



FCC Part 95G Test Report

APPLICANT	WISYCOM
	Via Tiepole, 7/E Tombola Italy 35019
FCC ID	POUCST38
MODEL NUMBER	CST38
PRODUCT DESCRIPTION	VHF BASE TRANSMITTER
STANDARD APPLIED	CFR 47 Part 95
DATE SAMPLE RECEIVED	06/10/2019
DATE TESTED	06/10/2019
TESTED BY	Tim Royer
APPROVED BY	Franklin Rose
TEST RESULTS	☒ PASS ☐ FAIL

Report Number	Report Version	Description	Issue Date
1467UT19_PT95_TestReport	Rev1	Initial Issue	06/10/2019
1467UT19_PT95_TestReport	Rev2	Updated Address, Revised test frequency, Revised frequency stability	10/9/2019
1467UT19_PT95_TestReport	Rev3	Updated test frequency	10/22/2019

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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GENERAL REMARKS

Summary

The device under test does:

- ☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.
- ☐ Not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669
Designation #: US1070

Tested by:



Name and Title	Tim Royer, Project Manager / EMC Testing Engineer
Date	06/13/2019

Reviewed and Approved by:



Name and Title	Franklin Rose, Project Manager / EMC Testing Technician
Date	06/10/2019

GENERAL INFORMATION

EUT Description	VHF BASE TRANSMITTER
FCC ID	POUCST38
Model Number	CST38
Operating Frequency	216.0125 – 216.975MHz
Test Frequencies	216.0125 MHz, Channel 1, Standard Band Channels
Modulation	FM
EUT Power Source	☒ 110–120Vac/50– 60Hz
	☐ DC Power
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☒ Mobile
	☐ Portable
Antenna Connector	N/A
Test Conditions	The temperature was 26°C Relative humidity of 50%.
Modification to the EUT	No Modification to EUT.
Test Exercise	The EUT was placed in continuous transmit and was operated in "Test Mode" for digital emissions tests.
Applicable Standards	FCC CFR 47 Part 2, & 74 KDB 971168 D01 V02R02 ANSI/TIA 603-D:2010 ANSI C63.4 2014 ANSI C63.26 2015
Test Facility	Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070

RESULTS SUMMARY

FCC Rule Part	Requirement	Test Item	Result
2.1046(a), 95.2167 (a)	ERP	RF Power Output	PASS
2.1049(c), 95.2173	Operating Bandwidth	Occupied Bandwidth	Reporting Only
2.1049(c), 95.2173	Operating Bandwidth	Emission Mask	PASS
95.2179(a)	Unwanted Emissions	Emission Mask	PASS
2.1053, 95.2179	Unwanted Emissions	Field Strength of Spurious Emissions	PASS
2.1055, 95.2165	Frequency Tolerance	Frequency Stability	PASS

RF POWER OUTPUT

Rule Part No.: 2.1046(a), 95.2167 (1)

Requirement:

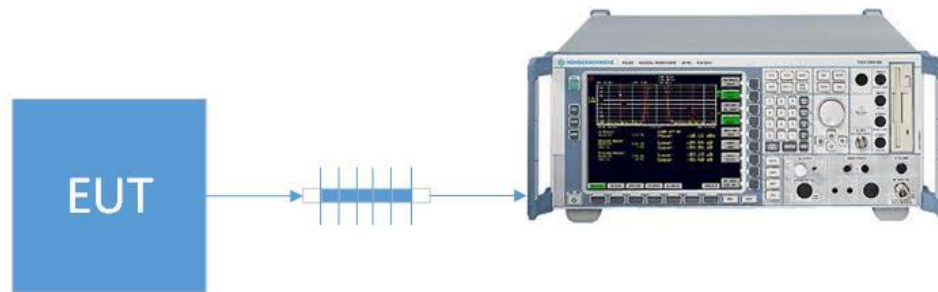
Each LPRS transmitter type not intended for use with an AMTS station must be designed to satisfy the transmitting power limits in paragraph (a) of this section. The licensee of each AMTS station is responsible for compliance with paragraph (b) of this section.

