



SHURE

ELECTROMAGNETIC COMPATIBILITY LABORATORY

TEST REPORT

TEST REPORT TITLE: Electromagnetic Compatibility Tests of the Shure AXT200 L3A Digital Wireless Transmitter in the 653MHz to 657MHz Band

TEST ITEM DESCRIPTION:

The Shure AXT200 is an analogue wireless microphone transmitter, microprocessor controlled transmitter.

For: Shure Incorporated
5800 West Touhy Avenue
Niles, IL 60714

Project ID Number: SEL-030/AXT200 L3A

Date Tested: February 8, 20, 26, 27, 2018, March 12, 13, 2018

Test Personnel: Alex Mishinger, Juan Castrejon, and Craig Kozokar

Test Specification: FCC Part 74, Subpart H – Low Power Auxiliary Stations

| | | | |
|-----------------|-------------------------|-----------------------------------|--------------------|
| TEST REPORT BY: | <u>Craig Kozokar</u> | <u>Global Compliance Engineer</u> | <u>MAY 1, 2018</u> |
| APPROVED BY: | <u>Norman E. Beeson</u> | <u>GC Project Engineer</u> | <u>5/1/18</u> |
| | Signature | Position | Date |



TABLE OF CONTENTS

| <u>PARAGRAPH</u> | <u>DESCRIPTION OF CONTENTS</u> | <u>PAGE NO.</u> |
|------------------|---|-----------------|
| 0. | Report Revision History | 4 |
| 1. | Introduction | 5 |
| 1.1. | Scope of Tests | 5 |
| 1.2. | Purpose | 5 |
| 1.3. | Deviation, Additions and Exclusions | 5 |
| 1.4. | EMC Laboratory Identification | 5 |
| 1.5. | Summary of Tests Performed | 5 |
| 2. | Applicable Documents..... | 6 |
| 3. | EUT Setup and Operation | 6 |
| 3.1 | General Description | 6 |
| 3.2 | Test Samples | 6 |
| 3.3 | Operational Mode..... | 6 |
| 4 | Test Instrumentation..... | 7 |
| 5 | Procedure..... | 7 |
| 6 | Other Test Conditions | 7 |
| 6.1 | Test Personnel..... | 7 |
| 6.2 | Disposition of the EUT | 7 |
| 7 | Results of Tests | 7 |
| 8 | Conclusions | 7 |
| 9 | Certification | 7 |
| 10 | Equipment List | 8 |
| 11 | Appendix A | 9 |
| 12 | Appendix B | 19 |
| 13 | Appendix C | 22 |

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LIST OF APPENDICIES

| APPENDIX | TEST DESCRIPTION |
|-----------------|--|
| A | Radiated RF Spurious Emissions Measurement, 30 MHz to 10 GHz |
| B | Power Output |
| C | Necessary Bandwidth |



REPORT REVISION HISTORY

| Revision | Date | Description |
|----------|----------------|-----------------|
| 0 | March 30, 2018 | Initial release |
| | | |
| | | |
| | | |
| | | |



1. INTRODUCTION

1.1. Scope of Tests

This report presents the results of testing per FCC Part 74, Subpart H, 74.861, Radiated RF Spurious Emissions, Power Output, and Necessary Bandwidth. The following data was taken following the measurement method as described in the document section(s) listed on page 1 of this document. Provided is the data for the test sample. Also included is a summary of the measurements made and a description of the measurement setup. The test sample meet the requirements of the above standards. The equipment under test (EUT) contained a transmitter that was designed to transmit in the UHF TV frequency bands shown in Table 1.

| Model | Band | Frequency (MHz) | Output Power (mW) |
|--------|------|-----------------|-------------------|
| AXT200 | L3A | 653 - 657 | 10 |

Table 1. EUT Band and Power Levels

1.2. Purpose

This series of testing was performed to determine if the test item would meet the requirements of FCC Part 74, Subpart H, 74.861, radiated spurious emissions 74.861 subsection 6 iii, power output 4 e iii, and occupied bandwidth 74.861 subsection 7.

1.3. Deviations, Additions and Exclusions

None

1.4. EMC Laboratory Identification

The electromagnetic compatibility tests were performed at the Shure Electromagnetic Laboratory, Shure Incorporated, 5800 West Touhy Ave, Niles, Illinois 60714-4608. This laboratory is registered with Industry Canada as Site # 616A-1. The Shure Electromagnetic Laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). The NVLAP Lab Code is: 200946-0.

1.5. Summary of Tests Performed

The following electromagnetic compatibility tests (Table 2) were performed on the test item in accordance with ETSI specifications.

Table 2. Summary of tests performed

| Test Spec | Description | Tested Frequency | Appendix | Test Results |
|--------------|----------------------------------|------------------|----------|--------------|
| FCC Part 74H | Radiated Spurious Emissions | 30 MHz to 10 GHz | A | Pass |
| FCC Part 74H | Power Output | 655.000MHz | B | Pass |
| FCC Part 74H | Necessary Bandwidth Measurements | 655.000MHz | C | Pass |



2. APPLICABLE DOCUMENTS

The following documents of the exact issue designated form part of this document to the extent specified herein:

FCC Part 74 Part H, "Low Power Auxiliary Stations", 74.861

EN 300 422-1 v1.4.2 (2011-08), "Wireless Microphone "Electromagnetic Compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25MHz to 3GHz frequency range; Part 1; Technical characteristics and methods of measurements"

ANSI C63.4 (2014), "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"

3. EUT SET-UP AND OPERATION

3.1. General Description

The test sample used was Shure AXT200 wireless microphone transmitter. The EUT was arranged and tested per individual Appendices.

3.2 Test Sample

The following product sample was tested:

Table 3: Shure AXT200 L3A Digital Wireless Transmitter Sample

| AXT200 L3A Serial Numbers |
|---------------------------|
| #1 |

3.3 Operational Mode

All radiated spurious emissions, power output, and necessary bandwidth tests were performed separately in the transmit frequency and output power modes shown in Table 4.

| Band | Frequency in MHz | Power Level in mW |
|------|------------------|-------------------|
| L3A | 655.000 | 10 |

Table 4. EUT Frequencies and Power Levels



4. Test Instrumentation

A list of the test equipment used can be found in Table 10-1. All equipment used was within calibration during and throughout the duration of the tests. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

5. Procedure

The specific test procedures are presented in the individual appendices.

