



Test Report - FCC Part 90

Applicant: HD Communications Corp.

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager

Date of Signature 1/3/2023

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Table of Contents

1.1	PART 90 TEST RESULT SUMMARY	4
2.	LOCATION OF TESTING	5
2.1	TEST LABORATORY	5
2.1	TESTING WAS PERFORMED, REVIEWED BY	5
3.	TEST SAMPLE(S) (EUT/DUT)	6
3.1	DESCRIPTION OF THE EUT	6
3.2	CONFIGURATION OF EUT	7
3.3	TEST SETUP OF EUT	7
4.	TEST METHODS & APPLICABLE REGULATORY LIMITS	8
4.1	TEST METHODS/STANDARDS/GUIDANCE:	8
4.2	APPLIED LIMITS AND REGULATORY LIMITS:	8
5.	MEASUREMENT UNCERTAINTY	8
6.	ENVIRONMENTAL CONDITIONS	8
6.1	TEMPERATURE & HUMIDITY	8
7.	LIST OF TEST EQUIPMENT AND TEST FACILITY	9
7.1	LIST OF TEST EQUIPMENT	9
8.	TEST RESULTS	11
8.1	POWER AT THE FINAL AMPLIFIER	12
8.2	RF OUTPUT POWER	13
8.2.1	<i>RF Power Output Plot, 42.06 MHz</i>	14
8.3	BANDWIDTH & EMISSION	15
8.3.1	<i>99% Bandwidth Plot, 2.5 kHz FM, 42.06 MHz</i>	17
8.4	EMISSION LIMITATIONS, IN-BAND	18
8.4.1	<i>Emission Mask, 2.5 kHz FM, 42.06 MHz</i>	19
8.5	EMISSION LIMITATIONS, OUT-OF-BAND	20
8.5.1	<i>Conducted Emissions, Below 1GHz, 42.06 MHz</i>	21
8.5.2	<i>Conducted Emissions Above 1GHz, 42.06 MHz</i>	22
8.6	RADIATED EMISSIONS	23
8.6.1	<i>Radiated Emissions, 42.06 MHz</i>	24
8.7	MODULATION CHARACTERISTICS	25
8.8	FREQUENCY STABILITY	26
8.8.1	<i>Frequency Stability Data</i>	27
8.8.1	<i>Frequency Stability Plot</i>	28
8.9	TRANSIENT FREQUENCY BEHAVIOR	29
8.10	ADJACENT CHANNEL POWER LIMITS	30
9.	ANNEX-A - PHOTOGRAPHS OF THE EUT	31
10.	ANNEX-B – TEST SETUP PHOTOGRAPHS	31



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11. HISTORY OF TEST REPORT CHANGES.....31



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CUSTOMER INFORMATION

Applicant: HD Communications Corp.
Address: 338 Jericho Turnpike, Unit 387
Syosset NY 11791
United States

1.1 Part 90 Test Result Summary

The following test procedure and guidance were used for measuring FCC PART 90 (PRIVATE LAND MOBILE RADIO SERVICES) known as Licensed Land Mobile; ANSI C63.26-2015. Full test results are available in this report.

Applicable Clauses from Part 2		
FCC Clauses	Description of the requirements	Result: (Pass, Fail, N/A)
2.202	Bandwidth & Emission	Pass
2.1033 (c)(8)	Power at the Final Amplifier	Reported
2.1046 (a)	RF Output Power	Pass
2.1047	Modulation characteristics	n/a
2.1049	Occupied Bandwidth	Pass
2.1051	Spurious emissions at antenna terminals	Pass
2.1053	Field strength of spurious radiation	Pass
2.1055	Frequency stability	Pass

Applicable Clauses from Part 90		
FCC Clauses	Description of the requirements	Result: (Pass, Fail, N/A)
90.205 (r)	Transmitter Power	Pass
90.207 (n)	Emission designator	Reported
90.209 (b) (5) footnote 2	Bandwidth limitations	Pass
90.210 (n)	Emission masks, In-band	Pass
90.210 (n)	Emission masks, Out-of-band	Pass
90.213 (a) footnote 10	Frequency stability	Pass
90.214	Transient Frequency Behavior	n/a
90.221	Adjacent channel power limits	n/a

No additions to the test methods were needed. There were no deviations, or exclusions from the test methods. No test results are from external providers or from the customer. The test results relate only to the items tested. Timco does not offer opinions and interpretations, only a pass/fail statement.



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2. Location of Testing

2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA"). Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780
FCC Designation # US1070
FCC site registration is under A2LA certificate # 0955.01
ISED Canada test site registration # 2056A
EU Notified Body # 1177
For all designations see A2LA scope # 0955.01

2.1 Testing was performed, reviewed by

Dates of Testing: 12-20-2022 – 12-22-2022

Signature:



Name & Title:

Tim Royer, EMC Engineer

Date of Signature

1/3/2023

Signature:

Name & Title:

Terri Allen, Technical Assistant

Date of Signature

1/3/2023



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3. Test Sample(s) (EUT/DUT)

The test sample was received: 12/20/2022

3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

Identification	
FCC ID:	YWFHD33568
Brief Description	HF Amplifier
Model(s) #	HD33568
Firmware version	N/A
Software version	N/A
Serial Number	N/A

Technical Characteristics	
Frequency Range	42-43 MHz
RF O/P Power (Max.)	1500 W
Antenna Connector	N Type
Voltage Rating (AC or Batt.)	240V 60 Hz AC source

Antenna Characteristics			
Antenna	Frequency Range	Mode / BW	Antenna Gain
1	n/a	n/a	0 dBi

- Note: Information such as antenna gain, firmware/software numbers are provided by manufacturer and cannot be validated by the test lab.



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3.2 Configuration of EUT

Test Modes				
Mode (#)	Mode (Type)	Test Frequencies (MHz)	BW (nominal) (kHz)	Emission Designator
1	Transmit	42.06	10.24	F1D

Operating conditions during Testing:

The device was operated without the provided antenna(s).

No other modifications of the device under test (including firmware, specific software settings, and input/output signal levels to the EUT) were made.

Peripherals used during Testing:

No peripherals used.

3.3 Test Setup of EUT

Equipment, antenna, and cable arrangement. The setup of the equipment and cable or wire placement on the test site that produces the highest radiated and the highest ac power line conducted emissions shall be shown clearly and described. Information on the orientation of portable equipment during testing shall be included. Drawings or photographs may be used for this purpose.

Test Setups are included in the test report.