(a) The ERP of an LPRS transmitter, other than an LPRS transmitter used with an AMTS station, must not exceed 100 mW.

(b) The ERP of an LPRS transmitter used with an AMTS station must not exceed 1 Watt.

Procedure: ANSI C63.26-2015 Section 5.2.7

Setup Diagram:



Test Data: Mean Output Power Measurement Table

Tuned Freq. MHz	Power Output		
	Level (dBm)	Level (mW)	Margin (mW)
216.0125	13.66	23.2	76.8

Results Meet Requirements

OCCUPIED BANDWIDTH

Rule Part No.: 2.1049, 95.2173, 95.2179

Requirement:

§95.2173 LPRS authorized bandwidths.

Each LPRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the channel bandwidth used.

(b) The occupied bandwidth for emissions transmitted on the standard band, extra band or AMTS channels listed in §95.2163(a), (b), or (d), respectively, is limited through compliance with the unwanted emissions rule (§95.2179).

§95.2179 LPRS unwanted emission limits.

The requirements in this section apply to each LPRS transmitter type both with and without the connection of attachments, such as an external microphone, power cord and/or antenna.

(a) *Emission masks.* Emission masks applicable to transmitting equipment in the LPRS are defined by the requirements in the following table. The numbers in the paragraphs column refer to attenuation requirement rule paragraph numbers under paragraph (b) of this section.

Channels	Paragraphs
narrowband 5 kHz	(1), (2)
standard band 25 kHz	(3), (4)
extra band 50 kHz	(5), (6)
AMTS 250 kHz	(7), (8)

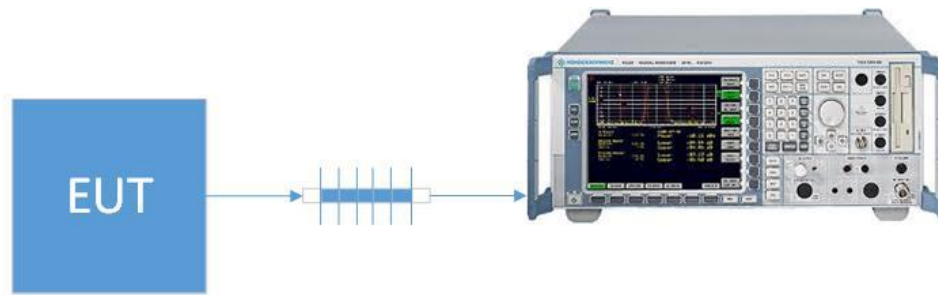
(3) 30 dB on any frequency removed from the channel center frequency by 12.5 kHz to 22.5 kHz.

(4) 43 + 10 log (P) dB on any frequency removed from the channel center frequency by more than 22.5 kHz.

Procedure: KDB 971168 D01 Power Bandwidth 99% section 4.2
KDB 971168 D01 Spurious Emissions at antenna term section 6
ANSI C63.26, 5.4.4 (using Test Setup from TIA 603-E 2.2.11, below)

OCCUPIED BANDWIDTH

Setup Diagram:



