



849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR
352.472.5500
FAX: 352.472.2030
EMAIL: INFO@TIMCOENGR.COM
[HTTP://WWW.TIMCOENGR.COM](http://WWW.TIMCOENGR.COM)

**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	JFZT3201DE2
IC	1752B-T3201DE2
MODEL NUMBER	ATW-T3201DE2
PRODUCT DESCRIPTION	3000 SERIES BELTPACK WIRELESS 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
1735AUT17TestReport	Rev1	Initial Issue	11/29/2017

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

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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



Date: 11/29/2017

Reviewed and approved by:

Name and Title: Sid Sanders, Engineer



Date: 11/30/2017

Applicant: AUDIO-TECHNICA CORPORATION
FCC ID: JFZT3201DE2
IC: 1752B-T3201DE2
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GENERAL INFORMATION

EUT Description	3000 SERIES HANDHELD MICROPHONE
FCC ID	JFZT3201DE2
IC	1752B-T3201DE2
MODEL #	ATW-T3201DE2
Operating Frequency	470 – 530 MHz
Test Frequencies	470 , 500 & 530 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 26°C 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.

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	Pass
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	Pass
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

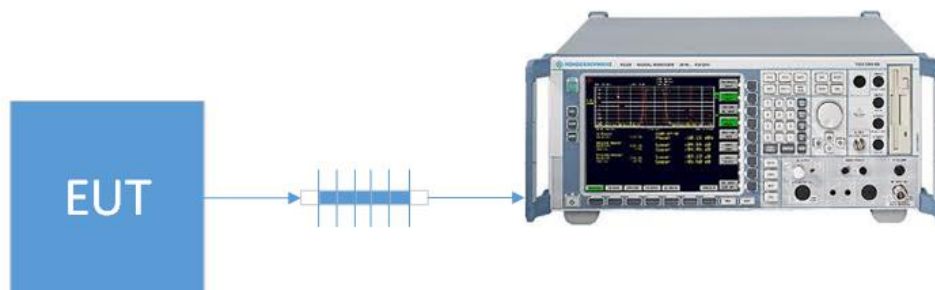
RF POWER OUTPUT

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	Power Output		
	Level (dBm)	Level (mW)	Margin (mW)
470.1250	14.30	26.9	223.1
500.0000	14.74	29.8	220.2
529.9750	14.70	29.5	220.5

Results Meet Requirements

OCCUPIED BANDWIDTH

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

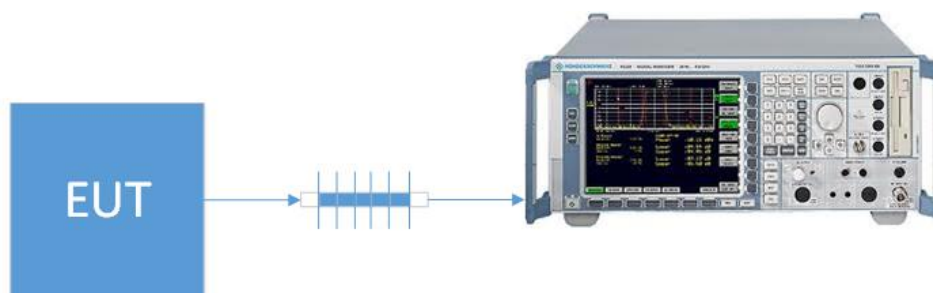
Requirement: The operating bandwidth shall not exceed 200 KHz, in addition the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

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	82.69	117.31
500	84.13	115.87
529.975	77.4	122.6

