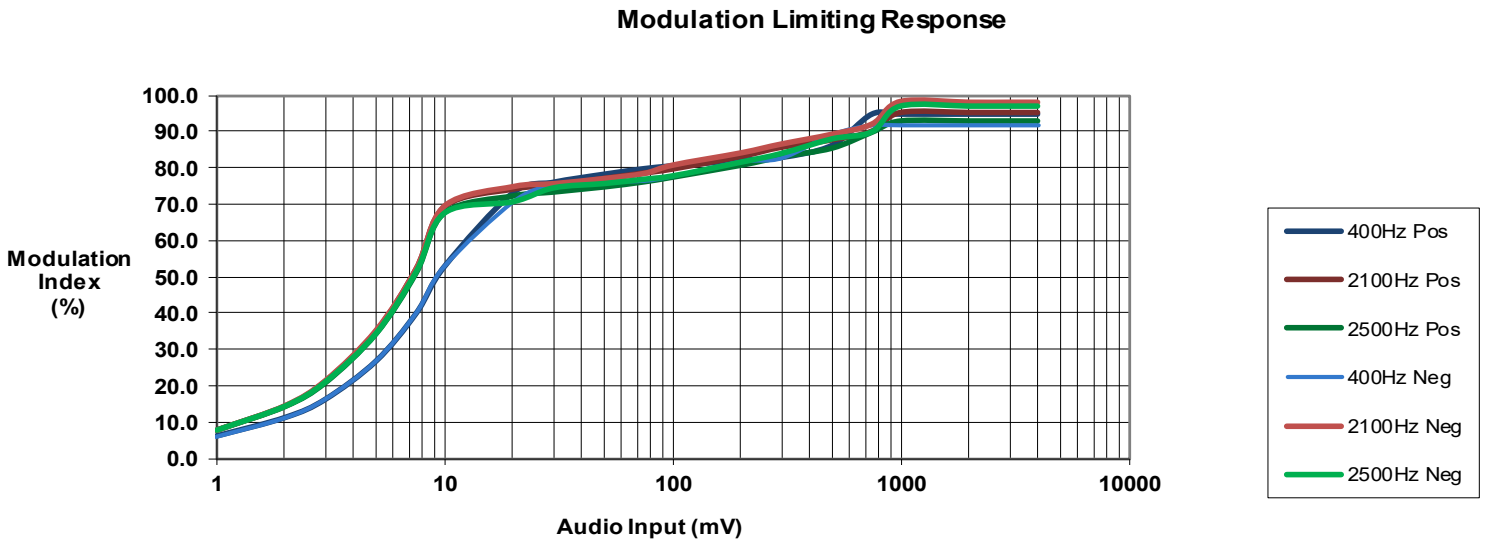


Note: 20% Deviation (+/-400Hz) could not be achieved below 300Hz or above 3100Hz.

Audio Frequency at -6dB Attenuation:	**3050Hz**
Result:	**Complies**

Plot 8.3 – Modulation Limiting Response (AM)

Modulation Limiting Response (AM)



Measured Modulation Response [Modulation Index (%)]

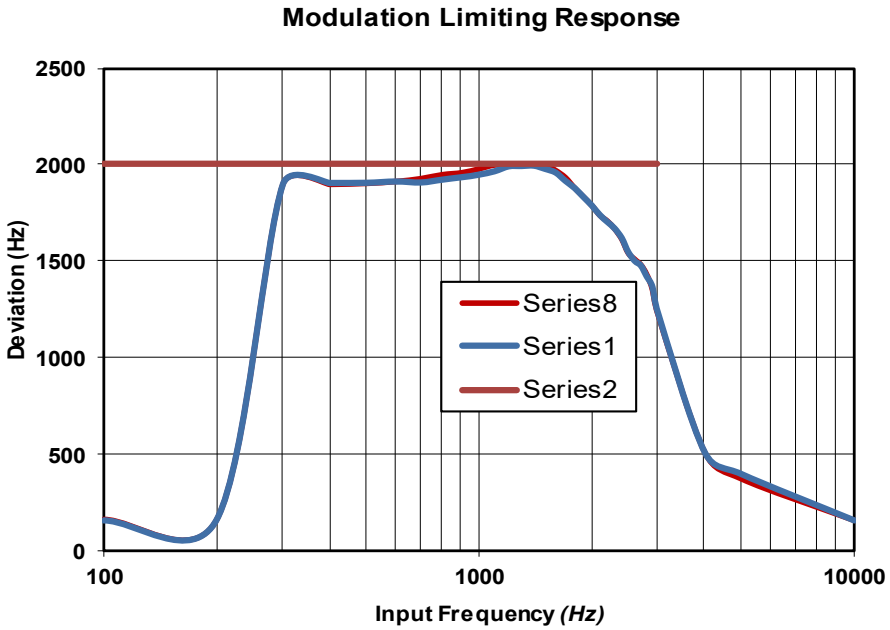
Freq (Hz)	Audio Input (mV)																			
	1	2	3	5	7.5	10	20	30	50	75	100	200	300	500	750	1000	2000	3000	4000	Deviation
400	6.2	11.3	16.3	26.8	39.9	52.8	73.0	75.8	78.0	79.5	80.3	81.8	82.6	85.9	94.5	94.5	94.5	94.5	94.5	Positive
2100	7.8	14.5	21.3	35.0	52.2	69.2	74.0	75.0	76.9	78.4	79.5	83.0	85.5	87.5	89.9	95.0	95.0	95.0	95.0	
2500	7.6	14.2	20.8	34.3	51.1	67.7	72.3	73.4	74.8	76.2	77.5	80.8	83.1	85.5	89.9	93.0	93.0	93.0	93.0	
400	6.1	11.3	16.4	26.8	39.9	52.8	70.5	75.1	76.0	76.3	77.5	81.5	82.5	89.0	91.5	91.5	91.5	91.5	91.5	Negative
2100	7.8	14.6	21.5	35.3	52.2	69.5	74.8	75.6	77.0	78.4	80.7	84.1	86.5	89.2	92.0	98.2	98.0	98.0	98.0	
2500	7.6	14.3	21.0	34.4	51.4	67.6	70.7	74.5	75.7	76.9	77.8	81.6	84.0	88.0	90.0	97.1	97.1	97.1	97.1	

