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FCC PART 74H
ISED PART RSS-210
LOW POWER LICENSED WIRELESS MICROPHONE

APPLICANT	**AUDIO-TECHNICA CORPORATION**
	2-46-1 NISHI-NARUSE **TOKYO, JAPAN 194-8666**
FCC ID	**JFZT3202DE2**
IC	**1752B-T3202DE2**
MODEL NUMBER	**ATW-T3202DE2**
PRODUCT DESCRIPTION	3000 SERIES HANDHELD MICROPHONE
STANDARD APPLIED	CFR 47 Part 74 & IC RSS-210
DATE SAMPLE RECEIVED	9/27/2017
DATE TESTED	10/25/2017
TESTED BY	Tim Royer
APPROVED BY	Sid Sanders

Report Number	Version Number	Description	Issue Date
1737AUT17TestReport	Rev1	Initial Issue	11/29/2017
	Rev2	Revised report	12/21/2017

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GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

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

Tested by:
Name and Title: Tim Royer, Project Manager/Testing Engineer

Sr. EMC Engineer
EMC-003838-NE

Date: 11/ 29/ 2017

Reviewed and approved by:
Name and Title: Sid Sanders, Engineer

Date: 11/ 30/ 2017

GENERAL INFORMATION

EUT Description	**3000 SERIES HANDHELD MICROPHONE**
FCC ID	**JFZT3202DE2**
IC	**1752B-T3202DE2**
MODEL #	**ATW-T3202DE2**
Operating Frequency	470.125 - 530 MHz
Test Frequencies	470.125, 500 & 529.975 MHz
Modulation	FM
EUT Power Source	☐ 110–120Vac/50– 60Hz
	☐ DC Power 12V
	☒ Battery Operated Exclusively
Test Item	☐ Prototype
	☐ Pre-Production
	☒ Production
Type of Equipment	☐ Fixed
	☐ Mobile
	☒ Portable
Test Conditions	The temperature was 26ºC with a relative humidity of 50%.
Revision History to the EUT	None
Test Exercise	The EUT was placed in continuous transmit mode.
Applicable Standards	FCC CFR 47 Part 2, & 74 *KDB 971168 D01 V02R02* *ANSI/TIA 603-D:2010* *ANSI C63.4 2014* *ISED RSS-210, RSS-GEN*
Test Facility	**Timco Engineering Inc.** **849 NW State Road 45** **Newberry, FL 32669 USA**. Designation #: US1070

RESULTS SUMMARY

FCC Rule Part	ISED Rules Part	Requirement	Test Item	Result
2.1046(a), 74.861(e)(1)(ii)	RSS-210	Conducted Power	RF Power Output	N/A
Part 2.1047(a)(b)		Modulation Characteristics	Modulation Characteristics	N/A
2.1049(c), 74.861(e)(5)	RSS-210	Operating Bandwidth	Occupied Bandwidth	Pass
2.1049(c), 74.861(e)(6)(i)(ii)	RSS-210	Unwanted Emissions	Occupied Bandwidth	Pass
2.1051(a), 74.861(e)(6)(iii)	RSS-210	Unwanted Emissions	Spurious Emissions at Antenna Terminals	N/A
2.1053, 74.861(e)(6)(iii)	RSS-210	Unwanted Emissions	Field Strength of Spurious Emissions	Pass
2.1055, 74.861(e)(4)	RSS-210	Frequency Tolerance	Frequency Stability	Pass

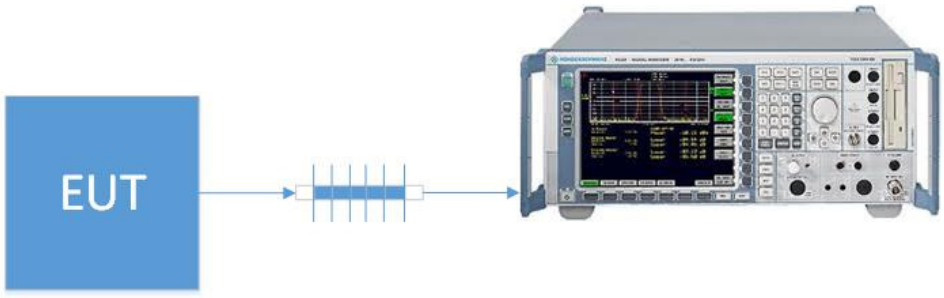
RF POWER OUTPUT

Rule Part No.: 2.1046(a), 74.861(e) (1) (ii), RSS-210

Requirement: 250 mW conducted power

Procedure: KDB 971168 D01 Average Power Measurements section 5.2.1

Setup Diagram:



Test Data: Mean Output Power Measurement Table

Tuned Freq MHz	Antenna Polarity	eirp (dBm)	Margin
470.12	V	3.38	13.60
470.12	H	8.22	8.76
500.00	H	8.51	8.47
500.00	V	-4.40	21.38
529.98	V	0.33	16.65

Note: Because there was no antenna connector or way to connect to the trace antenna, the EIRP measurements were compared to the conducted power limit.