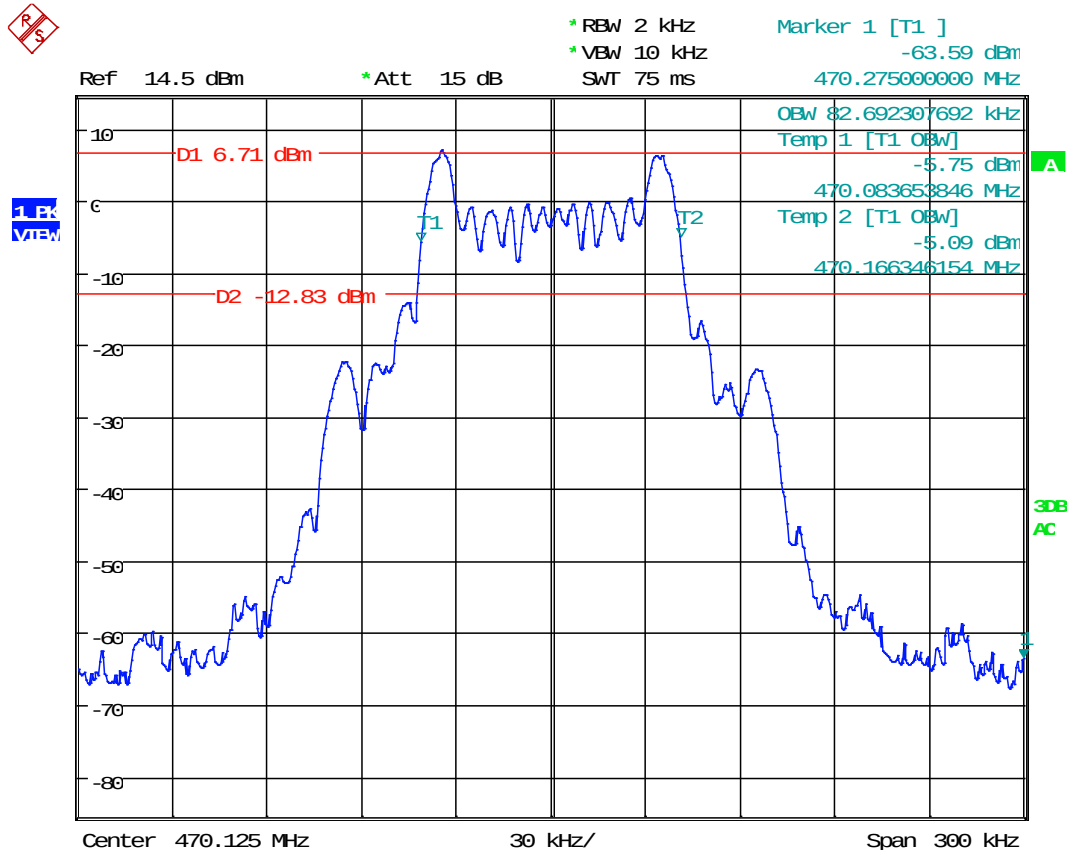
Results Meet Requirements

Applicant: AUDIO-TECHNICA CORPORATION
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OCCUPIED BANDWIDTH