Audio Frequency @ Maximum Deviation:	2100Hz
Audio Input @ Maximum Deviation:	4000mV
Maximum Measured Modulation Index:	98%
Result:	Complies

Plot 8.4 – Modulation Limiting Response (FM)

Modulation Limiting Response (FM)

Measured Frequency Response		
Input Freq (Hz)	Frequency Deviation (kHz)	
	Positive	*Negative*
100	160	165.00
200	165	165.00
300	1895	1895.00
400	1902	1895.00
500	1903	1900.00
600	1910	1910.00
700	1905	1925.00
800	1920	1945.00
900	1932	1955.00
1000	1945	1975.00
1100	1963	1995.00
1200	1988	1995.00
1300	1990	1995.00
1400	1992	1995.00
1500	1975	1995.00
1600	1956	1967.00
1700	1913	1930.00
1800	1875	1875.00
1900	1829	1830.00
2000	1785	1785.00
2100	1736	1735.00
2200	1701	1705.00
2300	1667	1665.00
2400	1618	1612.00
2500	1545	1540.00
2600	1500	1508.00
2700	1476	1480.00
2800	1420	1430.00
2900	1365	1350.00
3000	1230	1222.00
4000	510	510.00
5000	400	375.00
10000	160	160.00



Audio Input Amplitued:	39mV
Maximum Deviation:	1995Hz
Result:	Complies

9.0 OCCUPIED BANDWIDTH AND EMISSION MASKS

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1049, §95.973, RSS-236**

Limits	
47 CFR §95.973	Each CBRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the emission type under test. (a) AM. The authorized bandwidth for emission type A3E is 8 kHz.
RSS-236 5.3.2	The authorized bandwidth for emission type A1D or A3E is 8 kHz.
47 CFR §95.979	Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. (a) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table: For A3E (1), (3), (5), (6) (1) 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency; (3) 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency; (5) 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth. (6) 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.
RSS-236 4.4.4	For A1D and A3E: _ At least 25 dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth. _ At least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth. _ At least 53 + 10 log10 (T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%. _ At least 60 dB on any frequency twice or greater than twice the fundamental frequency.

Measurement Procedure

TIA 382 23.2 Transmitter Modulation Occupied Bandwidth

The transmitter is modulated by a sinusoidal audio signal applied to the microphone input jack. First, the frequency is adjusted to deliver 50% modulation at the highest audio response level (minimum applied audio level). Then the audio signal level is increased 16 dB and the audio frequency is readjusted to 2500 Hz The analyzer is adjusted to display each of the discrete modulation sidebands and their respective harmonic products within +/- 50 kHz of the carrier frequency.

Test Setup	Appendix A Figure A.1

See Appendix D for Measurement Plots

Table 9.1 - Summary of Occupied Bandwidth and Emission Mask Results

Occupied Bandwidth Results:						
Channel Number	Channel Frequency (MHz)	Power Setting	Modulation	Measured Occupied Bandwidth (kHz)	Emission Designator	Emissions Mask Results
1	26.965	1W	AM	5.40	5K40A3E	PASS
19	27.185			5.40	5K40A3E	PASS
40	27.405			5.40	5K40A3E	PASS
1	26.965		FM	5.45	5K45F3E	PASS
19	27.185			5.45	5K45F3E	PASS
40	27.405			5.43	5K43F3E	PASS
1	26.965	4W	AM	5.40	5K40A3E	PASS
19	27.185			5.40	5K40A3E	PASS
40	27.405			5.40	5K40A3E	PASS
1	26.965		FM	5.45	5K45F3E	PASS
19	27.185			5.43	5K43F3E	PASS
40	27.405			5.45	5K45F3E	PASS
					Result:	Complies

10 CONDUCTED OUT OF BAND SPURIOUS EMISSIONS

Test Conditions	
Normative Reference	**FCC 47 CFR §95.979**

Limits	
47 CFR §95.979	Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. (a) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table: For A3E (1), (3), (5), (6) (1) 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency; (3) 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency; (5) 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth. (6) 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

Measurement Procedure

TIA 382 21.2 Transmitter Conducted Spurious and Harmonic Emissions

The transmitter RF output shall be connected to the standard nonradiating output load. The output shall be sampled and displayed using spectrum analysis techniques. 2500 Hz modulation shall be applied at a level 16 dB above that required to produce 50% modulation at the frequency of maximum response. The sampled output shall be analyzed from the lowest frequency generated in the equipment to the 10th harmonic of the fundamental signal and the levels of all spurious outputs attenuated not more than 20 dB below the maximum required attenuation shall be recorded.