6. Other Test Conditions:

6.1. Test Personnel

All EMC tests were performed by qualified personnel from the Shure EMC Laboratory.

6.2. Disposition of the EUT

The EUTs and all associated equipment were returned to Shure Incorporated upon completion of the tests.

7. Results of Tests:

The results are presented in Appendices. It was found that the EUT meet the requirements of FCC Part 74 Subpart H, 74.861 for Radiated RF Spurious Emissions, Power Output, and Necessary Bandwidth.

8. Conclusions:

It was determined that the Shure AXT200 L3A Analogue Wireless Microphone Transmitter did fully comply with the requirements of FCC Part 74 Subpart H, 74.861, Radiated RF Spurious Emissions, Power Output, and Necessary Bandwidth.

9. Certification:

Shure EMC Laboratory certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specifications.

The data presented in this test report pertains to the EUTs at the test date. Any electrical or mechanical modification made to the EUTs subsequent to the specified test date will serve to invalidate the data and void this certification.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.



10. Equipment List

Table 10-1 Test Equipment

| L# or ID | Description | Manufacturer | Model # | Serial # | Frequency Range | Cal Date | Due Date |
|------------|---------------------------------|-----------------|-----------------------|-----------|-----------------|-----------|-----------|
| L23-011-01 | 3 meter RF Chamber | ETS Lindgren | FACT-3 | AJ640 | 25MHz - 18GHz | 8/8/2017 | 8/8/2018 |
| L23-011-02 | Electric Powered Turntable | ETS Lindgren | 2088 | N/A | N/A | N/A | N/A |
| L23-011-08 | Controller | EMCO | 2090 | 29799 | N/A | N/A | N/A |
| L23-011-09 | Antenna Positioner | ETS Lindgren | 2071-2 | 35500 | N/A | N/A | N/A |
| L23-011-15 | BiConiLog Antenna | ETS Lindgren | 3142C | 34790 | 25MHz-1GHz | 6/22/2017 | 6/22/2018 |
| L23-011-44 | BiConiLog Antenna | ETS Lindgren | 3142C | 79899 | 25MHz-1GHz | 2/27/2017 | 2/27/2018 |
| L23-011-54 | EMI Test Receiver | Rohde & Schwarz | ESR26 | 100220 | 9kHz-26GHz | 3/30/2017 | 3/30/2018 |
| L23-011-31 | EMI/EMS Test Software | Rohde & Schwarz | EMC32 | V 9.21.00 | N/A | N/A | N/A |
| L23-011-55 | Horn antenna with pre-amplifier | ETS Lindgren | 3117-PA | 206583 | 1GHz to 18 GHz | 4/27/2017 | 4/27/2018 |
| L23-011-41 | Horn Antenna | ETS Lindgren | 3117 | 123511 | 1GHz to 18 GHz | 5/7/2017 | 5/7/2018 |
| L23-011-57 | High Pass Filter | K&L | 11SH10-940/X10000-0/0 | 3 | 940MHz – 10GHz | 3/31/2017 | 3/31/2018 |
| L23-022-02 | Spectrum Analyzer | Rohde & Schwarz | FSW26 | 103788 | 9kHz-26GHz | 3/28/2017 | 3/28/2018 |
| L23-022-01 | Spectrum Analyzer | Rohde & Schwarz | FSU26 | 201043 | 9kHz-26GHz | 8/23/2017 | 8/23/2018 |
| L23-040-09 | 20dB attenuator | Mini-Circuits | BW-S20W2 | N/A | 20MHz to 18GHz | 2/21/2017 | 2/21/2018 |
| L23-040-04 | 20dB attenuator | Mini-Circuits | BW-S20W5 | 1133 | 20MHz to 18GHz | 7/18/2017 | 7/18/2018 |
| L23-034-05 | Temperature Hygrometer | Extech | 445703 | 48254-66 | N/A | 9/15/2016 | 9/15/2018 |
| L23-034-04 | Temperature Hygrometer | Extech | 445703 | 48254-13 | N/A | 9/15/2016 | 9/15/2018 |
| L23-023-01 | RF Signal Generator | Rohde & Schwarz | SMF100A | 101553 | 20Hz to 26.5GHz | 8/23/2017 | 8/23/2018 |



Appendix A

A. RADIATED RF SPURIOUS EMISSIONS – 30 MHZ TO 10 GHZ**Purpose:**

This test performed to determine if the EUT meets the radiated RF emission requirements of the FCC Part 74 Subpart H over the frequency range from 30MHz to 10GHz. An Average detector was used for the measurements.

Requirements:

As stated in FCC Part 74, Subpart H, 74.861, radiated spurious emissions 74.861 subsection 6 iii, spurious emissions must meet the limits specified in section 8.4 of ETSI EN 300 422-1 V1.4.2 (2011-08)

Measurement Uncertainty:

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

Values of Expanded Measurement Uncertainty (95% Confidence)

| Measurement Type | U_{lab} | U_{ETSI} |
|---|-----------|------------|
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz) | 4.12 dB | 6.00 dB |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 13 GHz) | 4.56 dB | 6.00 dB |

U_{lab} = Determined for Shure EMC Laboratory

U_{ETSI} = From ETSI EN 300 422-1 Table 6

Since U_{lab} is less than or equal to U_{ETSI} :

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- Non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

Test Setup and Instrumentation:

Photographs of the test setup are shown in Figure 1 and Figure 2. The test instrumentation can be determined from Table 10-1.

EUT Operation:

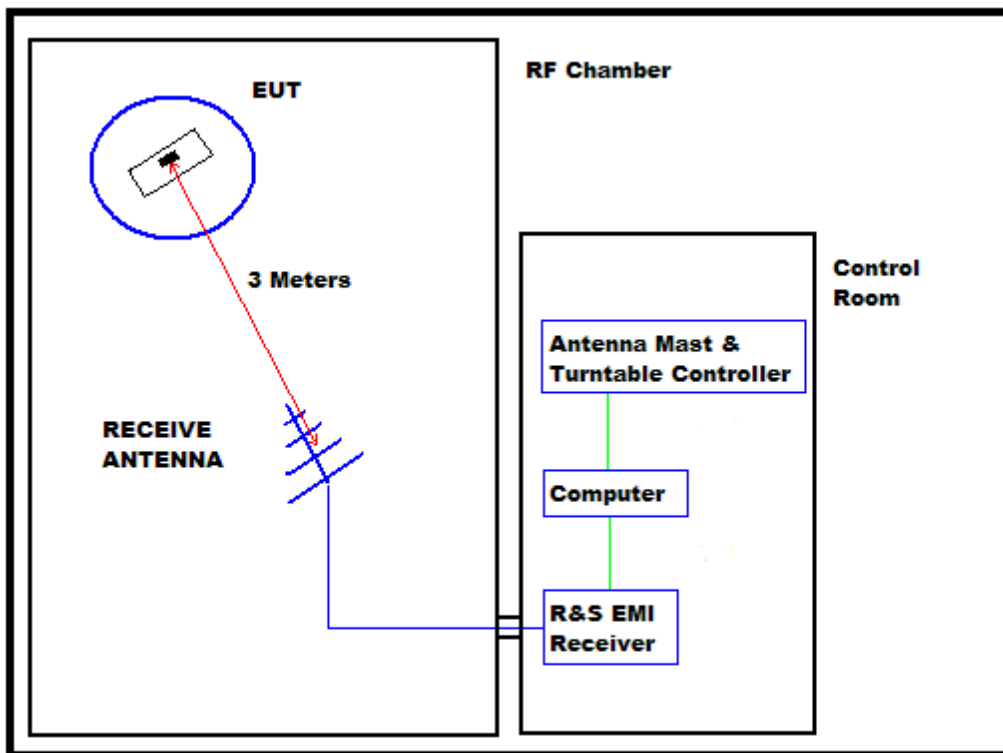
The EUT was powered up and the frequency of the transmitter was selected using the front panel controls. The EUT was checked for proper operation after it was setup on the table. For radiated spurious emission testing, the testing was conducted with the EUT set to the middle frequency within the operating frequency range, and at 10mW RF output.

Appendix A

Specific Test Procedures:

All tests were performed in a 28ft. x 20ft. x 18.5ft. 3m semi-anechoic test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4-2003 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All power lines and signal lines entering the enclosure pass through filters on the enclosure wall. The power line filters prevent extraneous signals from entering the enclosure on these leads.



BLOCK DIAGRAM OF SHIELDED ENCLOSURE

Preliminary radiated measurements were performed to determine the frequencies where the significant emissions might be found. With the EUT at one set position and the measurement antenna at a set height (i.e. without maximizing), the radiated emissions were measured using a peak detector and automatically plotted. The BiConiLog measuring antenna was positioned at a 3 meter distance from the EUT.

Appendix A

All significant broadband and narrowband signals found in the preliminary sweeps were then measured using a peak detector at a test distance of 3 meters. The measurements were made with a BiConiLog antenna over the frequency range of 30 MHz to 1 GHz, and a double ridged waveguide antenna over the frequency range of 1 GHz to 10 GHz.

To ensure that maximum emission levels were measured, the following steps were taken:

- i. The EUT was rotated so that all of its sides were exposed to the receiving antenna.
- ii. Since the measuring antennas are linearly polarized, both horizontal and vertical field components were measured.
- iii. The measuring antenna was raised and lowered from 1 to 4 meters for each antenna polarization to maximize the readings.

The equivalent power was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power, another antenna was set in place of the EUT and connected to a calibrated signal generator. (A tuned dipole was used for all measurements below 1GHz and a double ridged waveguide antenna was used for all measurements above 1GHz.) The output of the signal generator was adjusted to match the received level at the EMI receiver. The signal level was recorded. The reading was corrected to compensate for cable loss and antenna gain.

Results:

The plots of the peak preliminary radiated voltage levels and maximized peak radiated voltage levels results are presented on page 12 thru page 17. The ERP measurements are shown on page 18. All emissions measured from the EUT were within the ETSI EN 300 422-1 specification limits.

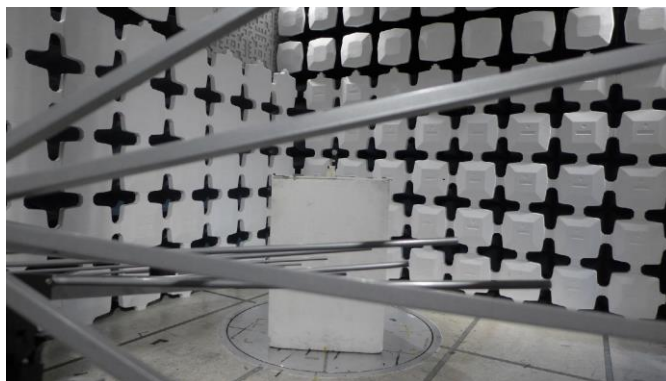


Figure 1: AXT200 Transmitter Test Setup



Figure 2: AXT200 Transmitter Test Setup



SHURE Radiated RF Emissions Test Report

Common Information

Test Description: FCC74H Radiated Emissions 30MHz - 1GHz
EUT AXT100 L3A
Serial Number #1
Operating Conditions: 655.000MHz, 10mW
Date Tested: Tested March 12, 2018
Operator Name: Alex Mishinger

EMI Auto Test Template: Bandsaw COMPLIANCE TEST FCC 74H 30MHz to 1GHz 34790 FCC

Hardware Setup: Electric Field Strength 34790
Measurement Type: Open-Area-Test-Site
Frequency Range: 30 MHz - 1 GHz
Graphics Level Range: 0 dB μ V/m - 125 dB μ V/m

Preview Measurements:
Graphics Display: Show separate traces for horizontal and vertical polarization
Sweep Test Template: Compliance Test FCC 74 30MHz 1GHz 34790 PREVIEW

Adjustment:
Template for Single Meas.: COMPLIANCE TEST FCC 74 30 to 1000 MHz 34790 MAX

Final Measurements:
Template for Single Meas.: COMPLIANCE TEST FCC 74 30 to 1000 MHz 34790 FINAL

| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 1 GHz | 30 kHz | PK+ | 120 kHz | 1 s | 0 dB |

Receiver: [ESR 26]



Appendix A

Hardware Setup: EMI radiated\Electric Field Strength 34790 - [EMI radiated]

Subrange 1

Frequency Range: 25 MHz - 1 GHz

Receiver: ESR 26 [ESR 26]
@ GPIB0 (ADR 20), SN 1316.3003K26/101347, FW 2.26, CAL
5/28/2016

Signal Path: Receiver-EMI to 1 GHz
FW 1.0
Correction Table: Receiver-EMI Antenna 18GHz L23_041_38 8m