Test Data: 99 % Plot



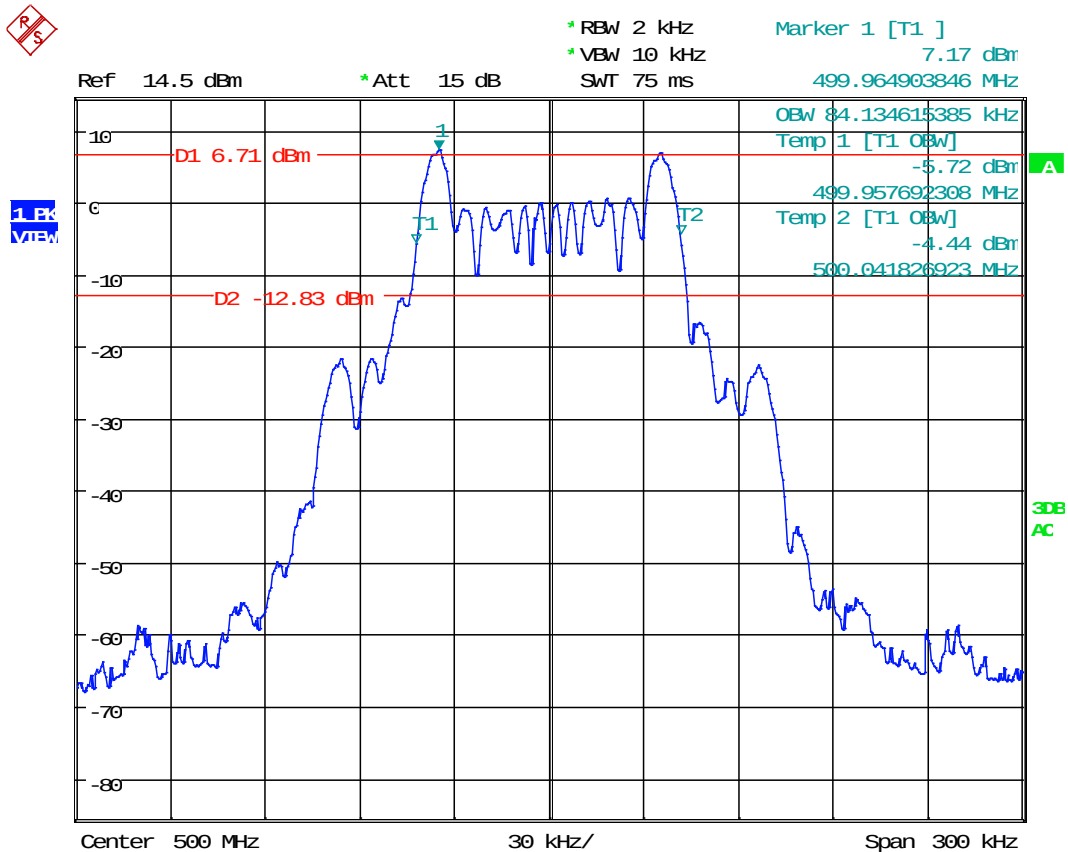
Date: 25.OCT.2017 14:23:12

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OCCUPIED BANDWIDTH

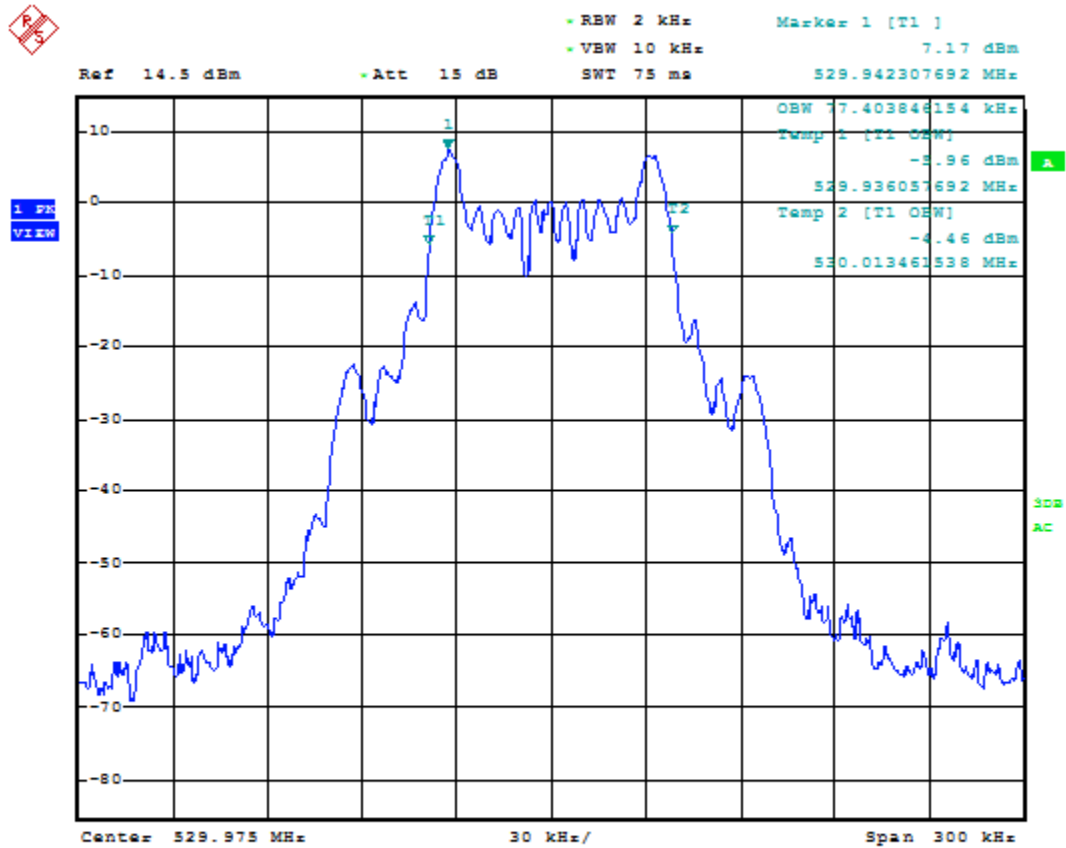
Test Data: 99 % Plot