Test Setup	Appendix A A.1

See Appendix D for Measurement Plots

Table 10.1 – Summary of Conducted Out of Band Emissions

Conducted Spurious Emissons Measurement Results:									
Channel Number	Frequency (MHz)	Power Setting	Modulation	Fundamental Power [P_{Fund}] (dBm)	Emission Frequency (MHz)	Measured Emission [P_{Meas}] (dBm)	Attenuation [Att] (dBm)	Limit (dB)	Margin (dB)
1	26.965	1W	AM	29.85	ND	ND	-	60.0	-
19	27.185			29.90	ND	ND	-		-
40	27.405			30.08	ND	ND	-		-
1	26.965		FM	29.53	53.85	-38.34	67.87		7.9
19	27.185			29.71	54.41	-38.28	67.99		8.0
40	27.405			29.94	54.81	-38.80	68.74		8.7
1	26.965	4W	AM	35.30	53.90	-27.24	62.54		2.5
19	27.185			35.46	54.31	-27.50	62.96		3.0
40	27.405			35.54	54.80	-28.03	63.57		3.6
1	26.965		FM	35.70	53.91	-33.06	68.76		8.8
19	27.185			35.86	54.37	-32.86	68.72		8.7
40	27.405			36.00	54.80	-32.65	68.65		8.7
								Result:	Complies

Attenuation [Att] = Fundamental Power [Pf_{und}] - Measured Emission [P_{meas}]
Margin = [Att] - Limit
ND = None Detected
No other emissions were detected

11.0 RADIATED SPURIOUS TX EMISSIONS

Test Conditions	
Normative Reference	**FCC 47 CFR §95.979**

Limits	
47 CFR §95.979	Each CBRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section. (a) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) as specified in the applicable paragraphs listed in the following table: For A3E (1), (3), (5), (6) (1) 25 dB (decibels) in the frequency band 4 kHz to 8 kHz removed from the channel center frequency; (3) 35 dB in the frequency band 8 kHz to 20 kHz removed from the channel center frequency; (5) 53 + 10 log (P) dB in any frequency band removed from the channel center frequency by more than 250% of the authorized bandwidth. (6) 60 dB in any frequency band centered on a harmonic (i.e., an integer multiple of two or more times) of the carrier frequency.

Measurement Procedure

TIA 382 22.2 Transmitter Radiated Spurious and Harmonic Emissions

The transmitter shall be terminated in a nonradiating dummy load and shall be keyed but not modulated.

For each spurious frequency, raise and lower the receiver antenna to obtain a maximum reading on the FIM with the antenna at horizontal polarity. Then the turntable should be rotated to further increase this maximum reading. Repeat this procedure of raising and lowering the antenna and rotating the turntable until the highest possible signal has been obtained. The effect of the simulated accessory connections shall be noted, so that the measurement series producing the maximum radiation level can be recorded.

Test Setup	Appendix A Figure A.3

See Appendix D for Measurement Plots

Table 11.1 – Summary of Radiated Spurious Emissions - AM

Summary of Radiated Tx Emissions (AM)										
Measured Frequency Range (MHz)	Channel Frequency (MHz)	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
9kHz - 30MHz	27.2	Front *	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.2	Side *	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.2	Front **	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.2	Side **	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.2	Horizontal *	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.2	Vertical *	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.2	Horizontal **	82.38MHz	29.5	12.60	0.50	0.00 (3)	29.5 (2)	40.0	**10.5**
30-1000MHz	27.2	Horizontal **	794.2MHz	39.20	28.30	0.75	0.00 (3)	39.2 (2)	46.0	**6.8**
30-1000MHz	27.2	Vertical **	55.11MHz	29.00	11.30	0.50	0.00 (3)	29.0 (2)	40.0	**11.0**
30-1000MHz	27.2	Vertical **	82.38MHz	29.50	12.60	0.50	0.00 (3)	29.5 (2)	40.0	**10.5**
30-1000MHz	27.2	Vertical **	848.1MHz	41.50	29.50	0.75	0.00 (3)	41.5 (2)	46.0	**4.5**
								Results:		**Complies**

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF^E + L_C - G_A$

Where ACF^E is the Electric Antenna Correction Factor
* Without Manufacturer's Accessories, ** With Manufacturer's Accessories