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4. Test methods & Applicable Regulatory Limits

4.1 Test methods/Standards/Guidance:

Test procedures and guidance for measuring Licensed Part 90 Licensed device:

- 1) ANSI C63.26-2015

4.2 Applied Limits and Regulatory Limits:

- 1) FCC CFR 47 Part 90

5. Measurement Uncertainty

Parameter	Uncertainty (dB)
Conducted Emissions	± 3.14 dB
Radiated Emissions (9kHz – 30 MHz)	± 3.08 dB
Radiated Emissions (30 – 200 MHz)	± 2.16 dB
Radiated Emissions (200 – 1000 MHz)	± 2.15 dB
Radiated Emissions (1 GHz – 18 GHz)	± 2.14 dB
Radiated Emissions (18 GHz – 40 GHz)	± 2.31 dB

Note: The uncertainties provided in this table represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of K=2.

6. Environmental Conditions

6.1 Temperature & Humidity

Measurements performed at the test site did not exceed the following:

Parameter	Measurement
Temperature	23 C +/- 5%
Humidity	55% +/- 5%
Barometric Pressure	30.05 in Hg

Note: Specific environmental conditions that are applicable to a specific test are available in the test result section.



7. List of Test Equipment and Test Facility

The test equipment used identified by type, manufacturer, serial number, or other identification and the date on which the next calibration or service check is due.

Description of the firmware or software used to operate EUT for testing purposes.

A complete list of all test equipment used shall be included with the test report. The manufacturer's model and serial numbers, and date of last calibration, and calibration interval shall be included. Measurement cable loss, measuring instrument bandwidth and detector function, video bandwidth, if appropriate, and antenna factors shall also be included where applicable.

7.1 List of Test Equipment

Test Equipment						
Type	Device	Manufacturer	Model	SN#	Current Cal	Cal Due
Antenna	Biconical 1057	Eaton	94455-1	1057	10/16/2023	10/16/2023
Antenna, NSA	Log-Periodic 1243	Eaton	96005	1243	5/4/21	5/3/2024
Antenna	Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	2/25/20	2/24/2023
CHAMBER	CHAMBER	Panashield	3M	N/A	3/12/19	12/21/2023
Pre-amp	Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	2/27/19	7/26/2025
Receiver	EMI Test Receiver R&S ESU 40	Rohde & Schwarz	ESU 40	100320	5/27/21	5/26/2024
Receiver	EMI Test Receiver R&S ESW44	Rohde & Schwarz	ESW44	103049	10/13/21	10/12/2024
Function Generator	Function Generator	Standford	DS340	25200	1/13/21	1/13/2024



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Signal Generator	Signal Generator HP 8648C	HP	8648C	35537A016 79	3/29/19	8/03/2025
Thermometer	Type K J Thermometer	Martel	303	080504494	1/18/20	1/17/2023

Software			
Software	Author	Version	Validation on
ESU Firmware	Rohde & Schwarz	4.43 SP3; BIOS v5.1-24-3	2018
RSCommander	Rohde & Schwarz	1.6.4	2014
ScopeExplorer	LeCroy	v2.25.0.0	2009
Field Strength	Timco	v4.10.7.0	2016



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8. Test Results

The results of the test are usually indicated in the form of tables, spectrum analyzer plots, charts, sample calculations, as appropriate for each test procedure.

A description and/or a block diagram of the test setup is usually provided.

The measurement results, along with the appropriate limits for comparison, may be presented in tabular or graphical form. In addition, any variation in the measurement environment may be reported if applicable (e.g., a significant change of temperature that could affect the cable loss and amplifier response).

Unless noted otherwise in the referenced standard, the measurements of **ac power-line conducted emissions and conducted power output** will be reported in units of dB μ V. Unless noted otherwise in the referenced standard, the measurements of **radiated emissions** will be reported in units of decibels, referenced to one microvolt per meter (dB μ V/m) for electric fields, or to one ampere per meter (dBA/m) for magnetic fields, at the distance specified in the appropriate standards or requirements. The measurements of antenna-conducted power for receivers may be reported in units of dB μ V if the impedance of the measuring instrument is also reported. Otherwise, antenna-conducted power will be reported in units of decibels referenced to one milliwatt (dBm). All formulas for data conversions and conversion factors, if used, will be included in this measurement report.

Example:

Freq (MHz)	Meter Reading	+ ACF	+CL	= FS
33	20 dB μ V	+ 10.36 dB/m	+0.40 dB	=30.36 dB μ V/m @ 3m

$$\text{EIRP} = \text{Pcond (dBm)} + \text{dBi}$$



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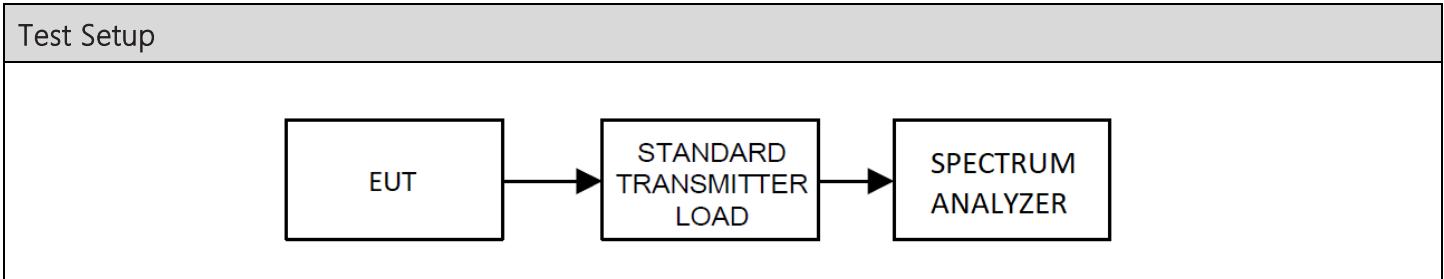
8.1 Power at the Final Amplifier

Limits from FCC Part 2.1033 (c)(8). No method of measurement is specified.

Test Results		
EUT Operating Voltage (V)	EUT Current (A)	Power at the Final Amplifier (W)
240	30	7200