MODULATION CHARACTERISTICS

Rule Part No.: Part 2.1047(a)(b)

Test Requirements:

Method of Measurement:

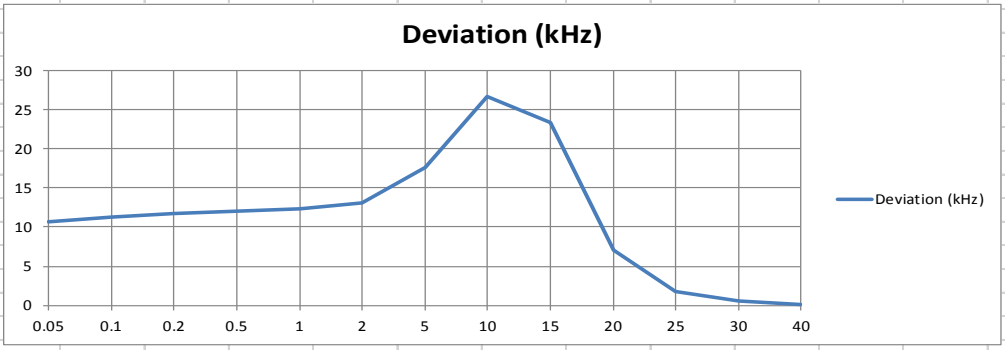
Audio frequency response

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with no exception. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.

Part 2.1047(a) Voice modulated communication equipment: For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all the circuitry installed between the modulation limiter and the modulated stage shall be submitted.

AUDIO FREQUENCY RESPONSE PLOT

1737AUT17	Testing at 1 Vpp
Audio In (kHz)	Deviation (kHz)
0.05	10.68
0.1	11.22
0.2	11.7
0.5	12.06
1	12.39
2	13.13
5	17.57
10	26.72
15	23.4
20	7.09
25	1.82
30	0.55
40	0.15



NOTES:	2.1047(b) - EUT does not employ Modulation limiting.
	2.1047(d) - EUT is tested as a 15.236 device, which has no specific requirement for Modulation Characteristics.
	90.214 - Transient Frequency Response does not apply to EUT. The EUT exhibits transmissions immediately when powered-on, continuously without inte

OCCUPIED BANDWIDTH

Rule Part No.: 2.1049(c), 74.861(e) (5), 74.861(e) (6) (i) (ii)

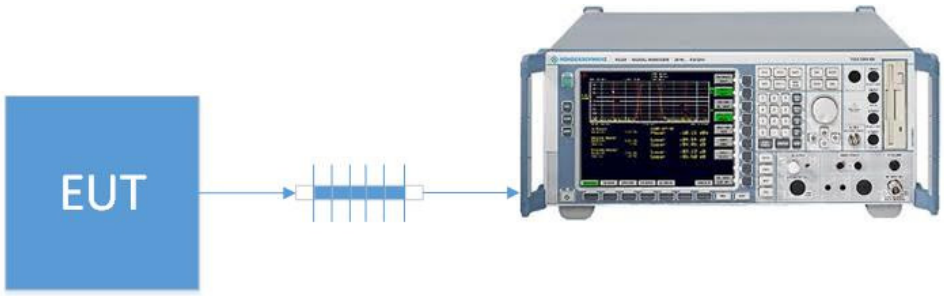
Requirement: The operating bandwidth shall not exceed 200 KHz, in addition the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;

On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;

Procedure: KDB 971168 D01 Power Bandwidth 99% section 4.2
KDB 971168 D01 Spurious Emissions at antenna term section 6
TIA 603-D Side Band Spectrum section 2.2.11

Setup Diagram:



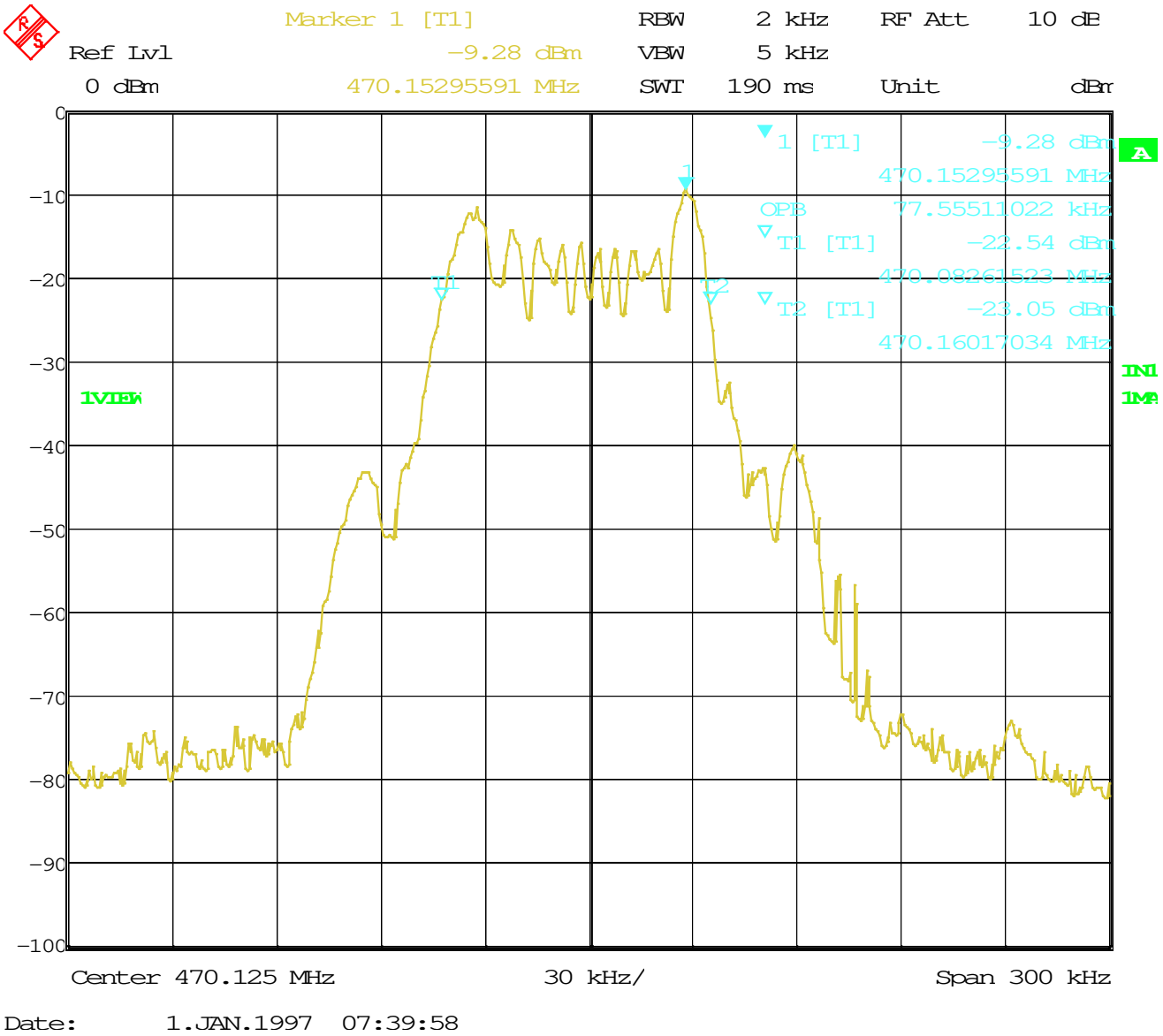
Test Data: Operating Bandwidth Measurement Table

Tuned Freq (MHz)	Measured 99% BW (KHz)	Margin (KHz)
470.125	77.55	122.45
500	78.15	121.85
529.975	73.34	126.66