Date: 25.OCT.2017 14:22:28

OCCUPIED BANDWIDTH

Test Data: 99 % Plot



Date: 25.OCT.2017 14:19:19

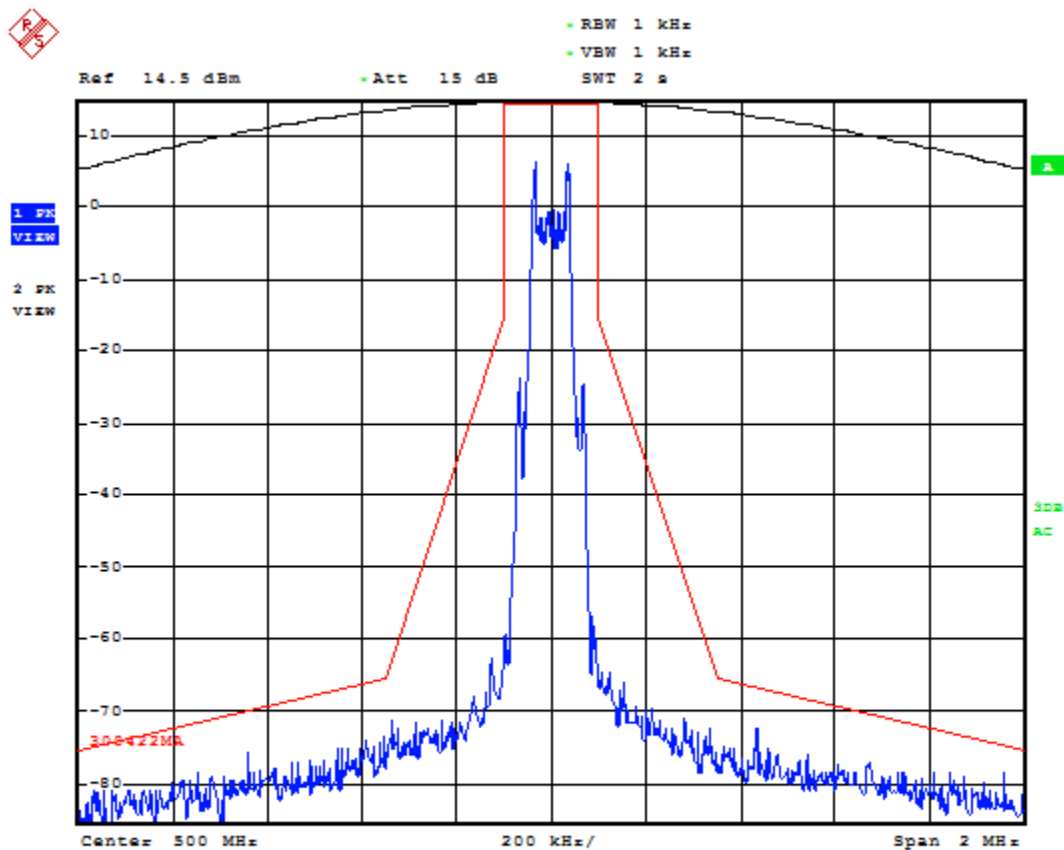
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OCCUPIED BANDWIDTH