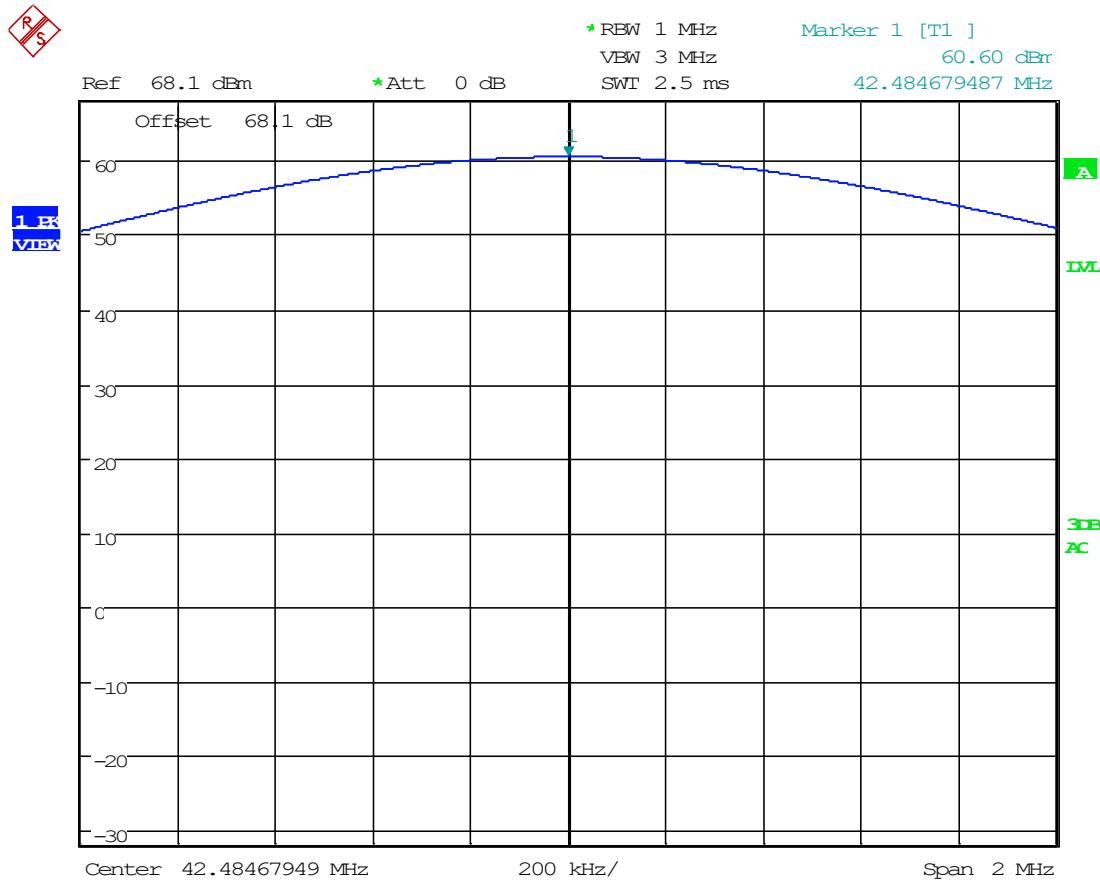
8.2 RF Output Power

Limits from FCC Parts 2.1046(a), and 90.205 (r); and test procedure from ANSI C63.26-2015.



Test Results, Mode 1		
Tuned Frequency (MHz)	Power Output (dBm)	Power Output (W)
42.06 MHz	60.60	1148.15

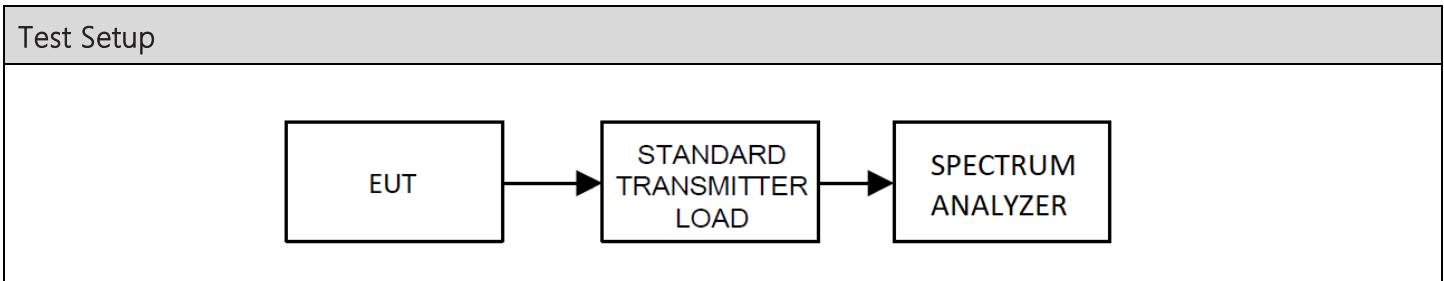
8.2.1 RF Power Output Plot, 42.06 MHz



Date: 21.DEC.2022 10:44:21

8.3 Bandwidth & Emission

Limits from FCC Parts 2.1049, and 90.207 & 90.209, and test procedure from ANSI C63.26-2015.



Test Results, Authorized Bandwidth

Rule Part	Operating Range (MHz)	Authorized Bandwidth (kHz)
Part 90	42.06	10.24

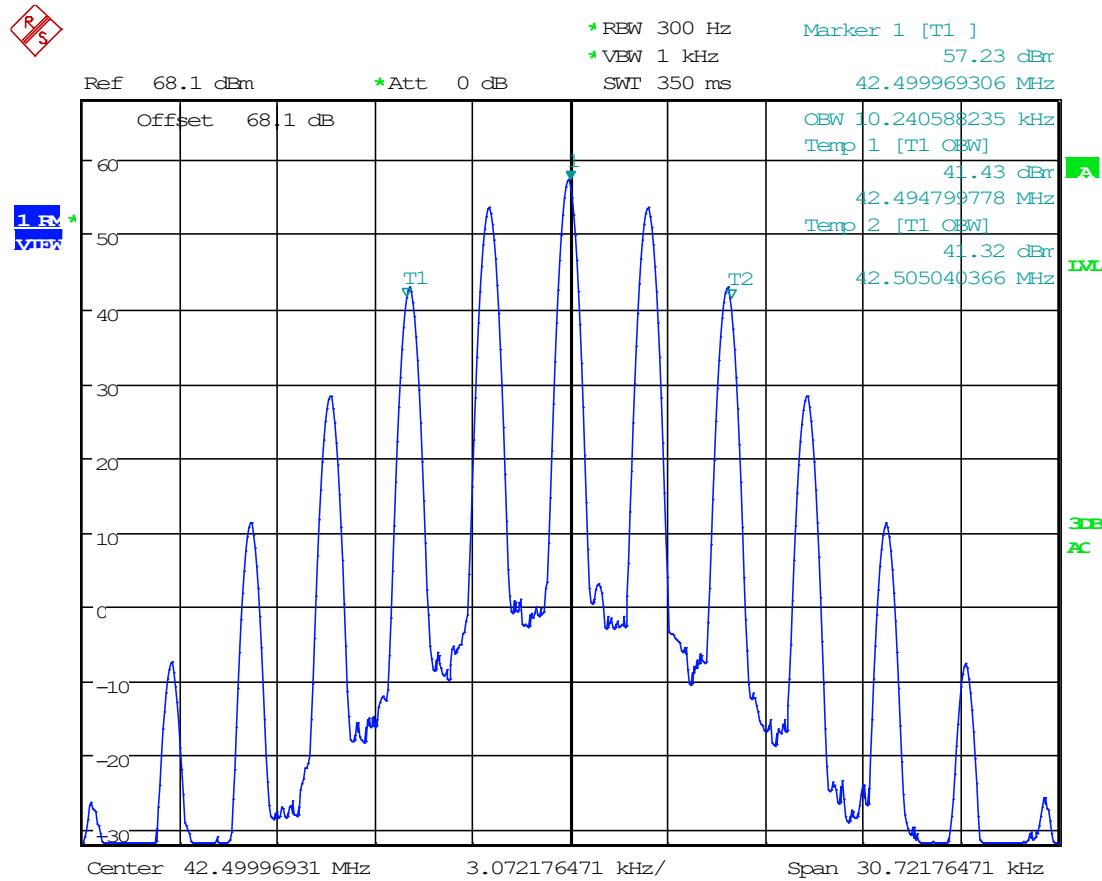


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Test Results, Occupied Bandwidth				
Tuned Frequency (MHz)	Mode	Emission Designator	Occupied Bandwidth (kHz)	Bandwidth Type
42.06	1	F1D	10.24	99%