Test Data: Operating Bandwidth Measurement Table

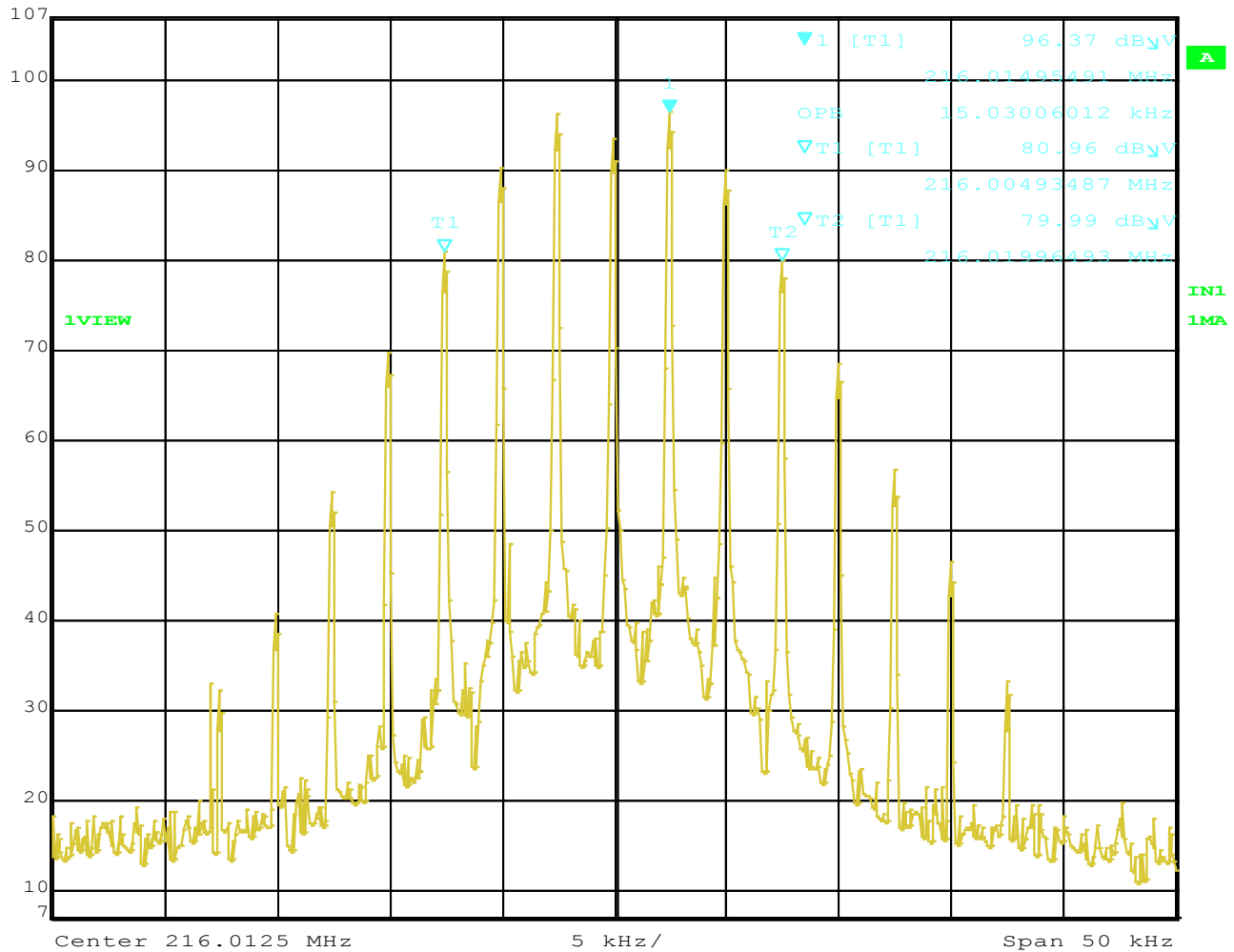
Tuned Freq (MHz)	Measured 99% BW (kHz)
216.0125	15.03

OCCUPIED BANDWIDTH

Test Data: Operating Bandwidth Measurement Plot



Marker 1 [T1] RBW 100 Hz RF Att 30 dB
 Ref Lvl 96.37 dB μ V VBW 3 kHz
 107 dB μ V 216.01495491 MHz SWT 25 s Unit dB μ V