Results Meet Requirements

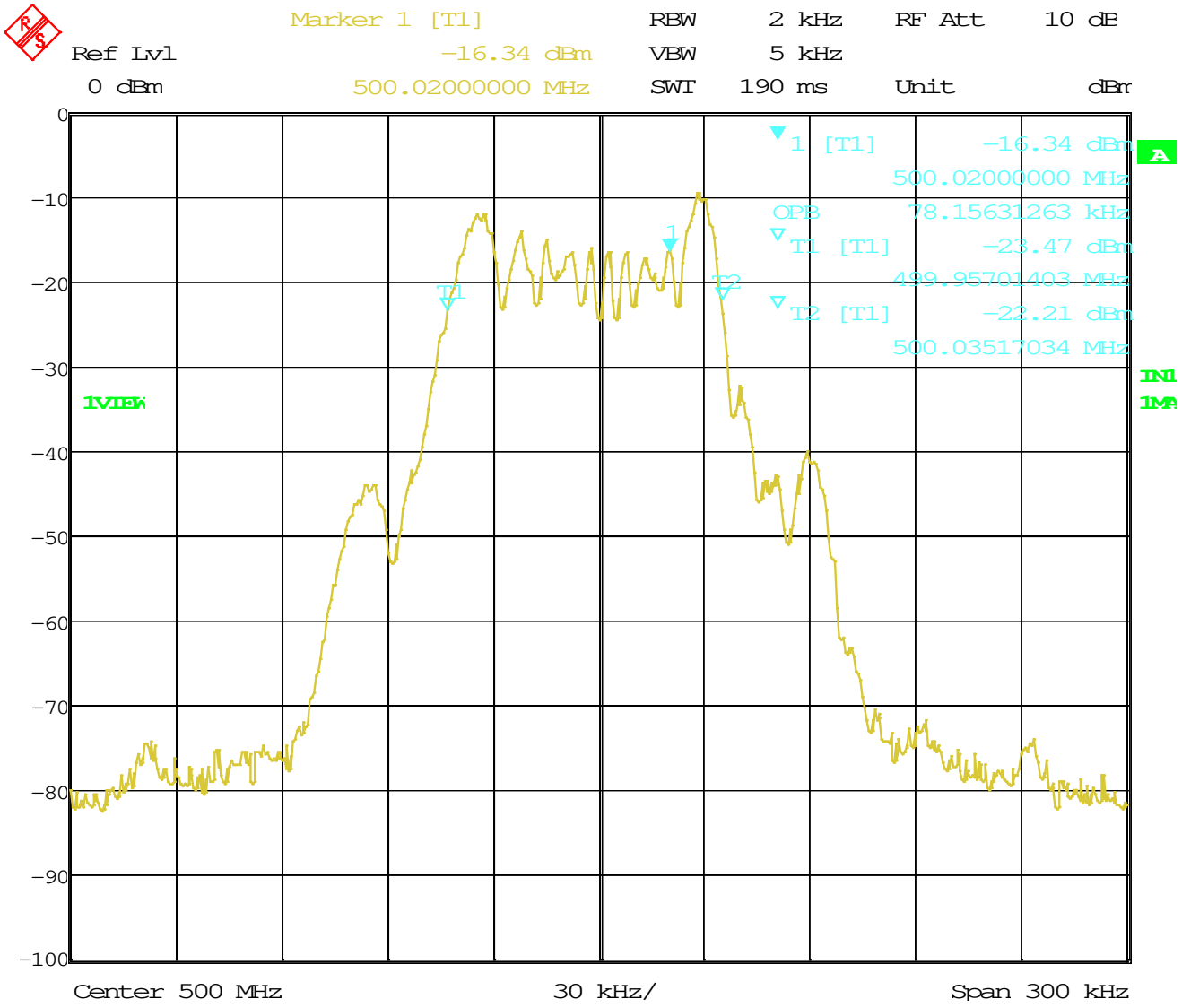
OCCUPIED BANDWIDTH (99%)

Test Data: 470.125 MHz



OCCUPIED BANDWIDTH PLOT (99%)