Occupied Bandwidth, Spectrum Plots

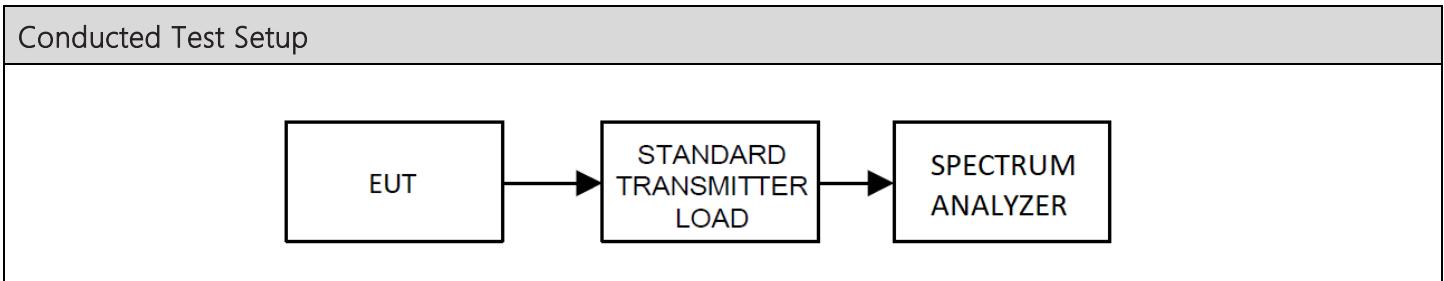
8.3.1 99% Bandwidth Plot, 2.5 kHz FM, 42.06 MHz



Date: 21.DEC.2022 12:22:41

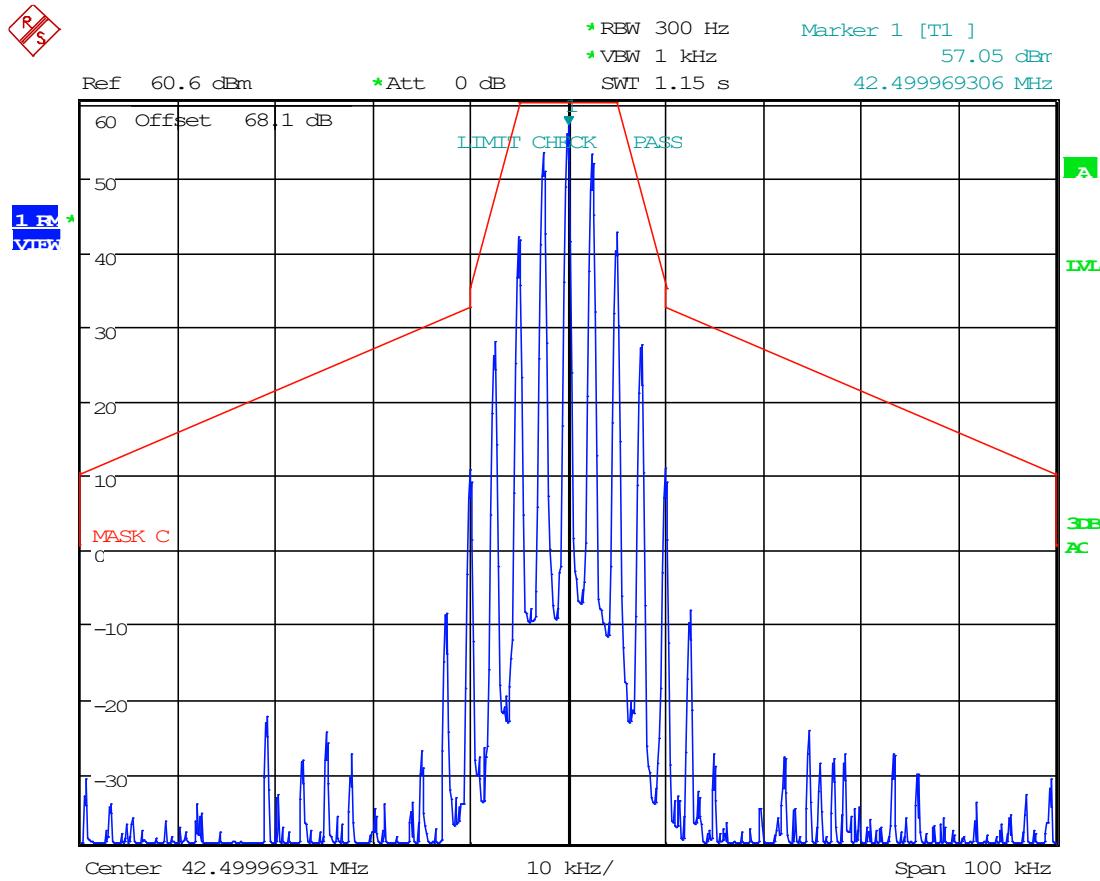
8.4 Emission Limitations, In-Band

Limits from FCC Part 90.210; and test procedure from ANSI C63.26-2015.



Conducted Emissions Mask, Spectrum Plots

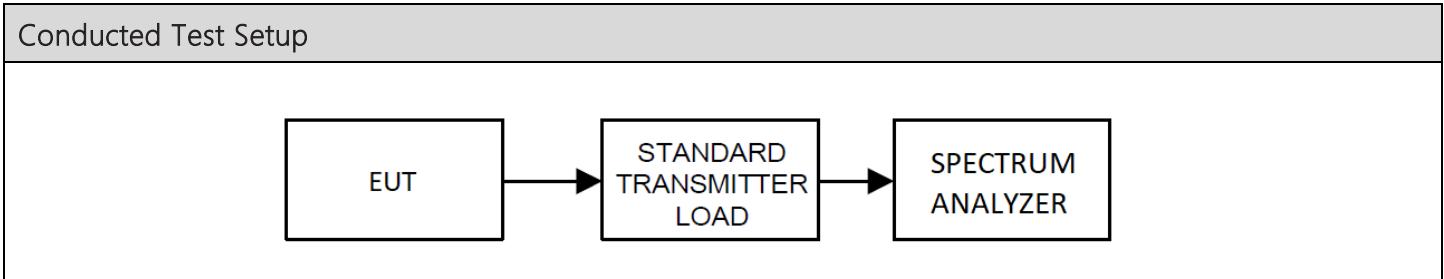
8.4.1 Emission Mask, 2.5 kHz FM, 42.06 MHz