See Appendix D for Measurement Plots

Table 11.2 – Summary of Radiated Spurious Emissions - FM

Summary of Radiated Tx Emissions (FM)										
Measured Frequency Range (MHz)	Channel Frequency (MHz)	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
9kHz - 30MHz	27.405	Front *	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.405	Side *	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.405	Front **	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.405	Side **	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.405	Horizontal *	89.40 MHz	14.1	11.70	0.77	0.00 (3)	26.6 (2)	40.0	**n/a**
30-1000MHz	27.405	Horizontal *	271.92 MHz	10.8	17.90	1.35	0.00 (3)	30.1 (2)	46.0	**n/a**
30-1000MHz	27.405	Horizontal *	745.20 MHz	9.5	28.70	2.60	0.00 (3)	40.8 (2)	46.0	**10.5**
30-1000MHz	27.405	Horizontal *	794.20 MHz	8.3	28.30	2.60	0.00 (3)	39.2 (2)	46.0	**6.8**
30-1000MHz	27.405	Vertical *	856.50 MHz	10.4	29.50	2.78	0.00 (3)	42.7 (2)	46.0	**11.0**
30-1000MHz	27.405	Horizontal **	89.40 MHz	9.8	13.40	0.77	0.00 (3)	24.0 (2)	43.5	**10.5**
30-1000MHz	27.405	Horizontal **	103.44 MHz	14.5	15.40	0.99	0.00 (3)	30.9 (2)	43.5	**4.5**
30-1000MHz	27.405	Horizontal **	136.11 MHz	7.1	16.60	0.99	0.00 (3)	24.6 (2)	43.5	**n/a**
30-1000MHz	27.405	Horizontal **	155.55 MHz	34.6	15.80	0.99	0.00 (3)	51.4 (2)	43.5	**n/a**
30-1000MHz	27.405	Horizontal **	155.82 MHz	34.3	15.80	0.99	0.00 (3)	51.0 (2)	43.5	**10.5**
30-1000MHz	27.405	Horizontal **	156.09 MHz	11.1	15.70	0.99	0.00 (3)	27.8 (2)	43.5	**6.8**
30-1000MHz	27.405	Horizontal **	244.65 MHz	11.3	16.80	1.35	0.00 (3)	29.4 (2)	46.0	**11.0**
30-1000MHz	27.405	Horizontal **	244.92 MHz	9.5	16.80	1.35	0.00 (3)	27.7 (2)	46.0	**10.5**
30-1000MHz	27.405	Horizontal **	352.50 MHz	9.1	19.50	1.64	0.00 (3)	30.3 (2)	46.0	**4.5**
30-1000MHz	27.405	Horizontal **	353.20 MHz	9.5	19.50	1.64	0.00 (3)	30.7 (2)	46.0	**n/a**
30-1000MHz	27.405	Horizontal **	407.10 MHz	13.0	21.50	1.91	0.00 (3)	36.4 (2)	46.0	**n/a**
30-1000MHz	27.405	Horizontal **	407.80 MHz	13.5	21.50	1.91	0.00 (3)	36.9 (2)	46.0	**10.5**
30-1000MHz	27.405	Horizontal **	878.90 MHz	8.1	29.30	2.78	0.00 (3)	40.1 (2)	46.0	**6.8**
30-1000MHz	27.405	Horizontal **	886.60 MHz	7.4	29.10	2.78	0.00 (3)	39.2 (2)	46.0	**11.0**
30-1000MHz	27.405	Vertical **	128.01 MHz	8.8	16.70	0.99	0.00 (3)	26.5 (2)	43.5	**10.5**
30-1000MHz	27.405	Vertical **	139.62 MHz	8.6	16.50	0.99	0.00 (3)	26.1 (2)	43.5	**4.5**
30-1000MHz	27.405	Vertical **	139.89 MHz	6.7	16.50	0.99	0.00 (3)	24.2 (2)	43.5	**n/a**
30-1000MHz	27.405	Vertical **	407.10 MHz	5.4	21.50	1.91	0.00 (3)	28.8 (2)	46.0	**n/a**
30-1000MHz	27.405	Vertical **	407.80 MHz	9.4	21.50	1.91	0.00 (3)	32.8 (2)	46.0	**10.5**
30-1000MHz	27.405	Vertical **	867.70 MHz	7.9	29.40	2.78	0.00 (3)	40.1 (2)	46.0	**6.8**
30-1000MHz	27.405	Vertical **	884.50 MHz	8.2	29.20	2.78	0.00 (3)	40.1 (2)	46.0	**11.0**
30-1000MHz	27.405	Vertical **	885.20 MHz	3.6	29.10	2.78	0.00 (3)	35.5 (2)	46.0	**10.5**
30-1000MHz	27.405	Vertical **	926.50 MHz	3.9	30.00	2.92	0.00 (3)	36.8 (2)	46.0	**4.5**
								Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF^E + L_C - G_A$

Where ACF^E is the Electric Antenna Correction Factor
* Without Manufacturer's Accessories, ** With Manufacturer's Accessories

12.0 RECEIVER RADIATED EMISSIONS - DOC

Test Procedure	
Normative Reference	**FCC 47 CFR §15.109** **ANSI C63.4:2014**

Limits	
47 CFR §15.109	(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values: 30-88MHz: 40dBuV/m 88-216MHz: 43.5dBuV/m 216-960MHz: 46dBuV/m > 960MHz: 54dBuV/m

Test Setup	Appendix A Figure A.3

Measurement Procedure
The DUT was set up as per ANSI C63.4:2014. Emissions were scanned between 30MHz and 1000MHz. The turntable was rotated 360 degrees and the antenna was elevated to 4m to optimize the measured emissions.

See Appendix D for Measurement Plots

Table 12.1 – Summary of Receiver Radiated Emissions (AM)

Summary of Radiated Tx Emissions (AM)										
Measured Frequency Range (MHz)	Channel Frequency (MHz)	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
9kHz - 30MHz	27.405	Front	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.405	Side	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.405	Horizontal	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.405	Vertical	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
								Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF^E + L_C - G_A$

Where ACF^E is the Electric Antenna Correction Factor

See Appendix D for Measurement Plots

Table 12.2 – Summary of Receiver Radiated Emissions (FM)

Summary of Radiated Tx Emissions FM)										
Measured Frequency Range (MHz)	Channel Frequency (MHz)	Antenna Polarization	Emission Frequency	Measured Emission [E_{Meas}] (dBuV)	Antenna ACF [ACF] (dB)	Cable Loss [L_C] (dB)	Amplifier Gain [G_A] (dB)	Corrected Emission [E_{Corr}] (dBuV/m)	Limit (dBuV)	Margin (dB)
9kHz - 30MHz	27.405	Front	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
9kHz - 30MHz	27.405	Side	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.405	Horizontal	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
30-1000MHz	27.405	Vertical	ND	ND (1)	0.00	0.00	0.00 (3)	ND (2)	n/a	**n/a**
								Results:	**Complies**	

(1) No Emissions Detected (ND) above ambient or within 20dB of the limit
(2) Antenna ACF, Cable Loss and Amplifier Gain corrected in Spectrum Analyzer Transducer Factor
(3) External Amplier not used

$E_{Corr} = E_{Meas} + ACF^E + L_C - G_A$

Where ACF^E is the Electric Antenna Correction Factor

13.0 FREQUENCY STABILITY

Test Conditions	
Normative Reference	**FCC 47 CFR §2.1055, §95.965, RSS-Gen, ANSI C63.10**

Limits	
47 CFR §95.965	Each CBRS transmitter type must be designed such that the transmit carrier frequency (or in the case of SSB transmissions, the reference frequency) remains within 50 parts-per-million of the channel center frequencies specified in §95.963 under all normal operating conditions.