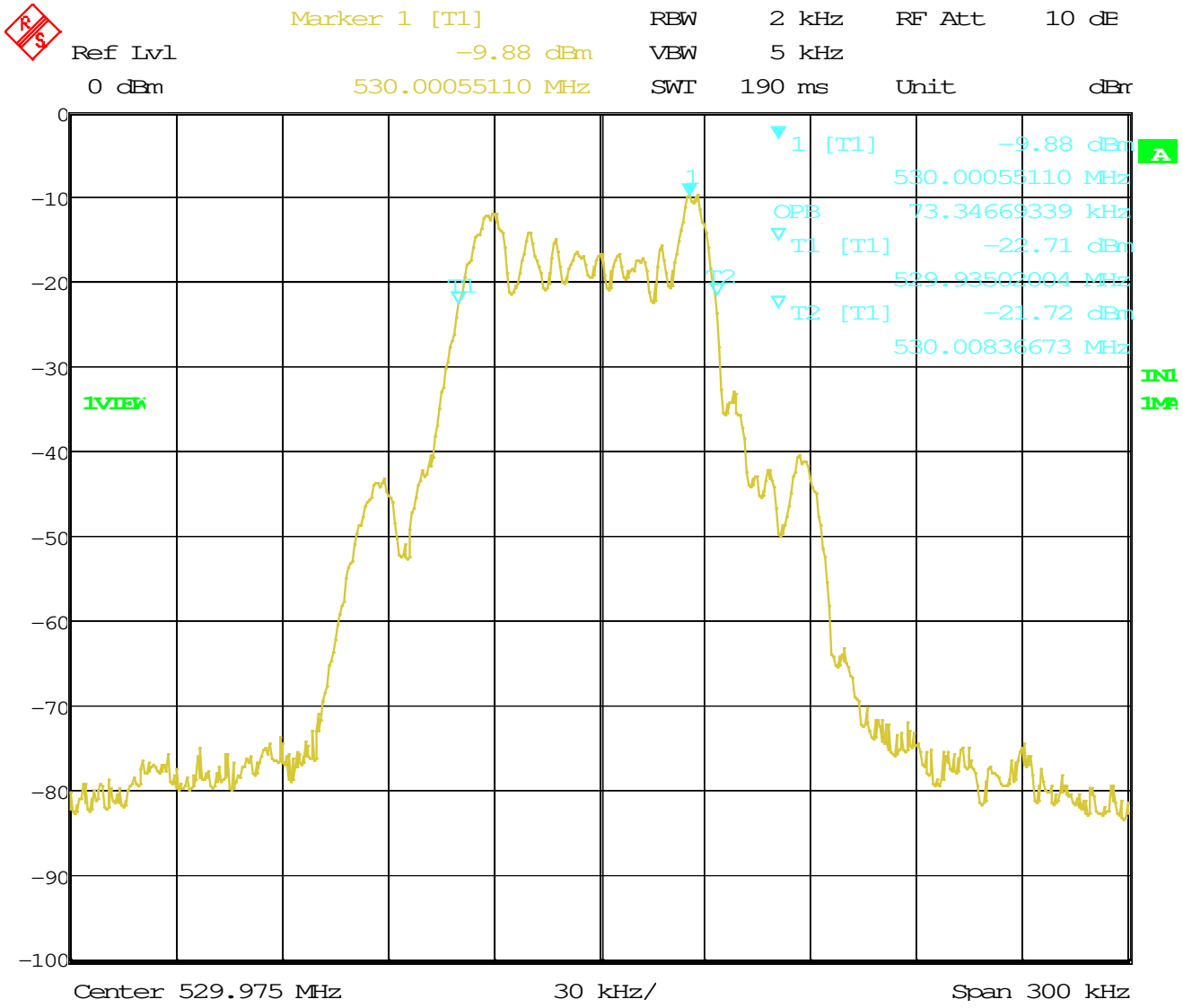
Test Data: 500 MHz



Date: 1.JAN.1997 07:34:42

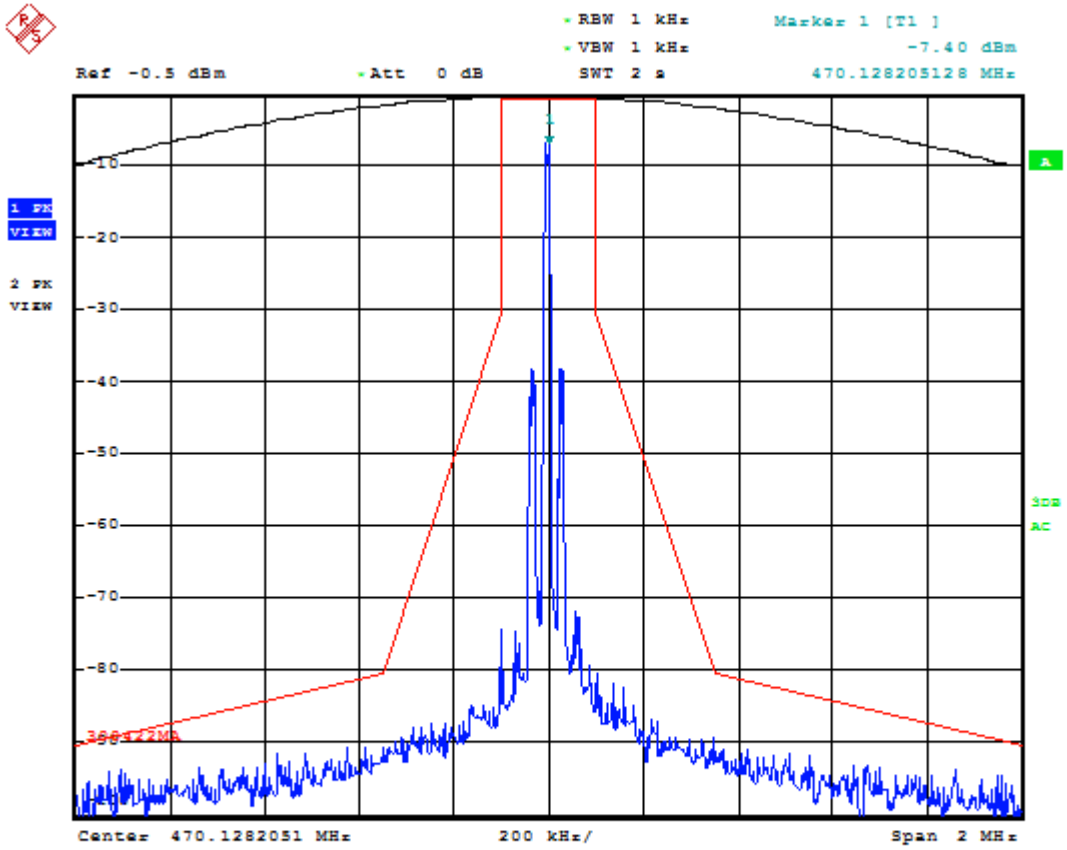
OCCUPIED BANDWIDTH PLOT (99%)