Date: 21.DEC.2022 12:29:27

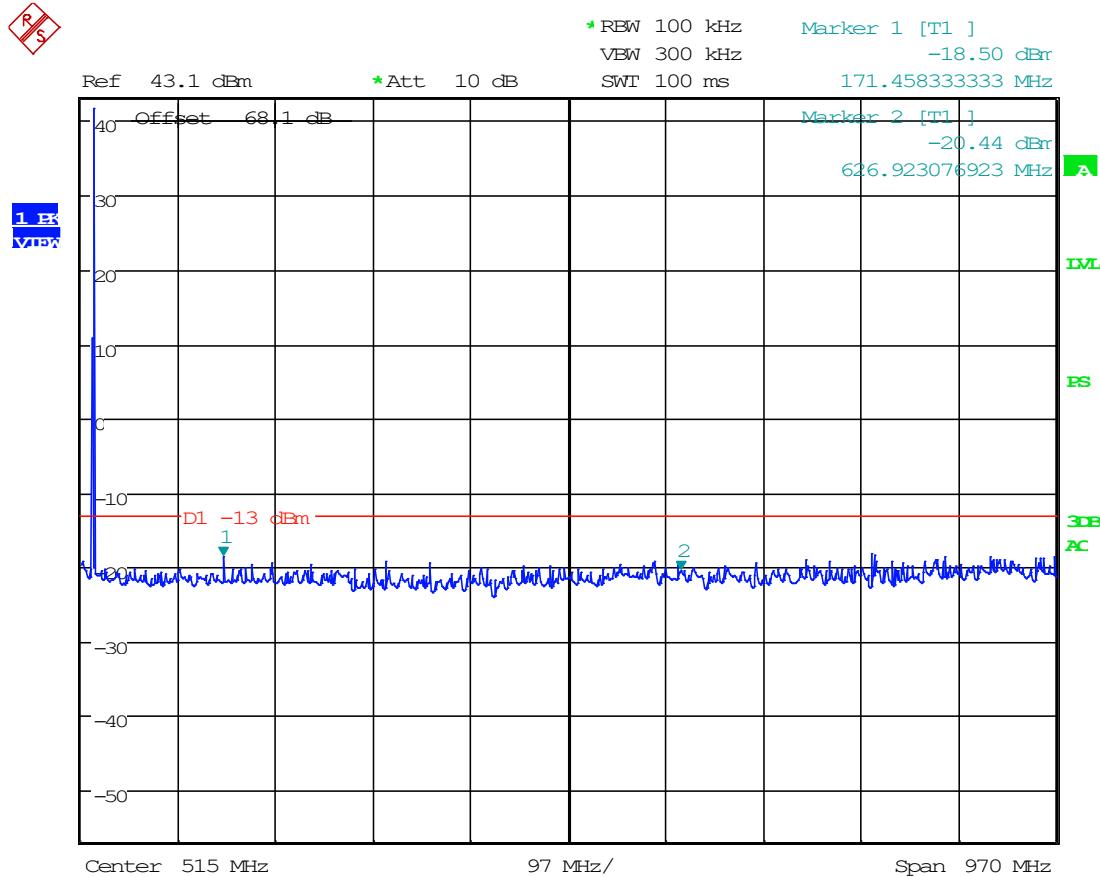
8.5 Emission Limitations, Out-of-Band

Limits from FCC Parts 2.1051, and 90.210; and test procedure from ANSI C63.26-2015.