Measurement Procedure

47 CFR §2.1055 Frequency Stability

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30° to +50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

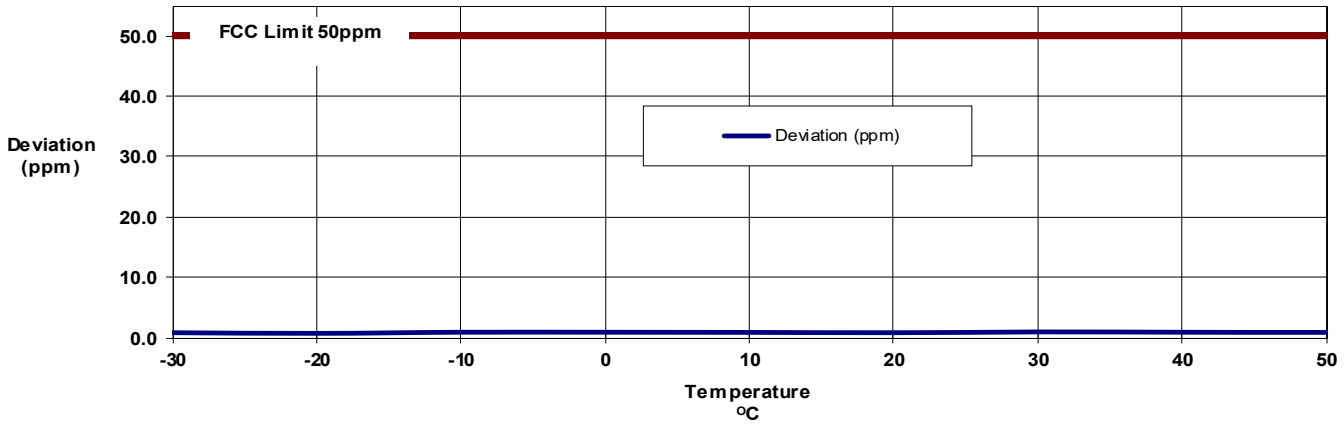
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

Test Setup	Appendix A Figure A.4

Table 13.1 – Summary of Frequency Stability Results (AM)

Frequency Stability

Nominal Frequency (MHz):	27.185
Nominal Channel BW (KHz):	CW
Nominal Voltage (VDC):	7.4
Nominal Temperature (°C):	20



Frequency Stability Measurements (Temperature)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
-30	27.185000	27.185024	24	0.87
-20		27.185020	20	0.72
-10		27.185026	26	0.95
0		27.185026	25	0.94
10		27.185025	25	0.92
20		27.185023	23	0.85
30		27.185028	28	1.01
40		27.185026	26	0.94
50		27.185025	25	0.92
			Maximum Deviation:	1.01
			Maximum Limit:	50.00
			Result:	Complies

Frequency Stability Measurements (Voltage)

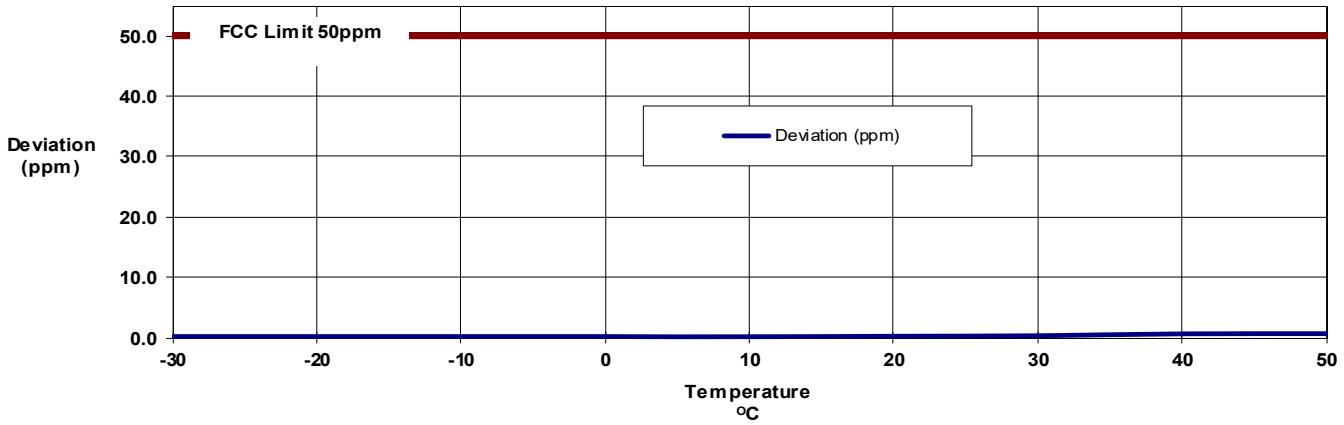
Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
	27.185000			
7.4 (100%)		27.185023	23	0.85
			Maximum Deviation:	0.85
			Maximum Limit:	50.00
			Result:	Complies

This is a battery powered device.
Test performed with fully charged battery.

Table 13.2 – Summary of Frequency Stability Results (FM)

Frequency Stability

Nominal Frequency (MHz):	27.185
Nominal Channel BW (KHz):	CW
Nominal Voltage (VDC):	7.4
Nominal Temperature (°C):	20



Frequency Stability Measurements (Temperature)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
-30	27.185000	27.184994	-6	0.22
-20		27.184994	-6	0.22
-10		27.184994	-6	0.22
0		27.184995	-6	0.20
10		27.184995	-5	0.19
20		27.184993	-7	0.26
30		27.184991	-9	0.33
40		27.184984	-16	0.58
50		27.184984	-16	0.59
			Maximum Deviation:	0.59
			Maximum Limit:	50.00
			Result:	Complies

Frequency Stability Measurements (Voltage)

Voltage (VDC)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Deviation [Absolute] (ppm)
	27.185000			
7.4 (100%)		27.184993	-7	0.26
			Maximum Deviation:	0.26
			Maximum Limit:	50.00
			Result:	Complies

This is a battery powered device.
Test performed with fully charged battery.