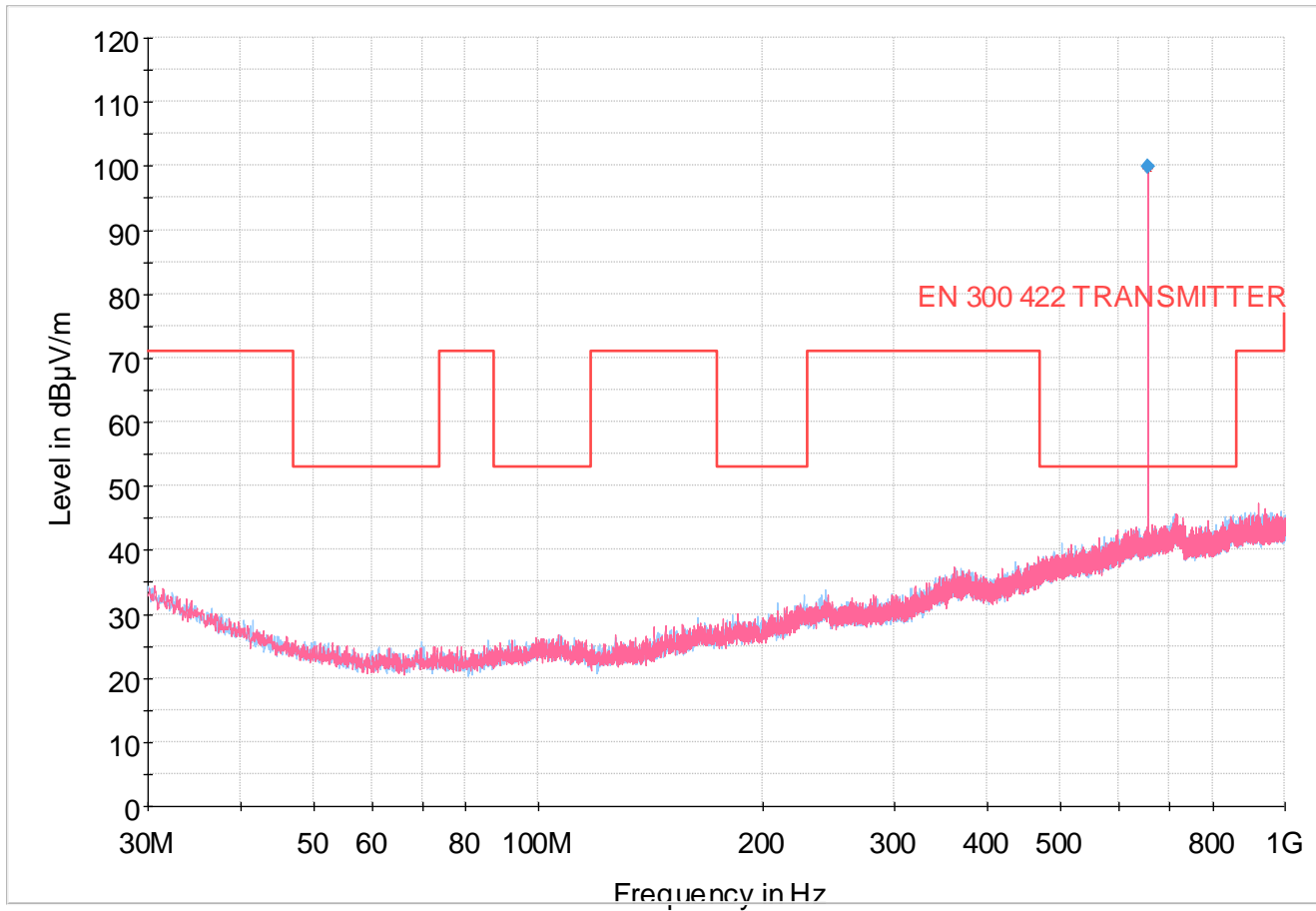
Antenna: ETS 3142C 34790
SN 34790, CAL 6/3/2017
Correction Table (vertical): BiconiLog 3142C Hor-34790 2017 06
17
Correction Table (horizontal): BiconiLog 3142C Hor-34790 2017
06 17

Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.21

Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), SN 29799, FW REV 3.21

Appendix A

Full Spectrum



Critical Results

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment | Corr. (dB) |
|-----------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|------------------------|------------|
| 655.003333 | 99.68 | 53.00 | -46.68 | --- | --- | 333.0 | V | 128.0 | --- | 3:20:38 PM - 3/12/2018 | --- |

Final Results

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment | Corr. (dB) |
|-----------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|------------------------|------------|
| 655.003333 | 99.93 | 53.00 | -46.93 | 1000.0 | 120.000 | 333.0 | V | 128.0 | 22.0 | 3:20:47 PM - 3/12/2018 | --- |



SHURE Radiated RF Emissions Test Report

Common Information

Test Description: FCC74H Radiated Emissions 1GHz - 10GHz
EUT: AXT200 L3A
Serial Number: # 1
Operating Frequency: 655.000MHz
Power Level / Mod Mode: 10mW
Name: Alex Mishinger
Comments: Tested February 20, 2018

EMI Auto Test Template: COMPLIANCE TEST FCC15C-EN300422 Transmitter 1GHz to 10GHz 3117-PA 200363

Hardware Setup: Electric Field Strength 3117-PA 200363 2017 10 17
Measurement Type: Open-Area-Test-Site
Frequency Range: 1 GHz - 10 GHz
Graphics Level Range: 0 dB μ V/m - 120 dB μ V/m

Preview Measurements:
Antenna height: 100 - 400 cm , Step Size = 50 cm , Positioning Speed = 6
Polarization: H + V
Turntable position: 0 - 360 deg , Continuously , Measuring Speed = 5
Graphics Display: Show separate traces for horizontal and vertical polarization
Sweep Test Template: COMPLIANCE TEST EN300422 Transmitter 1-18 GHz 3117-PA 200363 PREVIEW

Adjustment:
Antenna height: Range = 50 cm , Measuring Speed = 1
Turntable position: Range = 90 deg , Measuring Speed = 5
Template for Single Meas.: COMPLIANCE TEST EN300422 Transmitter 1 to 18 GHz 3117-PA 200363 MAX

Final Measurements:
Template for Single Meas.: COMPLIANCE TEST EN300422 Transmitter 1 to 18 GHz 3117-PA 200363 FINAL

| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|--------------------------------------|-----------|-----------|-------|------------|--------|
| Receiver: [ESR 26] 1 GHz - 18 GHz | 250 kHz | AVG | 1 MHz | 1 s | 0 dB |