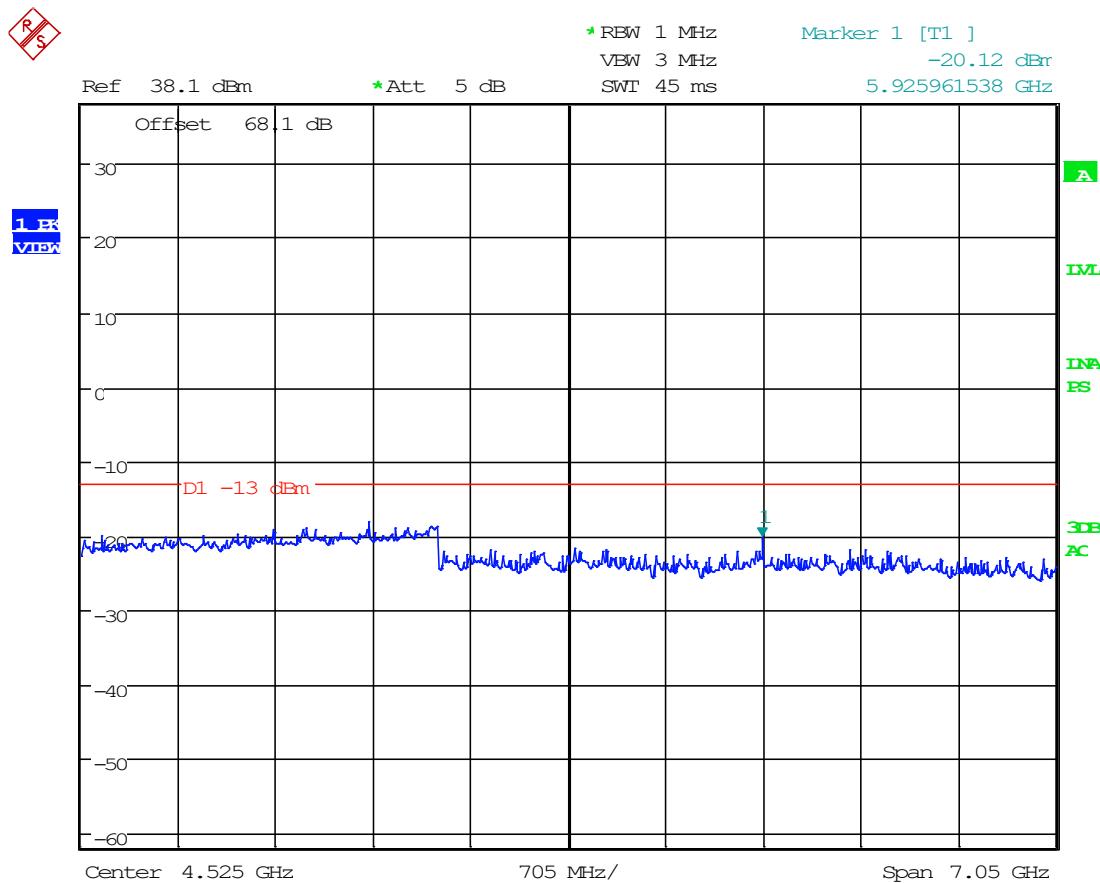
Conducted Emissions Spectrum Plots

8.5.1 Conducted Emissions, Below 1GHz, 42.06 MHz



Date: 21.DEC.2022 12:38:08

8.5.2 Conducted Emissions Above 1GHz, 42.06 MHz

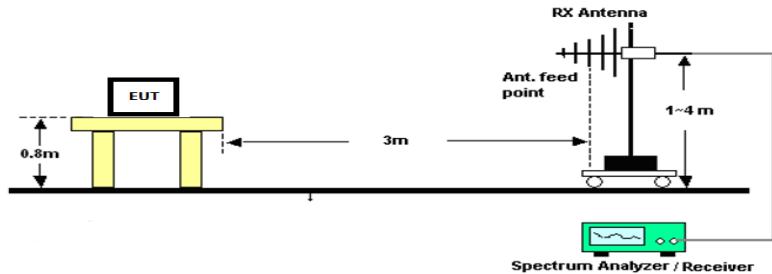


Date: 21.DEC.2022 12:38:58

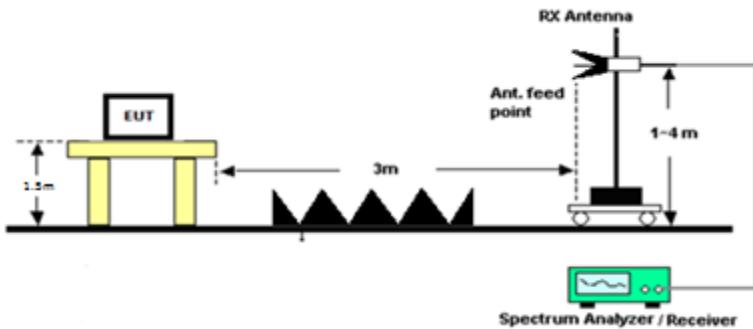
8.6 Radiated Emissions

Limits from FCC Parts 2.1053 and 90.210 (n); and test procedure from ANSI C63.26-2015.

Radiated Test Setup, 30 – 1000 MHz



Radiated Test Setup, Above 1000 MHz





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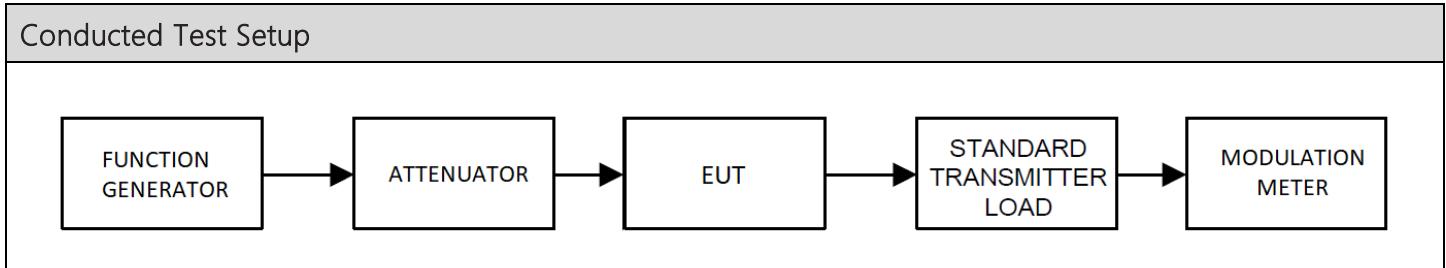
Radiated Emissions, Tabular Data

8.6.1 Radiated Emissions, 42.06 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBuV)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dB μ V/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dB)
42.06	84.12	PK	-8.80	H	1.10	9.62	3.00	1.93	-95.45	-13.00	82.45
42.06	84.12	PK	-8.90	V	1.10	9.62	3.00	1.83	-95.55	-13.00	82.55
42.06	126.18	PK	-7.60	H	1.27	12.04	3.00	5.71	-91.67	-13.00	78.67
42.06	126.18	PK	-8.80	V	1.27	12.04	3.00	4.51	-92.87	-13.00	79.87
42.06	168.24	PK	-3.10	H	1.51	15.48	3.00	13.88	-83.49	-13.00	70.49
42.06	168.24	PK	-8.90	V	1.51	15.48	3.00	8.08	-89.29	-13.00	76.29
42.06	210.30	PK	5.80	H	1.63	10.49	3.00	17.93	-79.45	-13.00	66.45
42.06	210.30	PK	5.00	V	1.63	10.49	3.00	17.13	-80.25	-13.00	67.25
42.06	252.36	PK	-7.40	H	1.92	11.44	3.00	5.95	-91.42	-13.00	78.42
42.06	252.36	PK	-6.90	V	1.92	11.44	3.00	6.45	-90.92	-13.00	77.92
42.06	294.42	PK	-4.10	H	2.08	13.11	3.00	11.09	-86.29	-13.00	73.29
42.06	294.42	PK	-2.00	V	2.08	13.11	3.00	13.19	-84.19	-13.00	71.19
42.06	336.48	PK	-8.40	H	2.11	13.70	3.00	7.41	-89.97	-13.00	76.97
42.06	336.48	PK	-9.00	V	2.11	13.70	3.00	6.81	-90.57	-13.00	77.57
42.06	378.54	PK	-3.60	H	2.24	14.65	3.00	13.29	-84.09	-13.00	71.09
42.06	378.54	PK	-7.30	V	2.24	14.65	3.00	9.59	-87.79	-13.00	74.79
42.06	420.60	PK	-7.40	H	2.34	15.45	3.00	10.39	-86.99	-13.00	73.99
42.06	420.60	PK	-6.10	V	2.34	15.45	3.00	11.69	-85.69	-13.00	72.69