APPENDIX A – TEST SETUP DRAWINGS AND EQUIPMENT

Table A.1 – Setup - Conducted Measurements Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00241	R&S	FSU40	Spectrum Analyzer

Figure A.1 – Test Setup Conducted Measurements

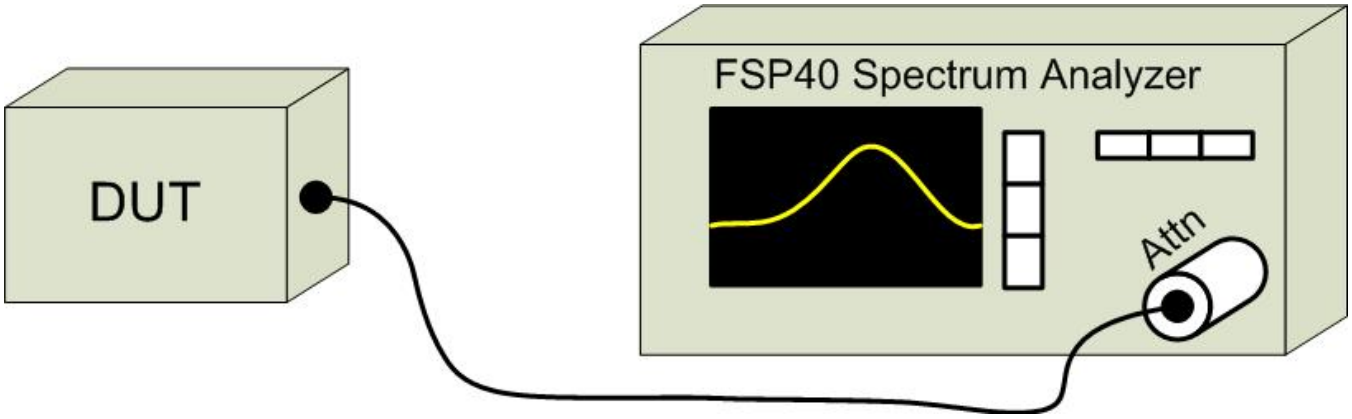


Table A.2 – Setup - Audio Modulation Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00028	HP	8901A	Modulation Analyzer
00027	HP	8903B	Audio Analyzer/Generator

Figure A.2 – Test Setup Audio Modulation Response Measurements

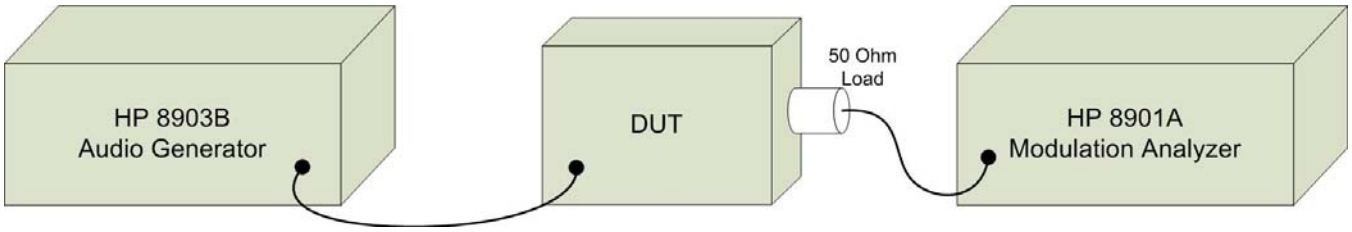


Table A.3 – Setup - Radiated Emissions Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00265	Miteq	JS32-00104000-58-5P	Microwave L/N Amplifier
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn

CNR: Calibration Not Required
COU: Calibrate On Use

Figure A.3 – Test Setup Radiated Emissions Measurements Below 30MHz

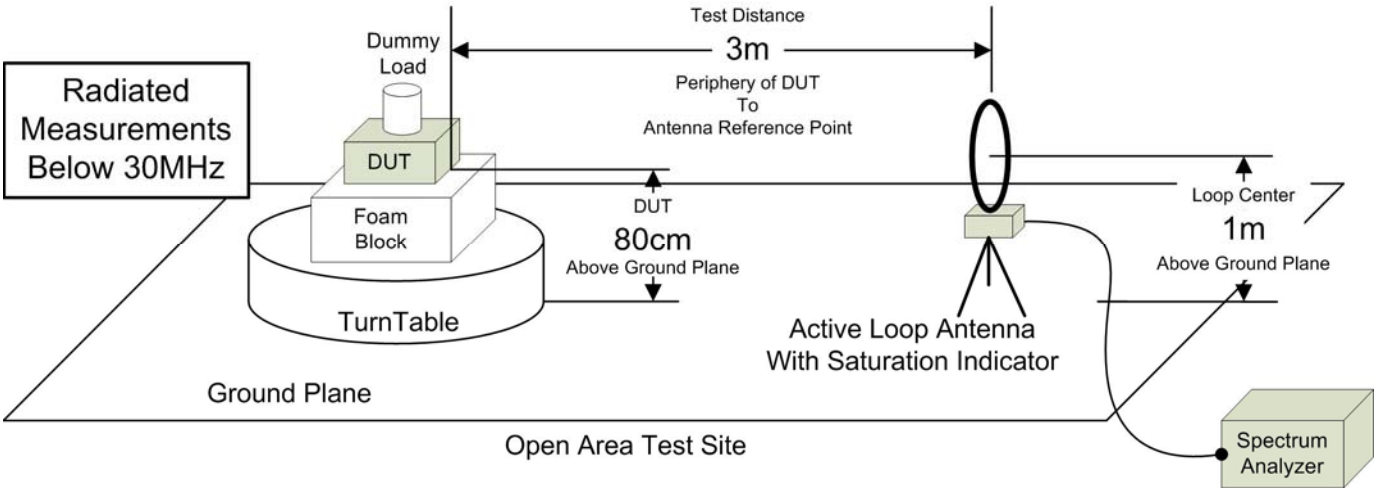


Figure A.4 – Test Setup Radiated Emissions Measurements 30-1000MHz

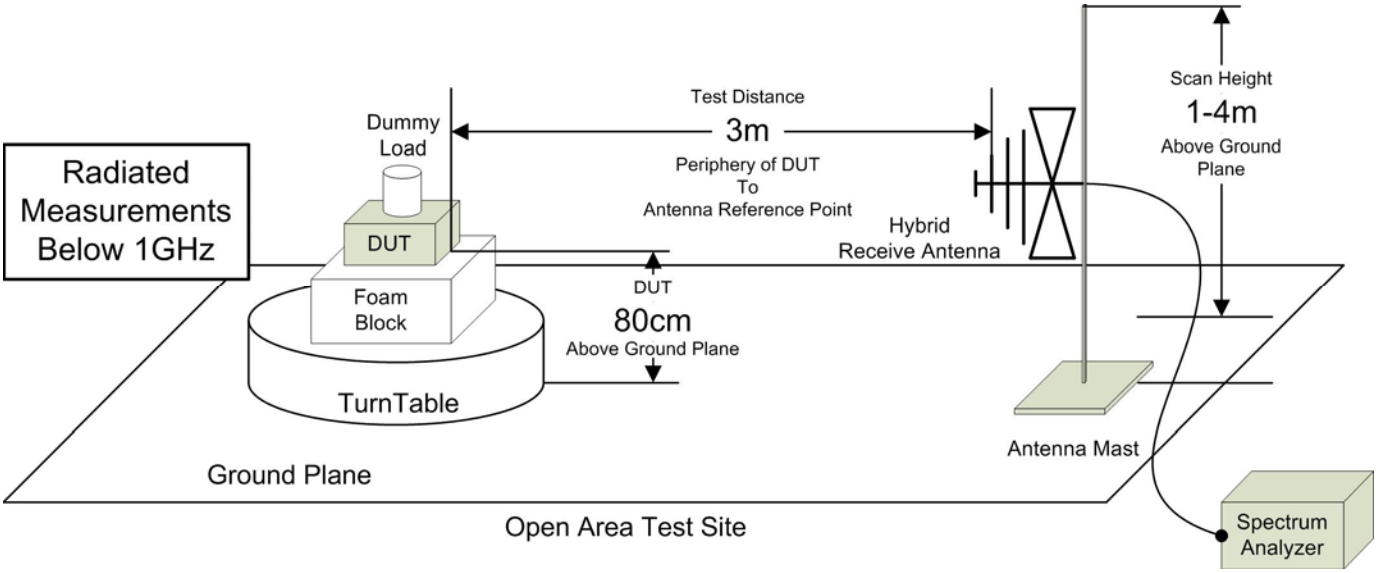


Figure A.5 – Test Setup Radiated Emissions Measurements 30-1000MHz

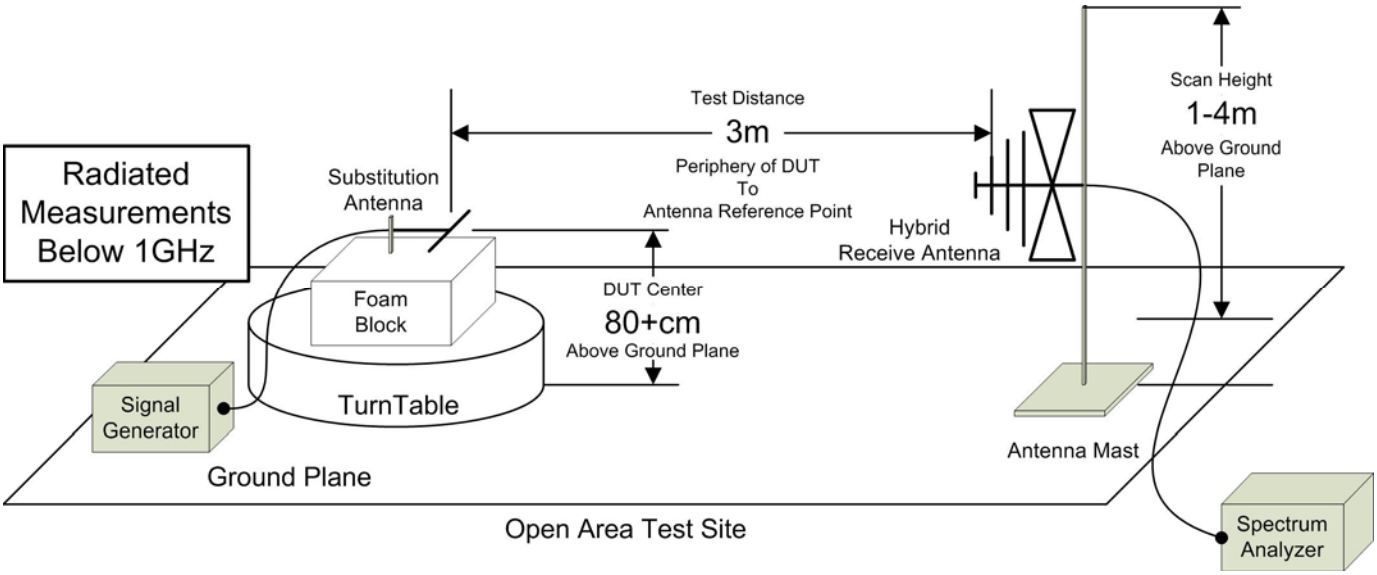
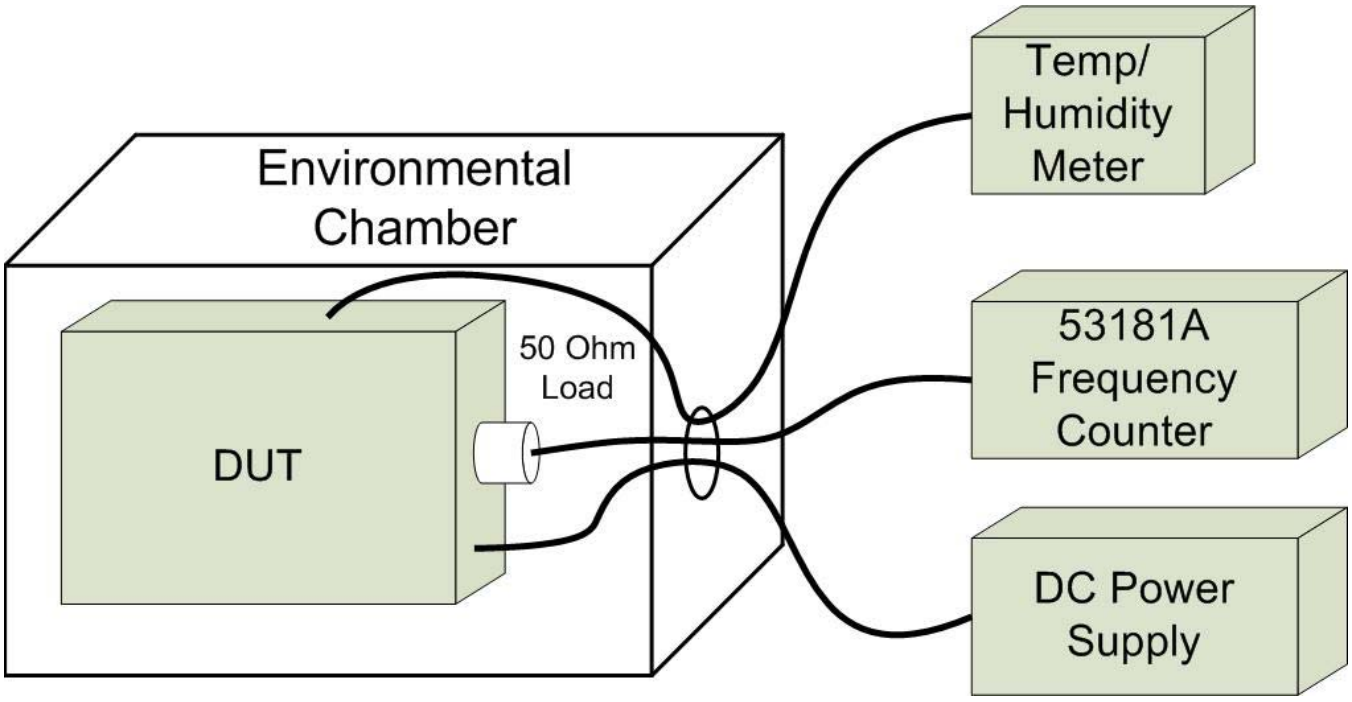