Test Data: 529.975 MHz



OCCUPIED BANDWIDTH PLOT

Test Data: Low End of Band

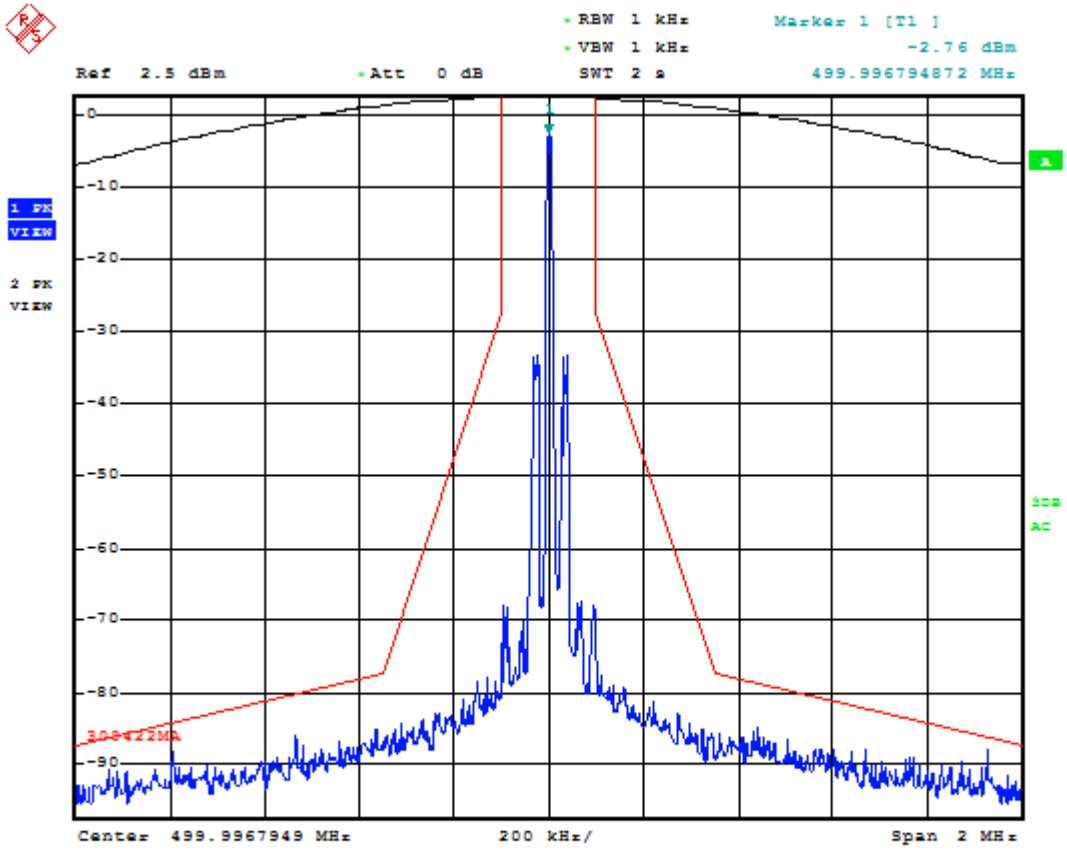


Date: 24.OCT.2017 10:38:21

Result: Meets Requirements

OCCUPIED BANDWIDTH PLOT

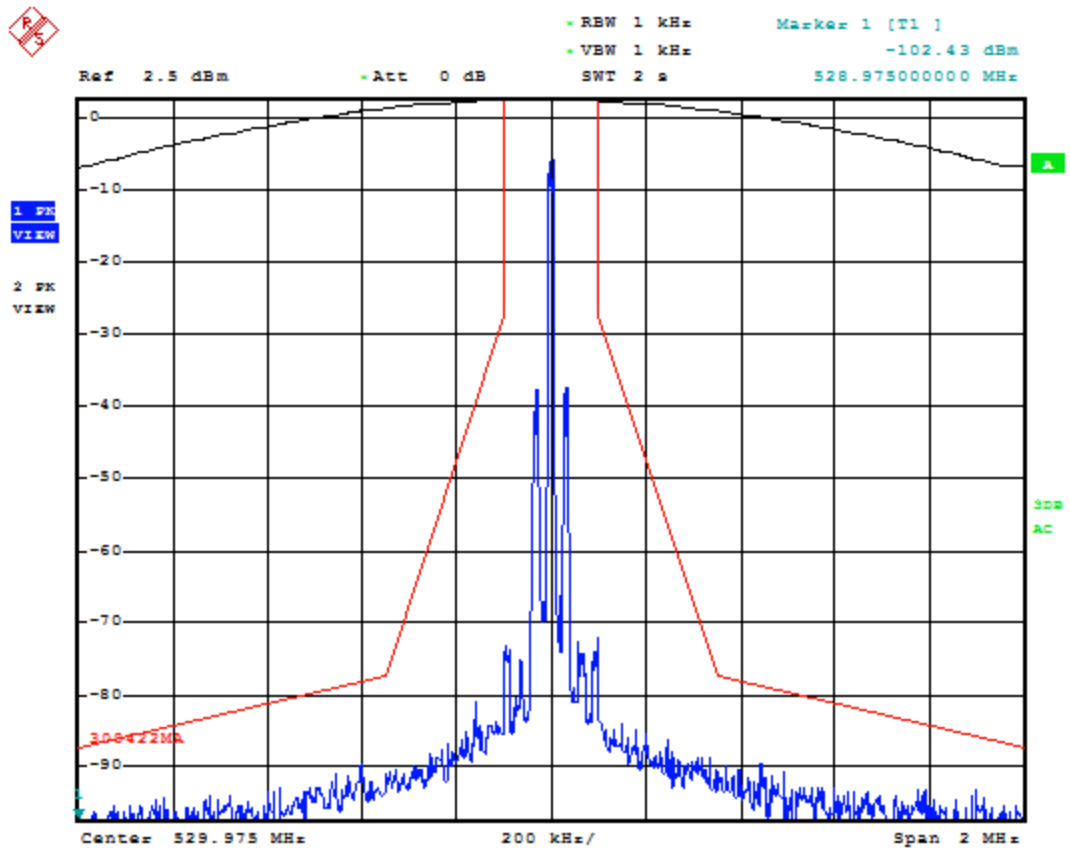
Test Data: Middle of Band



Result: Meets Requirements

OCCUPIED BANDWIDTH PLOT