8.7 Modulation Characteristics

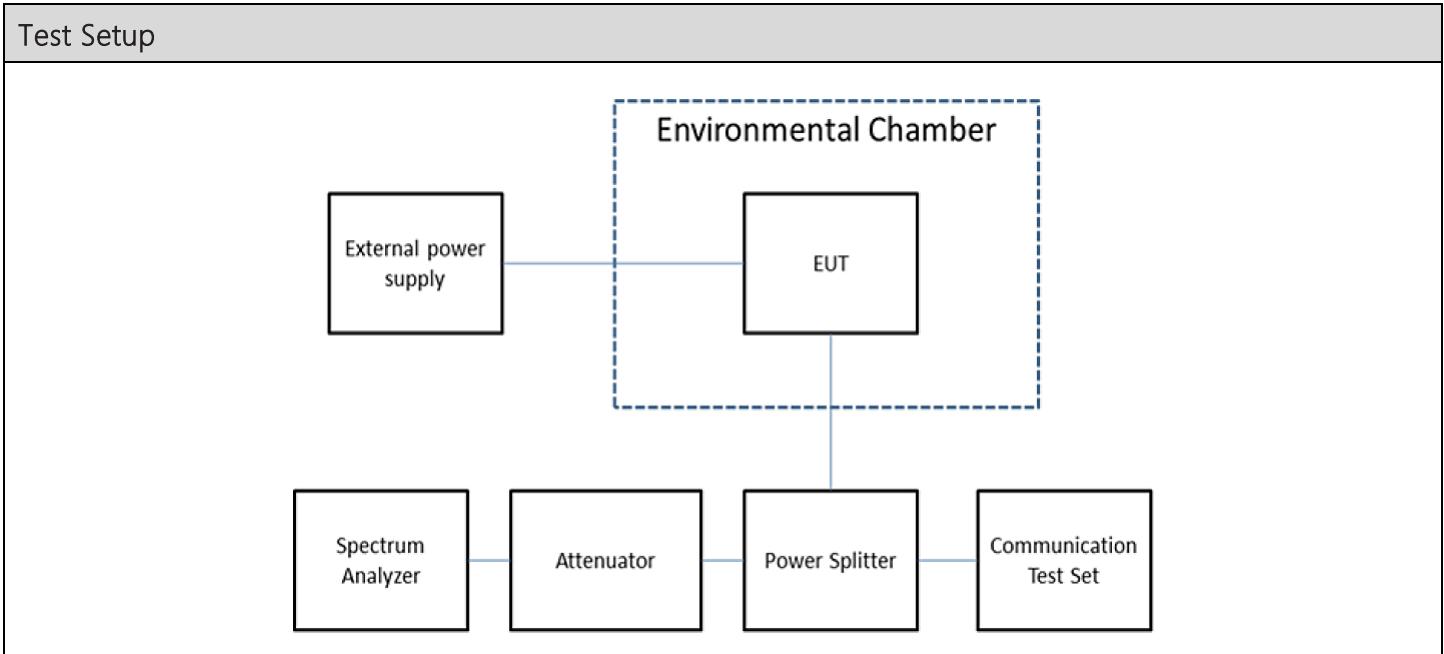
Limits from FCC Parts 2.1047 and test procedure from ANSI C63.26-2015



N/A

8.8 Frequency Stability

Limits from FCC Parts 2.1055, and 90.213; and test procedure from ANSI C63.26-2015.



Test Results, Mode 1

Tuned Frequency (MHz)	Max Deviation (kHz)	Limit (ppm)
42.06	-0.004	20

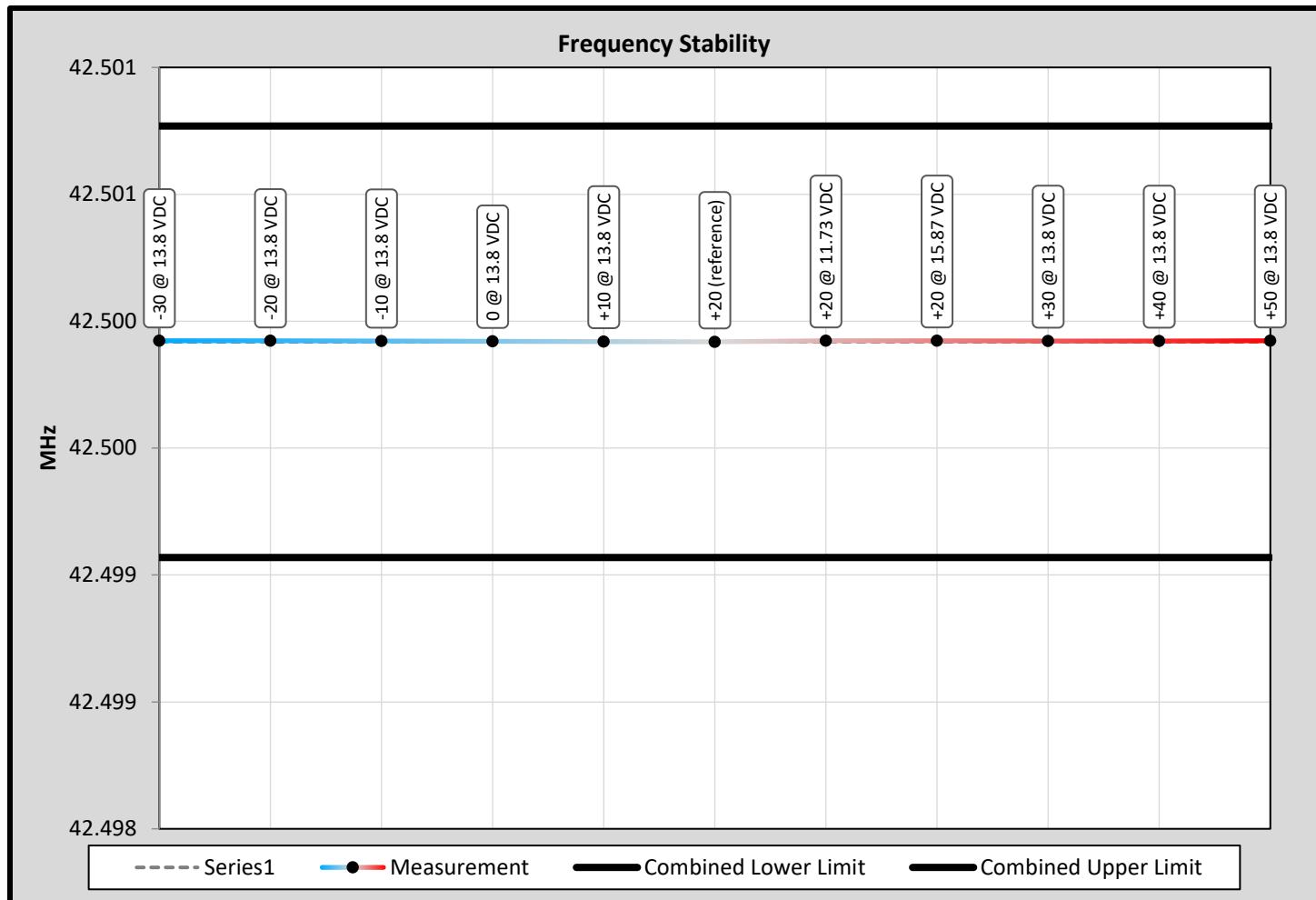


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8.8.1 Frequency Stability Data