Appendix A

Hardware Setup: EMI radiated\Electric Field Strength 3117-PA 200363 2017 10 17 - [EMI radiated]

Subrange 1

Frequency Range: 1 GHz - 18 GHz

Receiver: ESR 26 [ESR 26]
@ GPIB0 (ADR 20), SN 1316.3003K26/101347, FW 2.26, CAL 5/28/2016

Signal Path: Receiver-EMI to 18 GHz
FW 1.0

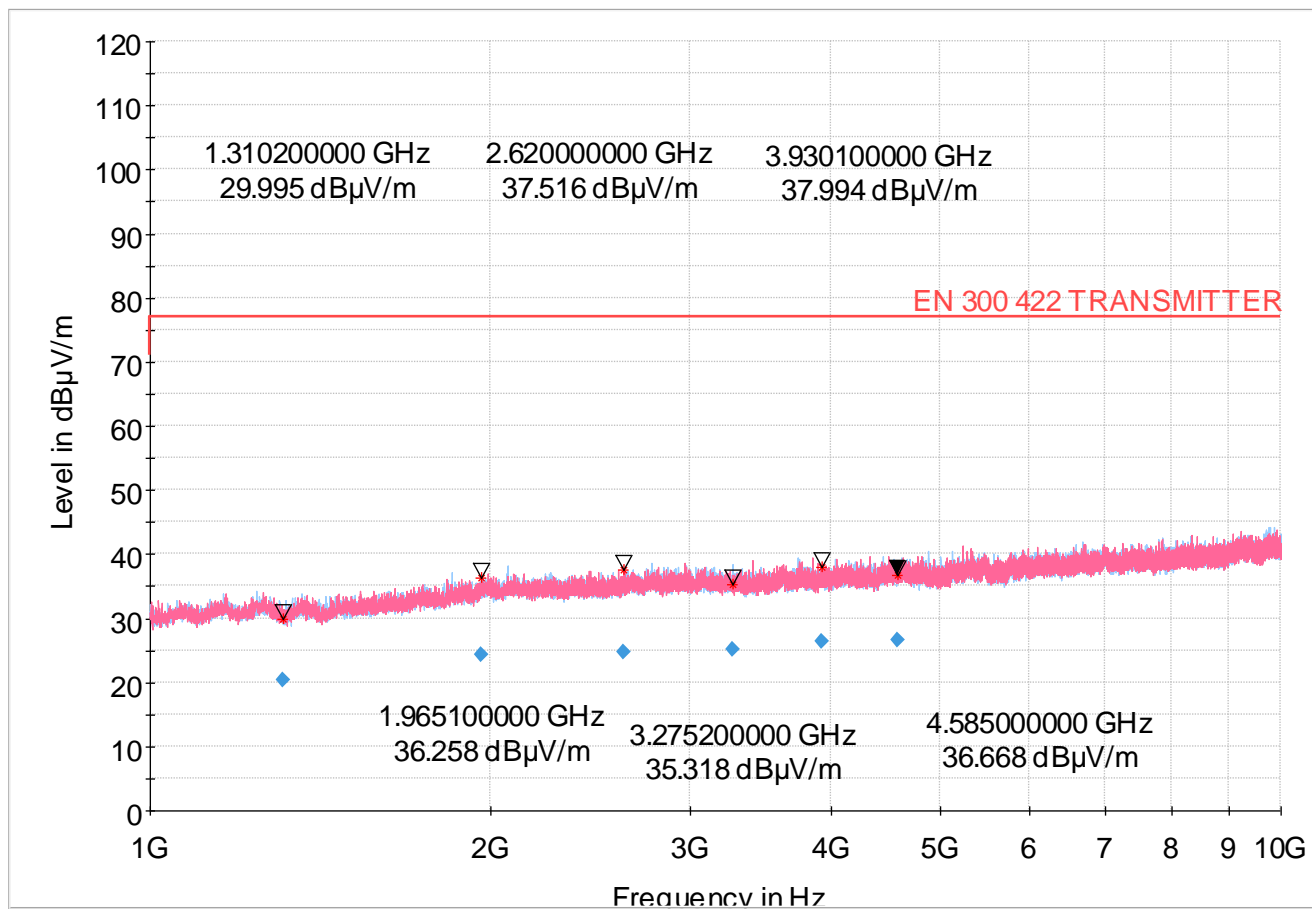
Antenna: Correction Table: Receiver-EMI Antenna TEMP 2016 11 23
EMI3117-PA 200385
SN 200385, CAL 10/16/2018
Correction Table (vertical): Horn ETS 3117-PA 200363 2017 10 16
Correction Table (horizontal): Horn ETS 3117-PA 200363 2017 10 16
Correction Table (vertical): L23_041_47 Cable
Correction Table (horizontal): L23_041_47 Cable

Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.21

Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), SN 29799, FW REV 3.21

Appendix A

Full Spectrum



Critical Frequencies

| Frequency (MHz) | MaxPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment | Corr. (dB) |
|-----------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|------------------------|------------|
| 1310.200000 | 30.00 | 77.00 | 47.00 | --- | --- | 244.0 | H | 79.0 | --- | 2:15:27 PM - 2/20/2018 | --- |
| 1965.100000 | 36.26 | 77.00 | 40.74 | --- | --- | 324.0 | V | 295.0 | --- | 2:21:52 PM - 2/20/2018 | --- |
| 2620.000000 | 37.52 | 77.00 | 39.48 | --- | --- | 308.0 | V | 186.0 | --- | 2:20:38 PM - 2/20/2018 | --- |
| 3275.200000 | 35.32 | 77.00 | 41.68 | --- | --- | 125.0 | V | 202.0 | --- | 2:17:42 PM - 2/20/2018 | --- |
| 3930.100000 | 37.99 | 77.00 | 39.01 | --- | --- | 393.0 | H | 75.0 | --- | 2:16:32 PM - 2/20/2018 | --- |
| 4585.000000 | 36.67 | 77.00 | 40.33 | --- | --- | 229.0 | V | 44.0 | --- | 2:19:13 PM - 2/20/2018 | --- |