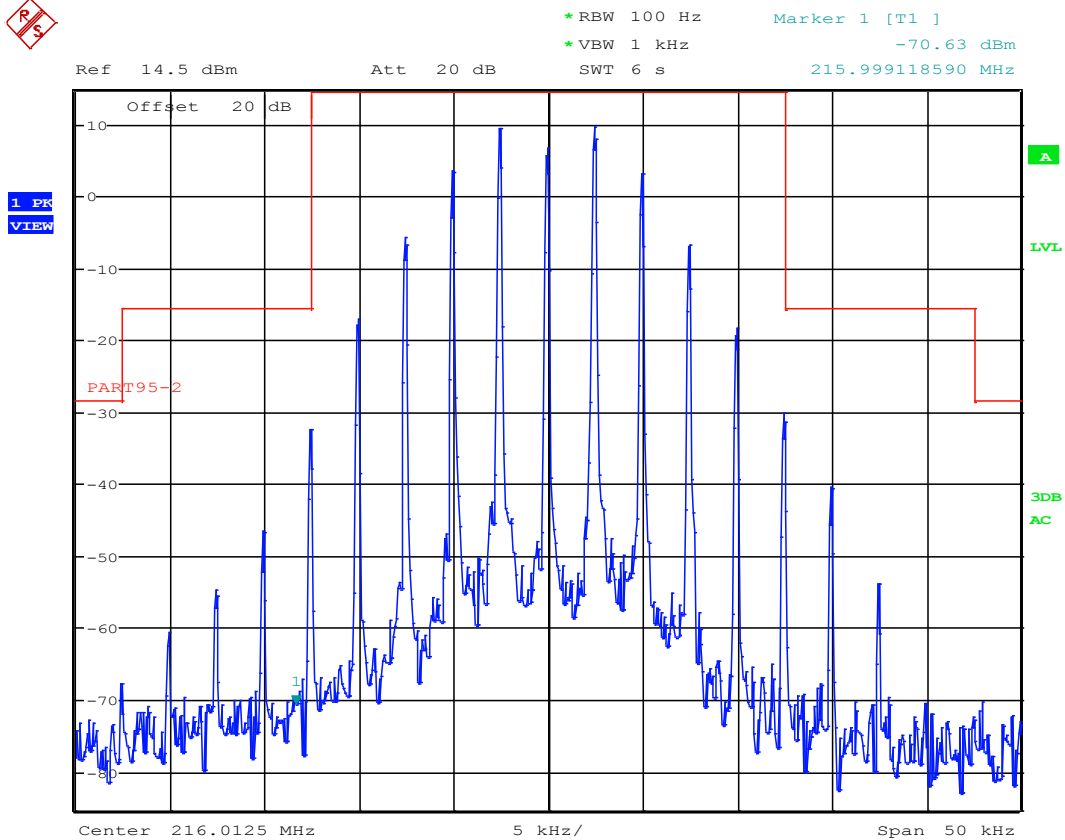
Date: 1.JAN.1997 00:35:53

Reporting only

Applicant: WISYCOM
 FCC ID: POU CST38
 REPORT: 1467UT19_PT95_TestReport_Rev3

OCCUPIED BANDWIDTH

Test Data: Emission Mask Plot



Date: 22.OCT.2019 17:09:46

FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Part No.: 2.1053, 95.2179

Requirement:

§95.2179 LPRS unwanted emission limits.

The requirements in this section apply to each LPRS transmitter type both with and without the connection of attachments, such as an external microphone, power cord and/or antenna.

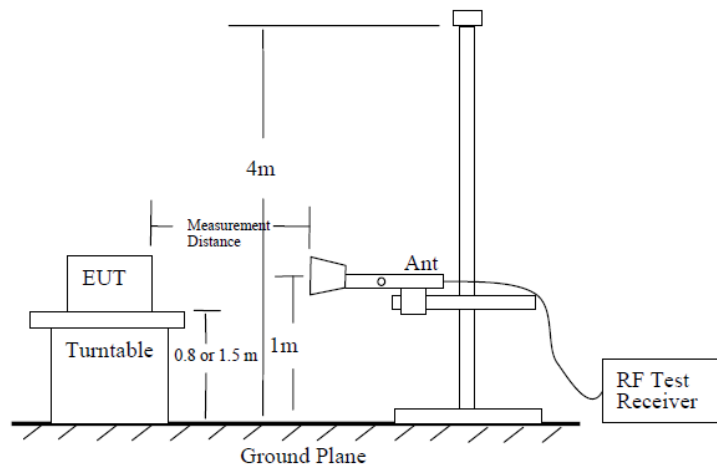
(a) *Emission masks.* Emission masks applicable to transmitting equipment in the LPRS are defined by the requirements in the following table. The numbers in the paragraphs column refer to attenuation requirement rule paragraph numbers under paragraph (b) of this section.