Test Data: High End of Band



Date: 24.OCT.2017 11:00:13

Result: Meets Requirements

SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

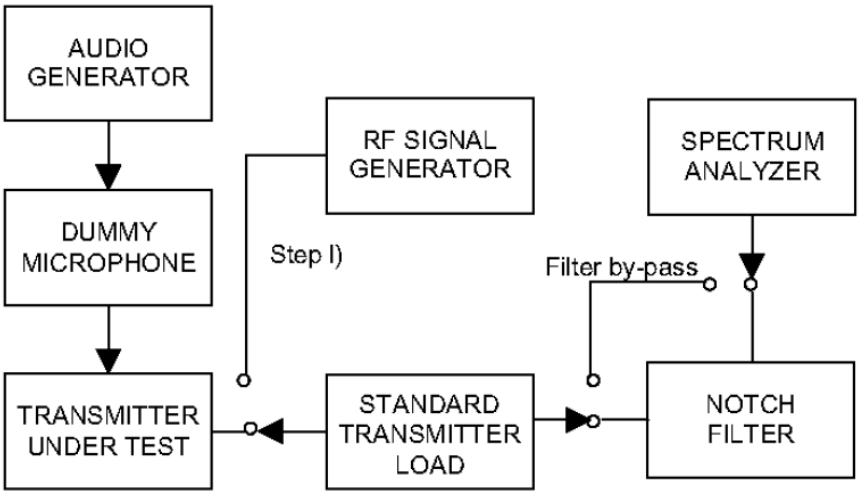
Rule Part No.: 2.1051(a), 74.861(e)(6)(iii), RSS-210

Requirement: the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10log10 (mean output power in watts) dB.