Final Result

| Frequency (MHz) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB/m) | Comment | Corr. (dB) |
|-----------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|--------------|------------------------|------------|
| 1310.200000 | 20.32 | 77.00 | 56.68 | 1000.0 | 1000.000 | 244.0 | H | 79.0 | -16.1 | 2:15:37 PM - 2/20/2018 | --- |
| 1965.100000 | 24.38 | 77.00 | 52.62 | 1000.0 | 1000.000 | 325.0 | V | 295.0 | -13.4 | 2:21:59 PM - 2/20/2018 | --- |
| 2620.000000 | 24.73 | 77.00 | 52.27 | 1000.0 | 1000.000 | 308.0 | V | 186.0 | -12.2 | 2:20:48 PM - 2/20/2018 | --- |
| 3275.200000 | 25.22 | 77.00 | 51.78 | 1000.0 | 1000.000 | 125.0 | V | 202.0 | -11.0 | 2:17:48 PM - 2/20/2018 | --- |
| 3930.100000 | 26.35 | 77.00 | 50.65 | 1000.0 | 1000.000 | 393.0 | H | 77.0 | -9.0 | 2:16:40 PM - 2/20/2018 | --- |
| 4585.000000 | 26.65 | 77.00 | 50.35 | 1000.0 | 1000.000 | 229.0 | V | 44.0 | -7.2 | 2:19:23 PM - 2/20/2018 | --- |



Appendix A

Date: February 27, 2018
 EUT: AXT200
 Band: L3A
 Serial Number: # 1
 Specification: EN 300 422-1, Spurious Radiated Emissions
 Comments: Test Distance is 3 meters
 Mode: EUT set to Middle 655.000 MHz
 Tested By: Alex Mishinger, February 26 & 27, 2018

| Frequency in MHz | Detector Used | Antenna Polarity | Measured Level in dBuV | Matched Sig. Gen. Reading in dBm | Antenna Gain in dB | Cable Loss in dB | ERP Total in dBm | ETSI Limit in dBm |
|------------------|---------------|------------------|------------------------|----------------------------------|--------------------|------------------|------------------|-------------------|
| 1310.200 | Average | H | 20.32 | -76.0 | 4.0 | 3.26 | -75.3 | -30 |
| 1310.200 | Average | V | 20.32 | -76.0 | 4.0 | 3.26 | -75.3 | -30 |
| 1965.100 | Average | H | 24.38 | -76.0 | 5.0 | 4.01 | -75.0 | -30 |
| 1965.100 | Average | V | 24.38 | -76.0 | 5.0 | 4.01 | -75.0 | -30 |
| 2620.000 | Average | H | 24.73 | -75.0 | 6.4 | 4.35 | -73.0 | -30 |
| 2620.000 | Average | V | 24.73 | -75.0 | 6.4 | 4.35 | -73.0 | -30 |
| 3275.200 | Average | H | 25.22 | -74.0 | 7.6 | 4.83 | -71.2 | -30 |
| 3275.200 | Average | V | 25.22 | -74.0 | 7.6 | 4.83 | -71.2 | -30 |
| 3930.100 | Average | H | 26.35 | -73.0 | 8.9 | 5.09 | -69.2 | -30 |
| 3930.100 | Average | V | 26.35 | -73.0 | 8.9 | 5.09 | -69.2 | -30 |
| 4585.000 | Average | H | 26.35 | -73.0 | 9.3 | 5.55 | -69.3 | -30 |
| 4585.000 | Average | V | 26.35 | -73.0 | 9.3 | 5.55 | -69.3 | -30 |

Total (dBm) = Matched Signal. Generator Reading (dBm) + Antenna Gain (dB) – Cable Loss (dB)

B. Power Output

Purpose:

This test performed to determine if the EUT meets the Power Output requirements of the FCC Part74H, Section 74.861.

Requirements:

As stated in FCC 74H Section 74.861 the maximum radiated power in the 600MHz duplex gap: 20mW EIRP.

Measurement Uncertainty:

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

Values of Expanded Measurement Uncertainty (95% Confidence)

| Measurement Type | U_{lab} |
|--|-----------|
| Conducted measurements (30 MHz – 1000 MHz) | 1.24 dB |

U_{lab} = Determined for Shure EMC Laboratory

Since U_{lab} is less than or equal to U_{ETSI} :

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
Non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

Test Setup and Instrumentation:

Photographs of the test setup are shown in Figure 1. The test instrumentation can be determined from Table 10-1.

EUT Operation:

The EUT was powered up and the frequency of the transmitter was selected using the front panel controls. For rated output power, the testing was conducted with the EUT set to the middle frequency within the operating frequency range, and at 10mW RF output.

Appendix B

Specific Test Procedures:

The output of the EUT was connected to a spectrum analyzer through 20dB of attenuation. The EUT was set to transmit on the middle frequency. The channel power was measured.

The spectrum analyzer was set to:

- RBW 10kHz
- VBW 100kHz
- Channel BW 200kHz
- Span 1MHz
- Detector Average
- State Average

Results:

The EIRP for the low and high frequency meets the FCC74H 74.861 requirements.

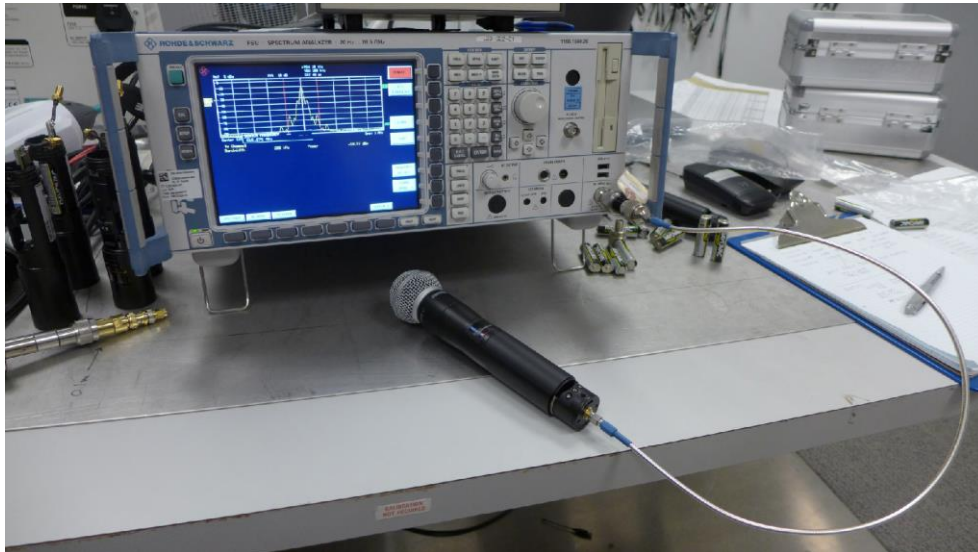


Figure 1: Test setup for Maximum Radiated Output



Appendix B

Test Information

EUT Name: AXT200 L3A
Serial Number: # 1
Test Description: Maximum Rated Output
Operating Conditions: Middle Frequency, 655.000MHz, 10mW
Operator Name: Craig Kozokar
Comment: FCC Part 74H, Section 74.861
Date Tested: Tested on March 13, 2018

| Spectrum Analyzer Measurement in dBm | Measured Antenna Gain in dBi | Cable Loss in dB | EIRP in dBm | EIRP Limit in dBm | Margin In dB |
|---|-------------------------------------|-------------------------|--------------------|--------------------------|---------------------|
| +9.28 | 1.00 | 0.40 | +10.68 | 13.00 | 2.32 |