Channels	Paragraphs
narrowband 5 kHz	(1), (2)
standard band 25 kHz	(3), (4)
extra band 50 kHz	(5), (6)
AMTS 250 kHz	(7), (8)

(4) $43 + 10 \log (P)$ dB on any frequency removed from the channel center frequency by more than 22.5 kHz.

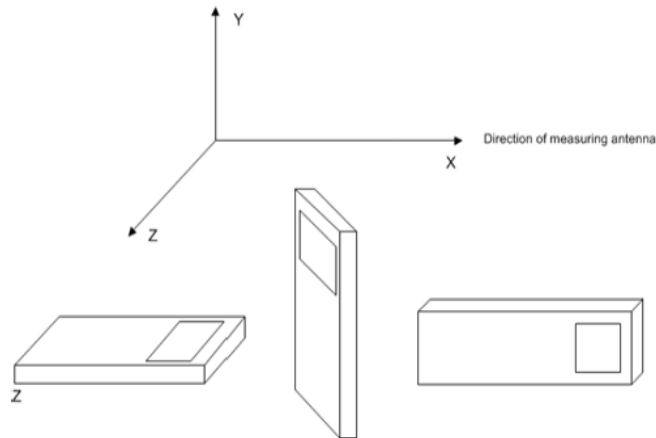
Procedure: KDB 971168 D01 Spurious Emissions at antenna term section 7
ANSI C63.26, 5.5.4
ANSI C63.4 General Radiated Testing and Site Validation

Test Site Setup:



FIELD STRENGTH OF SPURIOUS EMISSIONS

EUT Orientation(s):



Note: The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from the lowest frequency generated internally to at least the tenth harmonic of the fundamental. This test was conducted in accordance with the standard listed above using the substitution method. Measurements were made at the test site of TIMCO ENGINEERING, INC. located at 849 NW State Road 45, Newberry, FL 32669. The measurements below represent the worst case of all the frequencies tested.

Note: The six (6) highest emissions or more of each worst-case operational modes of the EUT are represented below. Emissions 20 dB below the limit are not required to be reported.

FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data:

Tuned Frequency (MHz)	Emission Frequency (MHz)	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Correction Factor (dB/m)	Field Strength (dBμV/m)	Distance (m)	Field Strength (dBμV/m)	ERP (dBm)	Margin (dB)	Limit
216.0125	432.03	36.06	V	2.39	16.82	55.27	3.000	55.266	-42.112	29.11	-13
216.0125	432.03	35.56	H	2.39	16.82	54.77	3.000	54.766	-42.612	29.61	-13
216.0125	648.04	25.41	V	2.96	19.98	48.35	3.000	48.350	-49.027	36.03	-13
216.0125	648.04	26.11	H	2.96	19.98	49.05	3.000	49.050	-48.327	35.33	-13
216.0125	864.05	19.39	V	3.51	22.76	45.66	3.000	45.657	-51.720	38.72	-13
216.0125	864.05	16.08	H	3.51	22.76	42.35	3.000	42.347	-55.030	42.03	-13
216.0125	1080.06	20.32	H	3.81	27.02	51.15	3.000	51.152	-46.226	33.23	-13
216.0125	1080.06	16.38	V	3.81	27.02	47.21	3.000	47.212	-50.166	37.17	-13
216.0125	1296.08	16.67	H	4.12	28.67	49.46	3.000	49.456	-47.921	34.92	-13
216.0125	1296.08	18.80	V	4.12	28.67	51.59	3.000	51.586	-45.791	32.79	-13
216.0125	1512.09	24.39	H	4.51	27.76	56.66	3.000	56.665	-40.712	27.71	-13
216.0125	1512.09	24.17	V	4.51	27.76	56.44	3.000	56.445	-40.932	27.93	-13
216.0125	1728.10	14.64	H	4.82	29.48	48.94	3.000	48.939	-48.438	35.44	-13
216.0125	1728.10	21.19	V	4.82	29.48	55.49	3.000	55.489	-41.888	28.89	-13
216.0125	1944.11	20.93	H	5.11	31.30	57.34	3.000	57.337	-40.040	27.04	-13
216.0125	1944.11	26.39	V	5.11	31.30	62.80	3.000	62.797	-34.580	21.58	-13
216.0125	2160.13	16.59	H	5.37	31.26	53.22	3.000	53.222	-44.155	31.16	-13
216.0125	2160.13	16.38	V	5.37	31.26	53.01	3.000	53.012	-44.365	31.37	-13

FREQUENCY STABILITY

Rule Part No.: 2.1055, 95.2165

Requirement:

Each LPRS transmitter type must be designed to satisfy the frequency accuracy requirements in this section.