Test Data: Emission Mask Plot

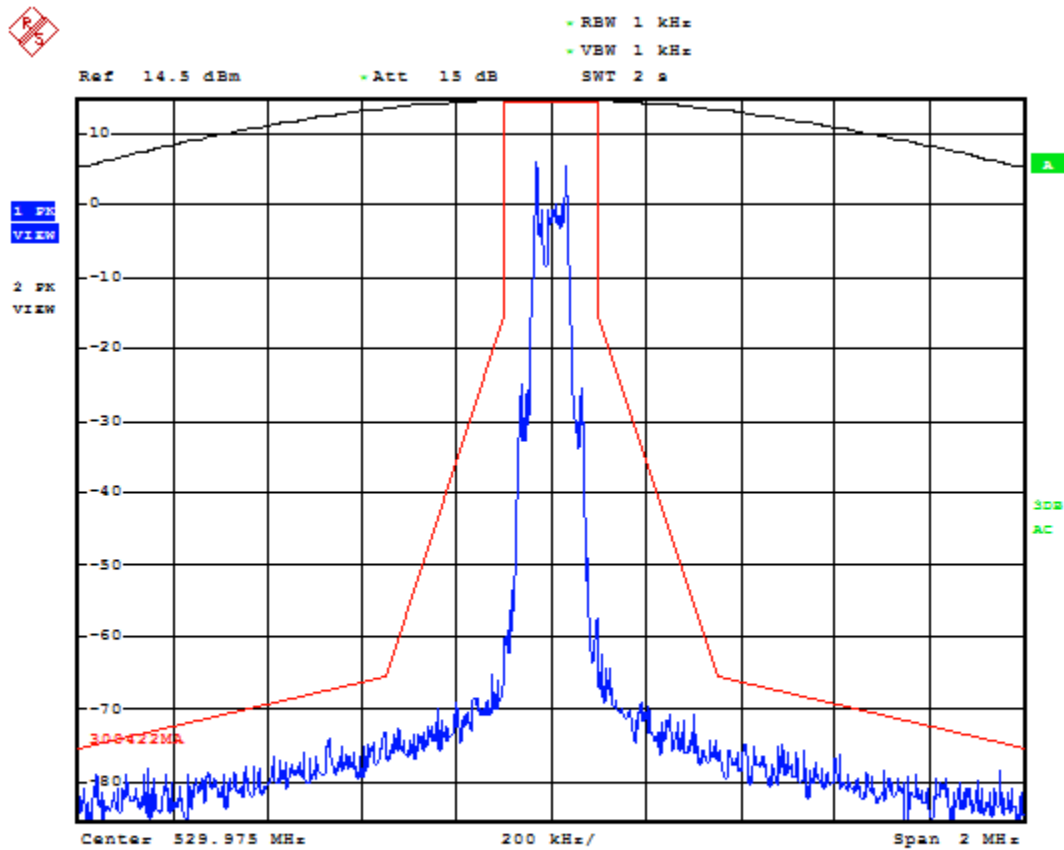
Test Data: Emission Mask Plot



Date: 25.OCT.2017 14:17:04

OCCUPIED BANDWIDTH

Test Data: Emission Mask Plot



Date: 25.OCT.2017 14:17:57

Applicant: AUDIO-TECHNICA CORPORATION
 FCC ID: JFZT3201DE2
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SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

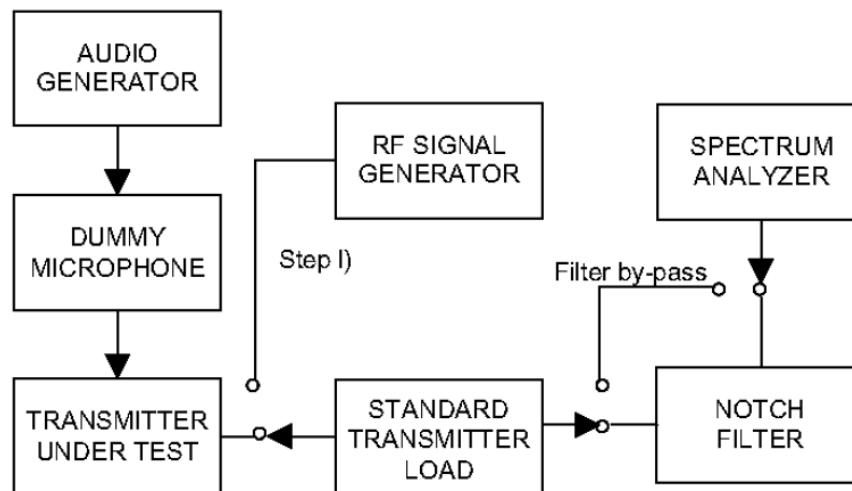
Rule Part No.: 2.1051(a), 74.861(e)(6)(iii), RSS-210