EIRP (dBm) = Measurement (dBm) + Measured Antenna Gain (dB) + Cable Loss (dB)

Measured AXT200 L3A antenna gain is 1.00dBi

NECESSARY BANDWIDTH MEASUREMENTS

B.1 PURPOSE

This test was performed to determine if the EUT meets the occupied bandwidth requirements of EN 300 422-1, section 8.3.3., with the EUT operating at 655.000MHz and at 10mW RF Output.

B.2 REQUIREMENTS

As stated in EN 300 422-1, section 8.3.3, the emission mask given in section 8.3.3.2 shall not be exceeded.

B.3 TEST SETUP AND INSTRUMENTATION

A photograph of the test setup is shown in Figure B-1. The test instrumentation can be determined from Table 10-1.

B.4 MEASUREMENT UNCERTAINTY

All measurements are an estimate of their true value. The measurement uncertainty characterizes, with a specified confidence level, the spread of values which may be possible for a given measurement system.

Values of Expanded Measurement Uncertainty (95% Confidence):

| Measurement Type | U_{LAB} |
|---------------------|----------------------------------|
| Necessary Bandwidth | $\pm 0.130 \%$ |

U_{lab} = Determined for Shure EMC Laboratory

Since U_{LAB} is less than or equal to U_{ETSI} :

- Compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- Non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

B.5 EUT OPERATION

The EUT was powered up and the transmit frequency and power output of the EUT were selected. The EUT was checked for proper operation after it was setup for the test. Testing was conducted with the EUT set to transmit at 655.000MHz, at an output power level of 10mW. The transmitter was modulated per EN300422-1 V1.4.2 (2011-08), clause 7.1.2.

B.6 TEST PROCEDURE

The test procedure followed is shown in EN300422-1 V1.4.2 (2011-08), section 8.3.3.1.

Appendix C**B.7 RESULTS**

The necessary bandwidth data is presented on pages 24 and 26. Data is shown on the figures for each transmitter. The figure shows the maximum relative level within the emission mask with modulation. As shown by the test data, the necessary bandwidth of the EUT meets the requirements of EN 300 422-1, section 8.3.3.

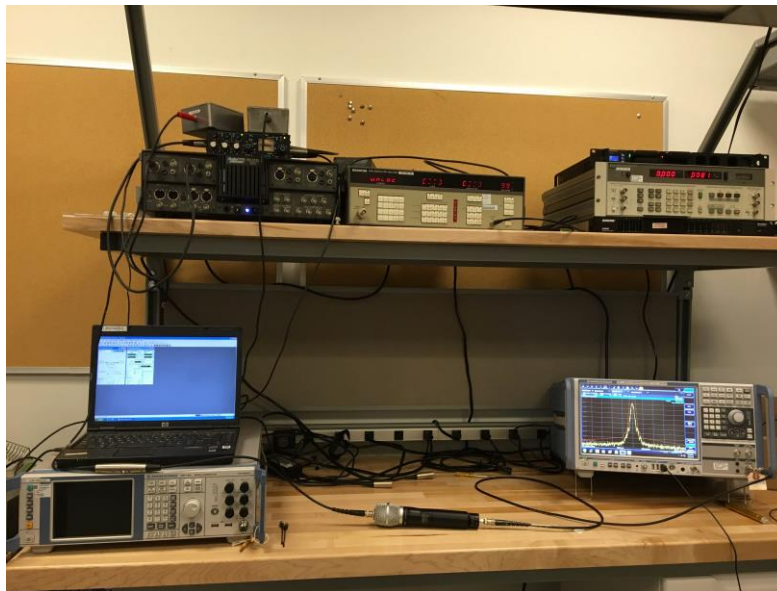
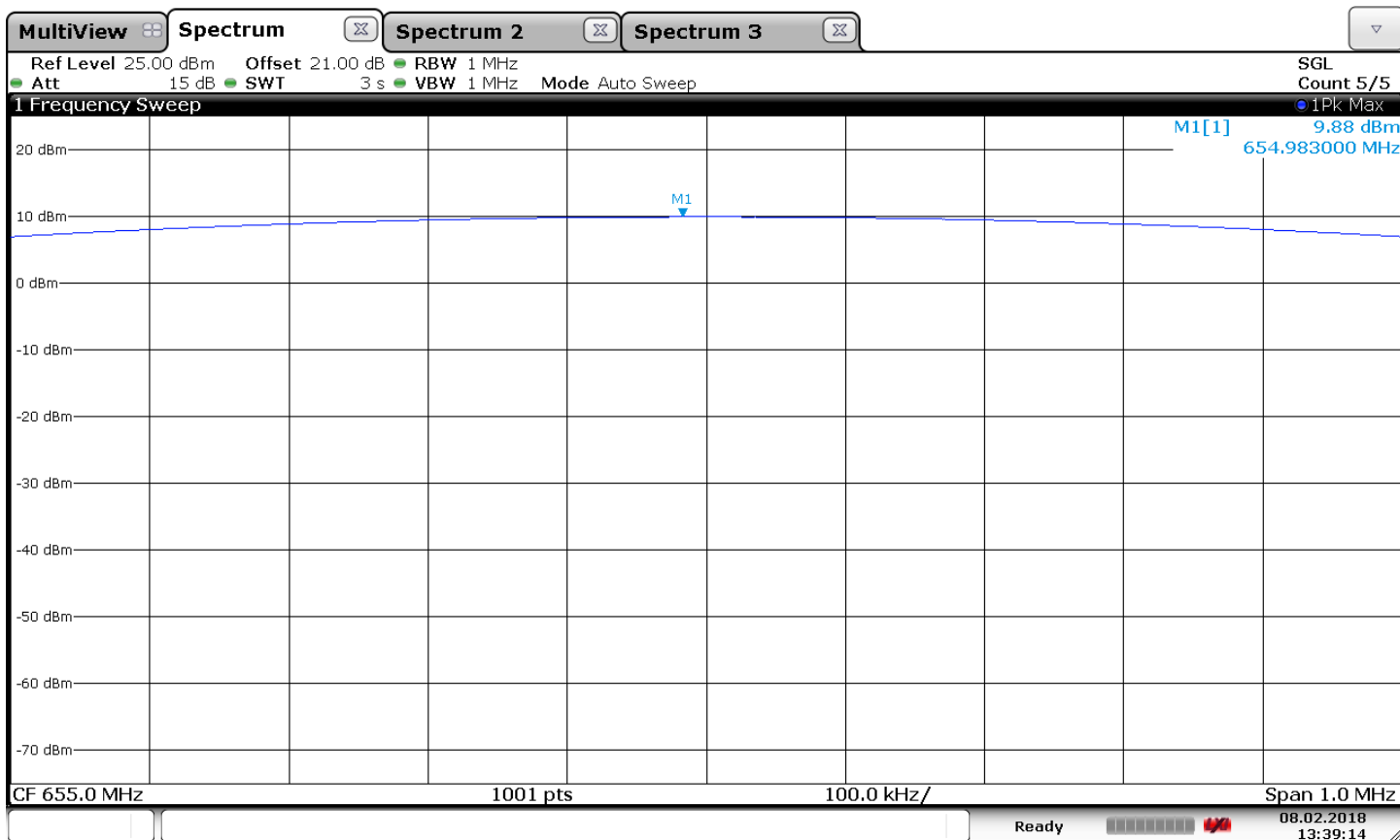