Procedure: KDB 971168 D01 Spurious Emissions at antenna term section 6
TIA 603-D Unwanted Emissions: Conducted section 2.2.13

Setup Diagram:



SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Note: EUT has an integral antenna with no antenna connector

FIELD STRENGTH OF SPURIOUS EMISSIONS

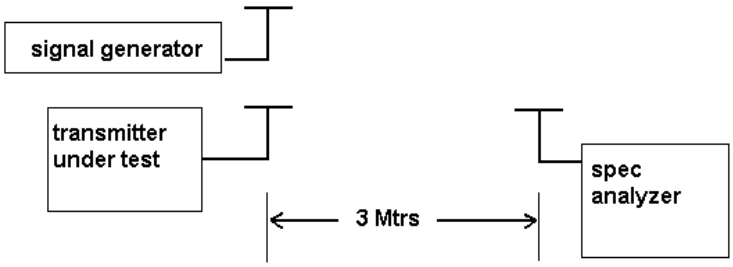
Rule Part No.: 2.1053, 74.861(e) (6) (iii), RSS-210

Requirement: the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43 + 10log10 (mean output power in watts) dB.

Procedure: KDB 971168 D01 Spurious Emissions at antenna term section 7
TIA 603-D Unwanted Emissions: Radiated section 2.2.12
ANSI C63.4 General Radiated Testing and Site Validation

Test Setup Diagram:



FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Data: Measurement Table

Tuned Freq MHz	Emission Frequency MHz	Antenna Polarity	erp (dBm)	Margin
470.12	940.25	H	-57.42	33.52
470.12	940.25	V	-62.54	38.64
470.12	1235.50	V	-27.87	3.97
470.12	1375.00	H	-26.43	2.53
470.12	2475.90	V	-25.51	1.61
500	2052.80	H	-24.72	0.82
500	2471.15	V	-26.25	2.35
529.98	1240.38	V	-27.60	3.70
529.98	1322.11	H	-27.96	4.06

Result: Meets Requirements

FREQUENCY STABILITY

Rule Part No.: 2.1053, 74.861(e) (6)(iii), RSS-210

Requirement: Temperature range requirements: -30 to +50º C.
Voltage Variation +, -15%

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

Test Data: Measurement Table

Temperature	Frequency MHz	Hz	PPM
25°C (reference)	529.97403		
-30°C	529.97395	-80	-0.151
-20°C	529.97395	-80	-0.151
-10°C	529.97383	-200	-0.377
0°C	529.97392	-110	-0.208
10°C	529.97396	-70	-0.132
20°C	529.97403	0	0.000
30°C	529.97397	-60	-0.113
40°C	529.97396	-70	-0.132
50°C	529.97393	-100	-0.189
Battery Voltage	Frequency	Hz	PPM
-15%	529.97379	-240	-0.453
15%	529.97455	520	0.981

Results Meet Requirements

STATE OF THE MEASUREMENT UC

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	±0.93dB	(1)
Conducted spurious emission of transmitter valid up to 40GHz	±1.86dB	
Occupied Bandwidth	±2.65%	
Audio Frequency Response	±1.86dB	
Modulation limiting	±1.88%	
Radiated RF Power	±1.4dB	
Maximum frequency deviation: Within 300 Hz and 6kHz of audio freq. Within 6kHz and 25kHz of audio Freq.	 ±1.88% ±2.04%	
Rad Emissions Sub Meth up to 26.5GHz	±2.14dB	
Adjacent channel power	±1.47dB	(1)
Transient Frequency Response	±1.88%	
Temperature	±1.0°C	(1)
Humidity	±5.0%	

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
Temperature Chamber LARGE	Tenney Engineering	TTRC	11717-7	09/01/16	09/01/18
Frequency Counter	HP	5385A	2730A03025	11/08/17	11/08/18
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	03/01/17	03/01/19
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
Antenna: Active Loop	ETS-Lindgren	6502	00062529		
Type K J Thermometer	Martel	303	080504494	11/06/17	11/06/19
Modulation Analyzer	HP	8901A	3050A05856	04/13/17	04/13/19
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - Chamber 3 cable set (Primary)	Micro-Coax	Chamber 3 cable set (Primary)	KMKM-0244-01; KMKM-0670-00; KFKF-0198-01	08/09/16	08/09/18
Function Generator	Standford	DS340	25200	02/02/16	02/02/18
Bore-sight Antenna Positioning Tower	Sunol Sciences	TLT2	N/A	N/A	N/A

*** EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

END OF REPORT