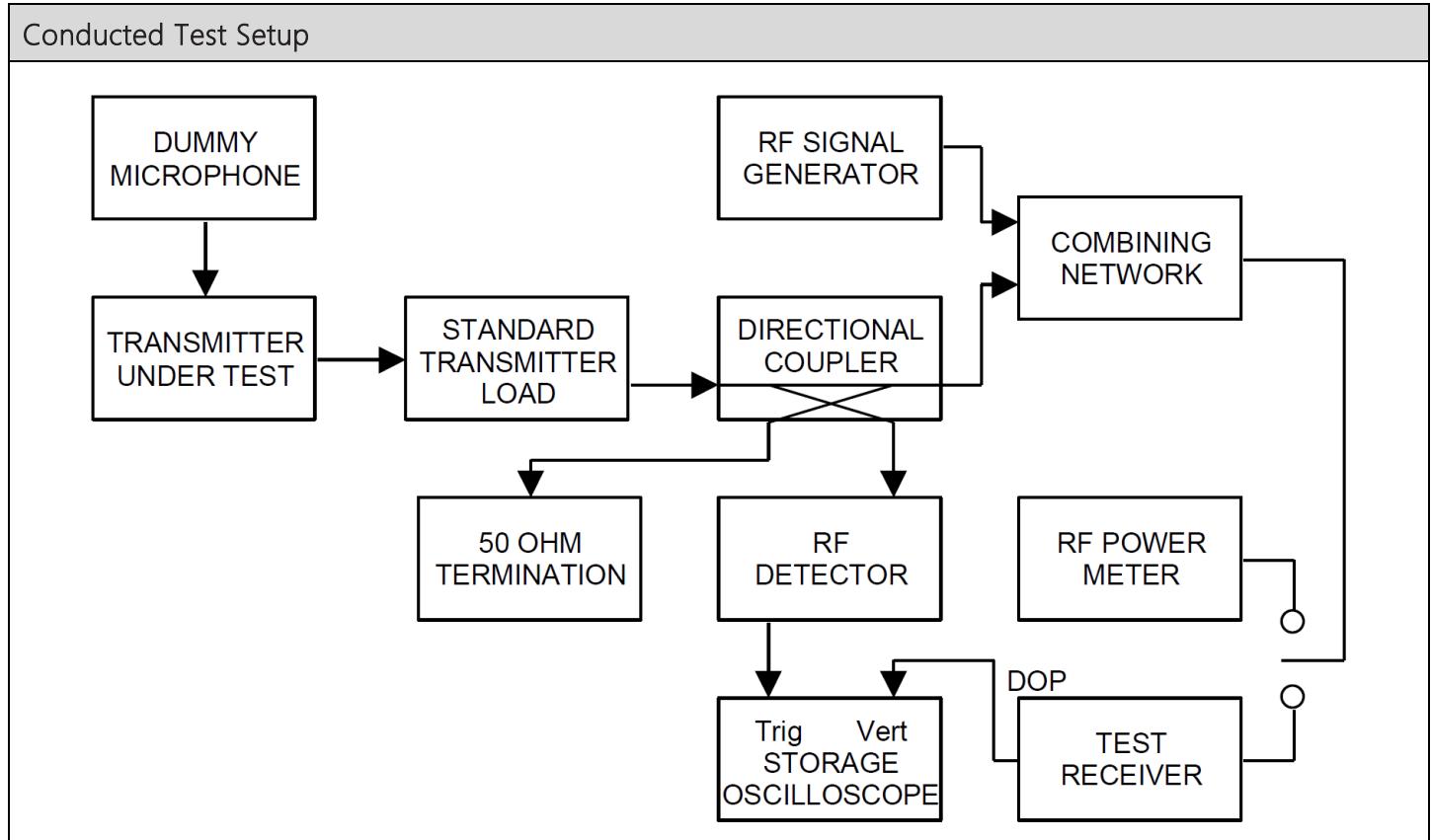
FCC Part 90 Limit	20.0	ppm	
FCC Part 90 Limit, as ppb	20000	ppb (Parts per Billion)	
FCC Part 90 Limit, as %	0.00200	%	
Strictest Combined Limit, as Hz	849.998	Hz	
Combined Lower Limit	42.499069	MHz	
Combined Upper Limit	42.500769	MHz	
Rated Supply Voltage	13.8	<input checked="" type="checkbox"/> AC <input type="checkbox"/> DC	
Temperature / Voltage Variation			
Temperature (°C)	Supplied Voltage (V)	Frequency (MHz)	Deviation (kHz)
-30	13.8	42.499923	-0.004
-20	13.8	42.499923	-0.004
-10	13.8	42.499922	-0.003
0	13.8	42.499921	-0.002
+10	13.8	42.499920	-0.001
+20 (reference)	13.8	42.499919	0.000
+20	11.7	42.499923	-0.004
+20	15.9	42.499923	-0.004
+30	13.8	42.499922	-0.003
+40	13.8	42.499922	-0.003
+50	13.8	42.499923	-0.004

8.8.1 Frequency Stability Plot



8.9 Transient Frequency Behavior

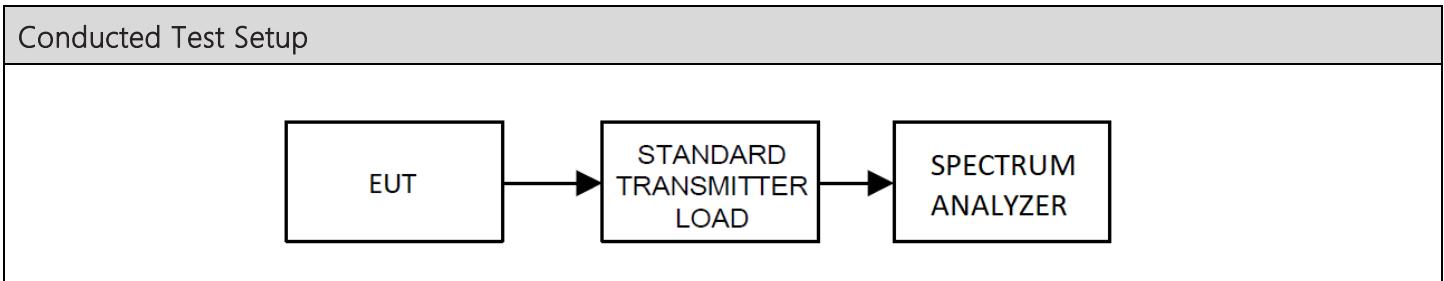
Limits from FCC Part 90.214; and test procedure from ANSI C63.26-2015.



N/A

8.10 Adjacent channel power limits

Limits from FCC Part 90.221, and test procedure from ANSI C63.26-2015.



n/a. The EUT does not operate in a band requiring ACP.



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9. ANNEX-A - Photographs of the EUT

Photographs of the EUT and any manufacturer supplied accessories to be used with the EUT are in separate supplementary documents labelled EXTERNAL PHOTOS and INTERNAL PHOTOS.

10. ANNEX-B – Test Setup Photographs

Test setup photographs are located in a separate supplementary ANNEX-B document.

11. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
TR_5811-22_FCC 90_	1	Initial release	12/22/2022



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END OF TEST REPORT