Figure B-1 - Test Setup for Necessary Bandwidth



Test Information

EUT Name: AXT200 L3A
Serial Number: #1
Test Description: EN 300 422 Digital Necessary Bandwidth
Operating Conditions: Middle Frequency, 655.000MHz, 10mW
Operator Name: Juan Castrejon
Comment: 8.3.3.1: Step 1; Carrier Power
Date Tested: Tested on February 8, 2018

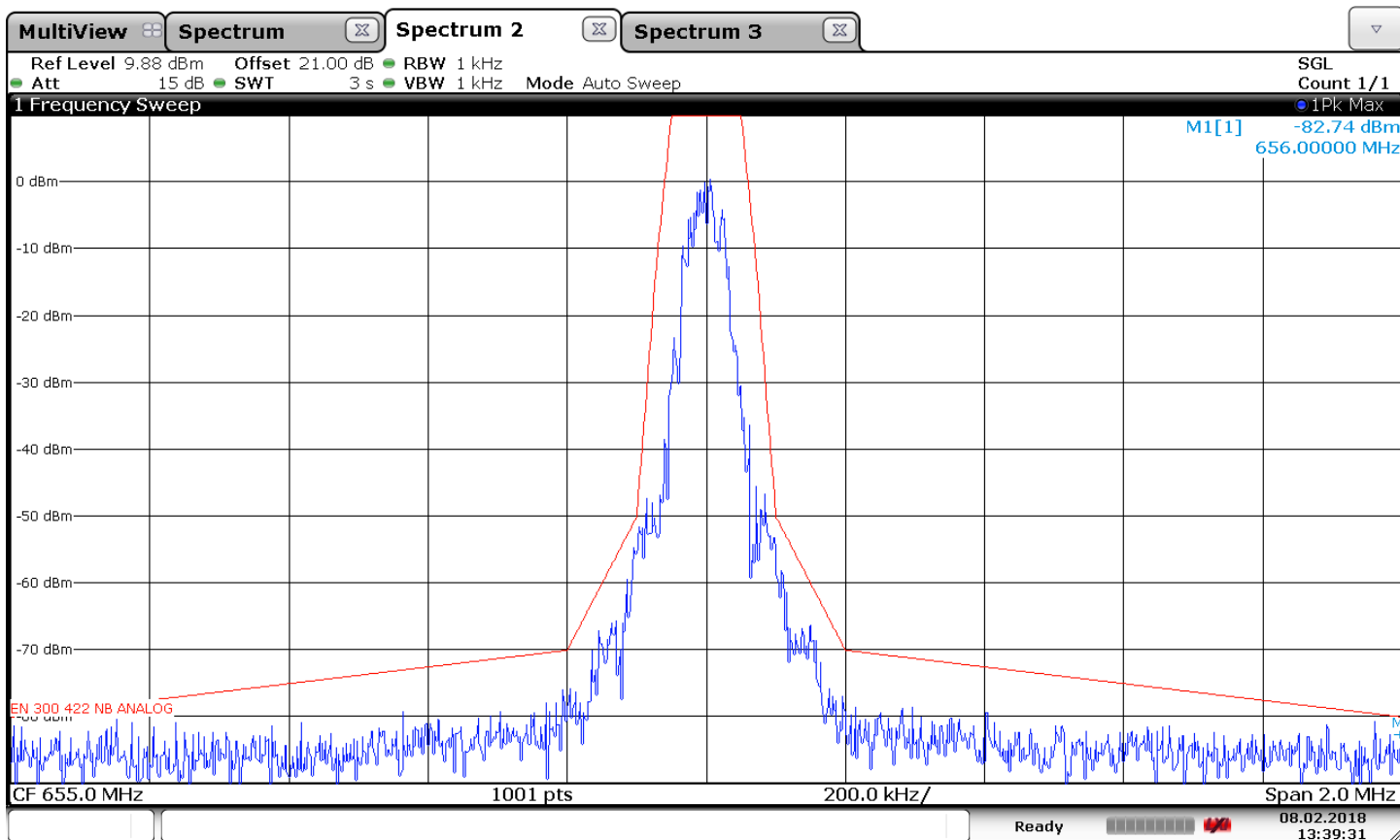


13:39:14 08.02.2018



Test Information

EUT Name: AXT200 L3A
Serial Number: #1
Test Description: EN 300 422 Digital Necessary Bandwidth
Operating Conditions: Middle Frequency, 655.000MHz, 10mW
Operator Name: Juan Castrejon
Comment: 8.3.3.1: Step 2;Maximum Relative Level
Date Tested: Tested on February 8, 2018



13:39:32 08.02.2018