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 $43 + 10\log_{10}$ (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)

Test Data: 470.125 MHz

Power Output	dBm	Watts	Limit (dBc)
	14.3	0.03	34.3

Frequency	dBc	Margin
(fundamental) 470.125	0.00	0.00
940.250	51.63	17.33
1410.375	72.63	38.33
1880.500	85.71	51.41
2350.625	83.96	49.66
2820.750	81.11	46.81
3290.875	86.68	52.38
3761.000	85.43	51.13
4231.125	85.43	51.13
* 4701.250	90.20	55.90

* Indicates Noise Floor

Test Data: 500 MHz

Power Output	dBm	Watts	Limit (dBc)
	14.74	0.03	34.74

Frequency	dBc	Margin
(fundamental) 500.000	0.00	0.00
1000.000	66.17	31.43
1500.000	74.72	39.98
2000.000	87.33	52.59
2500.000	86.22	51.48
3000.000	84.35	49.61
3500.000	88.20	53.46
4000.000	87.59	52.85
4500.000	87.59	52.85
* 5000.000	84.09	49.35

* Indicates Noise Floor

Results Meet Requirements

Applicant: AUDIO-TECHNICA CORPORATION
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SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Test Data: 529.975 MHz

Power Output	dBm	Watts	Limit (dBc)
	14.7	0.03	34.7

Frequency	dBc	Margin
(fundamental) 529.975	0.00	0.00
1059.950	64.01	29.31
1589.925	58.96	24.26
2119.900	78.88	44.18
2649.875	76.06	41.36
3179.850	68.51	33.81
3709.825	80.59	45.89
4239.800	75.98	41.28
4769.775	75.98	41.28
5299.750	83.84	49.14

* Indicates Noise Floor

Results Meet Requirements

FIELD STRENGTH OF SPURIOUS EMISSIONS

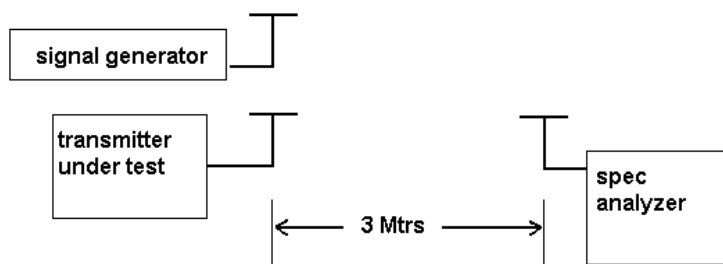
Rule Part No.: 2.1053, 74.861(e) (6) (iii), RSS-210

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 $43 + 10\log_{10}$ (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:



Test Data: MHz Measurement Table

Power Output	dBm	Watts	Limit (dB)
	14.74	0.03	27.74

Tuned Freq MHz	Emission Frequency MHz	Antenna Polarity	erp (dBm)	Margin
470.119951	940.25	H	-56.5367	43.54
470.119951	940.25	V	-51.3667	38.37
470.119951	1216.30005	H	-38.6916	25.69
470.119951	1528.80005	V	-38.0081	25.01
500	1413.45996	V	-37.7257	24.73
500	1456.69995	H	-37.2065	24.21
529.9799805	1427.80005	H	-37.9127	24.91
529.9799805	2235.5	V	-30.7682	17.77

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FREQUENCY STABILITY

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

Requirement: Temperature range requirements: -30 to +50° 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)	529.97424		
-30°C	529.97425	10	0.019
-20°C	529.97424	0	0.000
-10°C	529.97419	-50	-0.094
0°C	529.97418	-60	-0.113
10°C	529.97419	-50	-0.094
20°C	529.97415	-90	-0.170
30°C	529.97412	-120	-0.226
40°C	529.97413	-110	-0.208
50°C	529.97416	-80	-0.151
Battery Voltage	Frequency	Hz	PPM
-15%	529.97436	120	0.226
15%	529.97418	-60	-0.113

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

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