Table A.4 – Setup - Frequency Stability Measurement Equipment

Equipment List			
Asset Number	**Manufacturer**	**Model Number**	**Description**
n/a	ESPEC	ECT-2	Environmental Chamber
00003	HP	53181A	Frequency Counter
n/a	HP	E3611A	Power Supply
00234	VWR	61161-378	Temp/Humidity Meter

Figure A.6 – Test Setup Frequency Stability Measurements



APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval	Calibration Due
00050	Chase	CBL-6111A	1607	Bilog Antenna	3 Jan 2019	Triennial	3 Jan 2022
00085	EMCO	6502	9203-2724	Loop Antenna	11 Jun 2019	Triennial	11 Jun 2022
00333	HP	85685A	3010A01095	RF Preselector	23 Jun 2020	Triennial	30 Jun 2023
00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2020	Triennial	23 Jun 2023
00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2020	Triennial	23 Jun 2023
00223	HP	8901A	3749A07154	Modulation Analyzer	10 Dec 2020	Triennial	10 Dec 2023
00224	HP	8903B	3729A18691	Audio Analyzer	11 Dec 2020	Triennial	11 Dec 2023
00241	R&S	FSU40	100500	Spectrum Analyzer	10 Aug 2021	Triennial	10 Aug 2024
00005	HP	8648D	3847A00611	Signal Generator	23 Jun 2020	Triennial	23 Jun 2023
00003	HP	53181A	3736A05175	Frequency Counter	23 Jun 2020	Triennial	23 Jun 2023
00250	Circuit Test	DMR-1800	TE182	Digital Multi-Meter - DVM	23 Jun 2020	Triennial	23 Jun 2023
00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a	n/a
00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a	n/a
00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a	n/a
00081	ESPEC	ECT-2	0510154-B	Environmental Chamber	NCR	n/a	CNR
00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial	New
00201	HP	E3611A	KR83015294	DC Power Supply	COU	n/a	COU
00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a	COU
00275	TMS	LMR400	n/a	25m Cable	COU	n/a	COU
00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a	NCR

NCR: No Calibration Required
COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2
Radiated Emissions 30MHz - 200MHz
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB
Radiated Emissions 200MHz - 1000MHz
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB
Radiated Emissions 1GHz - 6GHz
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB
Radiated Emissions 6GHz - 18GHz
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB
Power Line Conducted Emissions 9kHz to 150kHz
U_{LAB} = 2.96dB U_{CISPR} = 3.8dB
Power Line Conducted Emissions 150kHz to 30MHz
U_{LAB} = 3.12dB U_{CISPR} = 3.4dB

	If the calculated uncertainty U_{lab} is **less** than U_{CISPR} then:
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
	If the calculated uncertainty U_{lab} is **greater** than U_{CISPR} then:
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (U_{lab} - U_{CISPR}), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (U_{lab} - U_{CISPR}), **EXCEEDS** the disturbance limit

Other Measurement Uncertainties (U_{LAB})
RF Conducted Emissions 9kHz - 40GHz
U_{LAB} = 1.0dB U_{CISPR} = n/a
Frequency/Bandwidth 9kHz - 40GHz
U_{LAB} = 0.1ppm U_{CISPR} = n/a
Temperature
U_{LAB} = 1^{O}C U_{CISPR} = n/a

END OF REPORT