(a) LPRS transmitters operating on standard band (25 kHz) or extra band (50 kHz) channels must be designed such that the carrier frequencies remain within ± 50 ppm of the channel center frequencies specified in §95.2163(a) and (b), respectively, during normal operating conditions.

(b) LPRS transmitters operating on narrowband (5 kHz) channels must be designed such that the carrier frequencies remain within ± 1.5 ppm of the channel center frequencies specified in §95.2163(c) during normal operating conditions.

Procedure: KDB 971168 D01 Spurious Emissions at antenna term section 9
TIA 603-D Carrier Frequency Stability 2.2.2

Test Data: Measurement Table

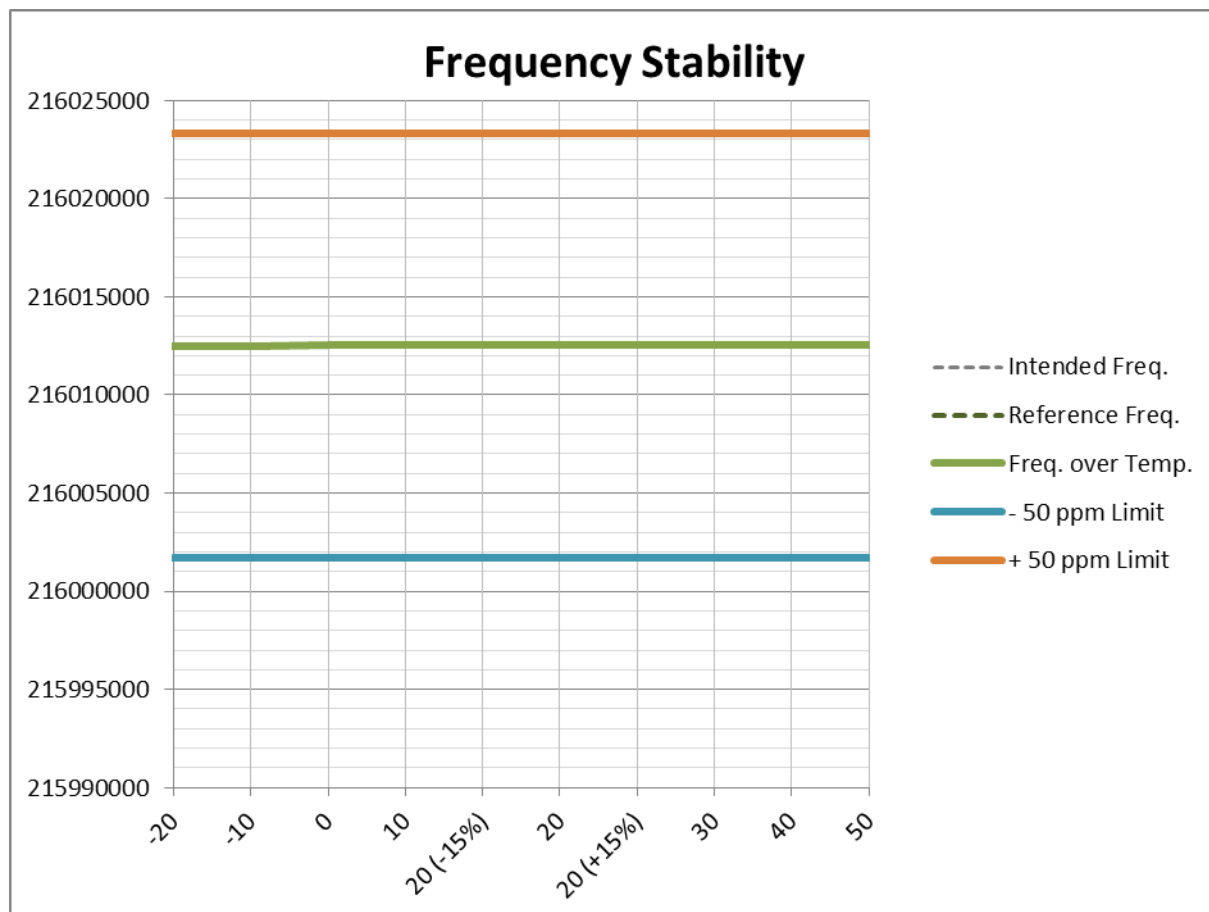
216.0125 MHz High Power				
Limit:		50	ppm	
Temperature (°C)	Supplied Voltage (VAC)	Intended Frequency (Hz)	Measured Reference Frequency (Hz)	Deviation (Hz)
20°C (reference)	110	216012500	216012530	-30
@ 20°C (reference)				
Supplied Voltage (%)	Supplied Voltage (VDC)	Frequency (Hz)	Deviation (Hz)	PPM
-15%	110	216012530	0	0.000
15%	110	216012530	0	0.000
Temperature (°C)	Supplied Voltage (VDC)	Frequency (Hz)	Deviation (Hz)	PPM
50	110	216012540	-10.000	-0.046
40	110	216012540	-10.000	-0.046
30	110	216012540	10.000	-0.046
20	110	216012530	0.000	0.000
10	110	216012530	0.000	0.000
0	110	216012520	10.000	0.046
-10	110	216012510	20.000	0.093
-20	110	216012470	60.000	0.278
-30	110	216012440	90.000	0.417

Results Meet Requirements

Applicant: WISYCOM
FCC ID: POUCAST38
REPORT: 1467UT19_PT95_TestReport_Rev3

FREQUENCY STABILITY

Test Data: Measurement Graph



Results Meet Requirements

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16-4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: “Uncertainty in EMC Measurements” and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
RF Frequency Accuracy	± 49.5 Hz	(1)
RF Conducted Power	± 0.93 dB	(1)
Conducted spurious emission of transmitter valid up to 40GHz	± 1.86 dB	
Occupied Bandwidth	$\pm 2.65\%$	
Audio Frequency Response	± 1.86 dB	
Modulation limiting	$\pm 1.88\%$	
Radiated RF Power	± 1.4 dB	
Maximum frequency deviation: Within 300 Hz and 6kHz of audio freq.	$\pm 1.88\%$	
Within 6kHz and 25kHz of audio Freq.	$\pm 2.04\%$	
Rad Emissions Sub Meth up to 26.5GHz	± 2.14 dB	
Adjacent channel power	± 1.47 dB	(1)
Transient Frequency Response	$\pm 1.88\%$	
Temperature	$\pm 1.0^\circ\text{C}$	(1)
Humidity	$\pm 5.0\%$	

Notes: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Biconical 1096	Eaton	94455-1	1096	08/01/17	08/01/19
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/26/17	07/26/19
Coaxial Cable - Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 KMKM-0670-01 KFKF-0197-00	N/A	N/A
CHAMBER	Panashield	3M	N/A	12/31/17	12/31/19
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	03/01/17	03/01/20
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
Antenna: Passive Loop	EMCO	6512	9706-1211	07/26/17	07/26/19
EMI Test Receiver R & S ESU 40	Rohde & Schwarz	ESU 40	100320	08/28/18	08/28/21
Attenuator N 20dB 20W DC-12G	Narda	768-20-SP	155	07/10/17	07/10/19
Attenuator N 20dB 20W DC-12G	Narda	768-20-SP	344	07/10/17	07/10/19
Attenuator BNC 10dB DC-2G	MiniCircuits	HAT-10+	#54	07/14/17	07/14/19
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	N/A	N/A
Terminator N 20W DC-18G	Narda	8205	#14	04/06/17	04/06/20
Attenuator BNC 6dB 50Ohm DC-2G	Mini-Circuits	HAT-6+	#53	07/14/17	07/14/19
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	09/01/16	09/01/19
Type K J Thermometer	Martel	303	080504494	11/02/17	11/02/19

*EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT