



# Electromagnetic Compatibility Laboratory Test Report

Test Report Title:	Electromagnetic Compatibility Tests for Shure P9T – X55 Transmitter
Test Item Description:	P9T is a half-rack, single channel wireless transmitter housed in a plastic chassis. The system operates in the X55 band (941 to 960 MHz) and is networkable over Ethernet connection. The P9T operates on AC power.
For:	Shure Incorporated 5800 West Touhy Avenue Niles, IL 60714
Project ID Number:	SEL-037A
Dates Tested:	07/25/2018 to 09/23/2018
Test Personnel:	Tom Braxton, Juan Castrejon, Hannah Hart, Jamal Qureshi
Test Specification:	FCC Part 74 : Subpart H RSS 210 Issue 9, Annex G: Low-Power Radio Apparatus Operating in the Television Bands

TEST REPORT BY:		Global Compliance Engineer	9/27/2018
	SIGNATURE	POSITION	DATE
APPROVED BY:		GC Project Engineer, Managing	9/27/2018
	SIGNATURE	POSITION	DATE





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<b>B</b>	Necessary Bandwidth
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<b>D</b>	Frequency Stability



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## Report Revision History

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Revision	Date	Description
0	9/27/2018	Released for use
1	11/27/2018	Updated to include RSS210 certification information

## Report Summary

### 1. Introduction

#### 1.1. Scope of Tests

This document presents the results of a series of electromagnetic compatibility (EMC) tests performed on the Shure P9T – X55 Transmitter. The test items were manufactured and submitted for testing by Shure Incorporated located in Niles, IL. The data was taken following the measurement methods as described in the test specifications listed on page 1 of this document. Provided is the data for the test samples which also includes a summary of the measurements made and a description of the measurement setup.

#### 1.2. Purpose

This series of tests was performed to determine if the test item would meet the selected requirements of the following specifications:

FCC Part 74 : Subpart H

RSS 210 Issue 9, Annex G: Low-Power Radio Apparatus Operating in the Television Bands

#### 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 ISED 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 were performed on the test item in accordance with the specifications as stated in the following:

FCC Part 74 : Subpart H

RSS 210 Issue 9, Annex G: Low-Power Radio Apparatus Operating in the Television Bands

**Table 1-1: Summary of tests performed**

Test Specifications	Description	Tested Range	Described in Appendix	Test Results
<b>FCC Part 74.861 RSS 210.9 Annex G.3.4</b>	Field Strength Spurious Emissions	941.625 MHz – 959.725 MHz	A	PASS
<b>FCC Part 74.861 RSS 210.9 Annex G.3.1</b>	Necessary Bandwidth	941.625 MHz – 959.725 MHz	B	PASS
<b>FCC Part 74.861 RSS 210.9 Annex G.3.1</b>	RF Output Power	941.625 MHz – 959.725 MHz	C	PASS
<b>FCC Part 74.861 RSS 210.9 Annex G.3.1</b>	Frequency Stability	941.625 MHz – 959.725 MHz	D	PASS

## 2. Applicable Documents

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

- RSS 210.9 Annex G
- FCC Part 74

## 3. EUT Set-Up and Operation

3.1. General Description

3.2. Test Samples

The following Shure P9T – X55 Transmitter samples were tested:

**Table 3-1: Transmitter Samples**

Frequency Band	RF Power Output In mW	EUT Serial Number
X55	100	328Y33217

3.3. Test Setup

3.3.1. Power Input

The EUT obtained power through internal power supply.

3.3.2. Signal Input /Output Leads

3.3.3. Grounding Considerations

3.3.4. Operational Mode

## 4. Test Instrumentation

A list of the test equipment used can be found in Table 10-1. All equipment is calibrated on an annual/semiannual basis depending on component critical status. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

## 5. Test Procedures

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

The results are presented in the individual test appendices. It was found that the EUT met the requirements of the following:

FCC Part 74 : Section 74.861

RSS 210.9 Annex G

## 8. Conclusions

It was determined that the Shure P9T – X55 Transmitter did fully comply with the requirements of the following:

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FCC Part 74 : Subpart H  
RSS 210 Issue 9, Annex G: Low-Power Radio Apparatus Operating in the Television Bands

## 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
L05-068-02	Modulation Analyzer	Boonton	8200	46410-1223	100KHz-2GHz	5/30/2018	5/30/2020
L19-006-01	Temperature Chamber	Espec	SU-240	91004211	N/A	4/5/2018	4/5/2019
L23-011-38	1340 MHz High-pass Filter	K&L	11SH10	13401-X1000-o/O	N/A	4/25/2018	4/25/2020
L23-021-01	Audio Signal Generator/Analyzer	Audio Precision	SYS-2722	48254-1041	N/A	4/26/2018	4/26/2020
L23-022-01	Spectrum Analyzer	Rhode & Schwarz	FSU26	201043	2Hz-26.5GHz	8/23/2017	8/23/2019
L23-022-02	Spectrum Analyzer	Rhode & Schwarz	FSW26	103788	2Hz-26.5GHz	4/24/2018	4/24/2020
L23-023-01	Signal Generator	Rhode & Schwarz	SMF 100A	48254-151	100kHz-22GHz	8/23/2017	8/23/2019
L23-024-01	Frequency Counter	Agilent	53220A	MY50006485	100MHz-6GHz	7/24/2018	7/24/2020
L23-040-03	20dB Signal Attenuator	Mini-Circuits	BW-N20W5+	0952	18GHz	5/31/2018	5/30/2020
L23-040-22	ETSI Noise Filter	Shure	N/A	N/A	N/A	5/24/2017	5/24/2019
L23-040-30	ETSI Noise Filter	Shure	N/A	N/A	N/A	5/24/2017	5/24/2019
L23-041-56	SMA-N-type Coaxial Cable	Florida RF Labs	N/A	46410-1080	100kHz-22GHz	5/30/2018	5/30/2019
L23-045-36	RF Power Meter	EMPower	7002-006	00151071	18GHz	1/31/2018	1/31/2020

## Appendix A: Radiated Emissions Measurements

### A.1. Purpose:

This test was performed to determine if the EUT (Shure P9T X55 Transmitter) meets the Radiated Emissions requirements of FCC Part 74.861 (d)(4)(i) and RSS 210.9 Annex G.3.4.

### A.2. Requirements:

FCC Part 74.861 (d)(4)(i) states:

“Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08).”

RSS 210.9 Annex G.3.4 states:

“The transmitter unwanted emissions shall meet the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and radio spectrum matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement.”

The limits for spurious emissions from a transmitter as stated by EN 300 422-1 v1.4.2 section 8.4 are shown below.

State	Frequency		
	47 MHz to 74 MHz 87,5 MHz to 137 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other Frequencies below 1 000 MHz	Frequencies above 1 000 MHz
Operation	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

*Figure 1: Table - Limits for Spurious Emissions*

### A.3. 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 <sub>LAB</sub>	U <sub>FCC</sub>
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1000 MHz)	4.24dB	6dB
Radiated disturbance (electric field strength on an open area test site or alternative test site) (1 GHz – 12.75 GHz)	4.60dB	6dB

U<sub>LAB</sub> = Determined for Shure EMC Laboratory

U<sub>FCC</sub> = From FCC EN 300 422-1 Table 10: Measurement uncertainty

Since U<sub>LAB</sub> is less than or equal to U<sub>FCC</sub>:

- 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.

#### A.4. Test Setup and Instrumentation:

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



#### A.5. EUT Operation:

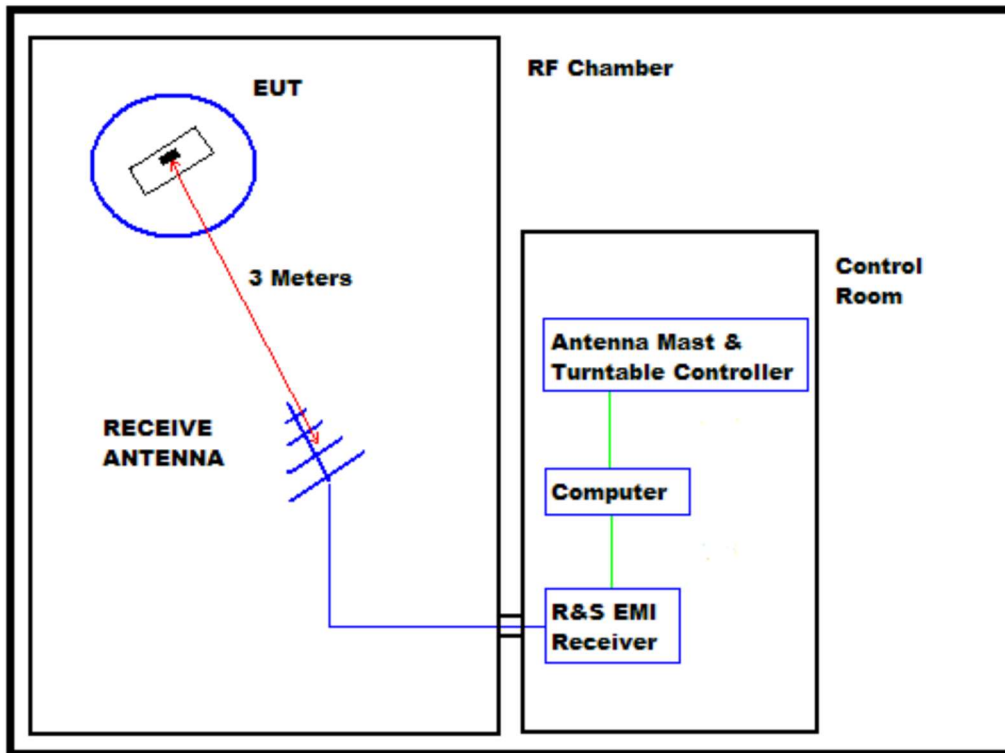
All ports were terminated on the EUT. The device was powered up and the frequency was set using the buttons on the front panel, with TX RF turned on. Testing was conducted with the EUT set to the Low, Mid, and High frequencies chosen within the operating frequency range. These frequencies were set as 941.625MHz, 954.55MHz, and 959.725MHz, respectively. The device was plugged into power from an outlet in the floor of the Shure EMC Lab anechoic chamber.

For the tests above 1GHz, a high-pass filter with a cutoff frequency of 1340MHz (L23-011-38) was used to clean up the signal. It was attached immediately after the antenna.

### A.6. 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. The broadband measuring antenna was positioned at a 3 meter distance from the EUT. The frequency range from 25MHz to 1GHz was investigated using a peak detector function with the BiConiLog antenna at horizontal and vertical polarization, and with several different orientations of the EUT with respect to the antenna. The maximum levels measured for each antenna polarization were then automatically plotted. The resultant field strength (FS) is a summation in decibels (dB) of the EMI receiver measurement (ERM), the antenna correction factor (AF), and the cable loss factor (CF). If an external pre-amplifier is used, the total is reduced by its gain (-PA).

$$\text{Formula 1: FS (dB}\mu\text{V/m)} = \text{MTR (dB}\mu\text{V)} + \text{AF (dB/m)} + \text{CF (dB)} + (-\text{PA (dB)})$$

To convert the Field Strength dB $\mu$ V/m term to  $\mu$ V/m, the dB $\mu$ V/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in  $\mu$ V/m terms.

Formula 2:  $FS (\mu V/m) = \text{AntiLog} [(FS (dB\mu V/m))/20]$

Final radiated RF emissions were performed on all significant broadband and narrowband emissions found in the preliminary sweeps using the following methods:

1) Measurements of all significant broadband and narrowband signals from 25MHz to 1GHz were made using a quasi-peak detector and a BiConiLog antenna. Measurements above 1GHz were made using an average detector and a broadband double ridged waveguide antenna.

2) To ensure that maximum or worst case, 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 antenna is 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.

Results:

The plots of the radiated spurious emission levels are presented on the following pages.

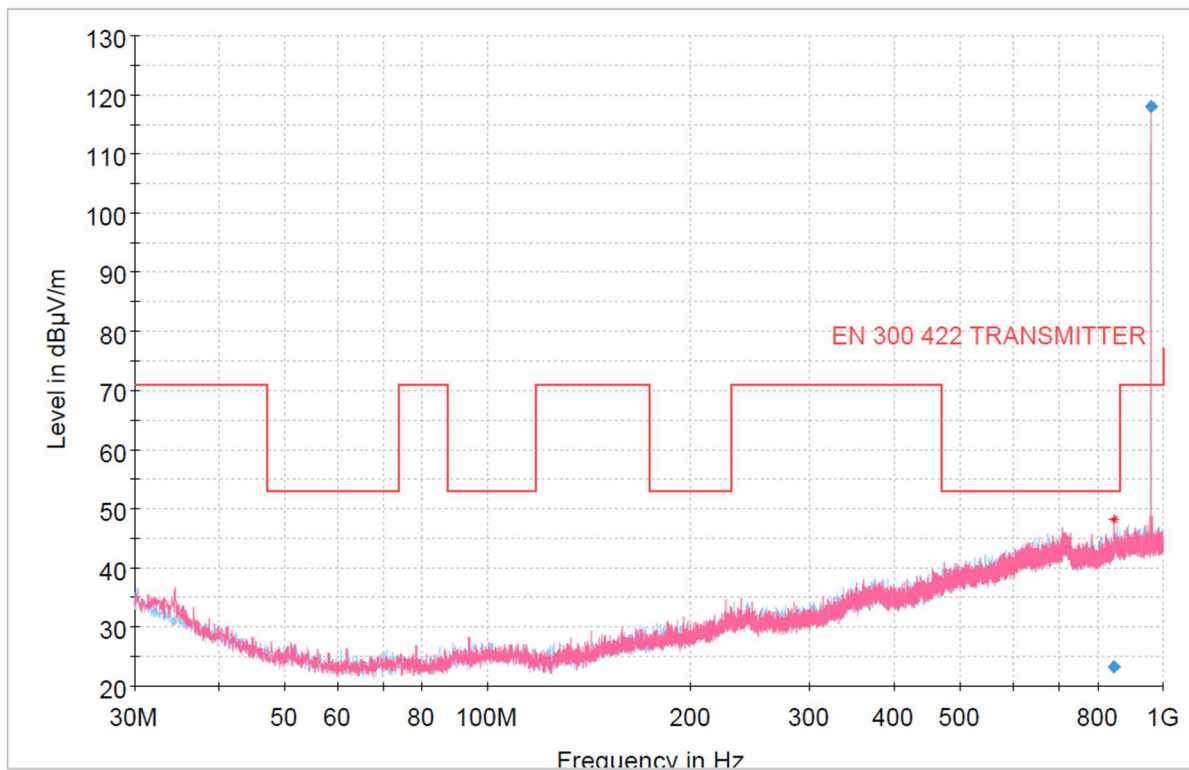


Figure 2: P9T X55 959.725MHz - 30MHz to 1GHz

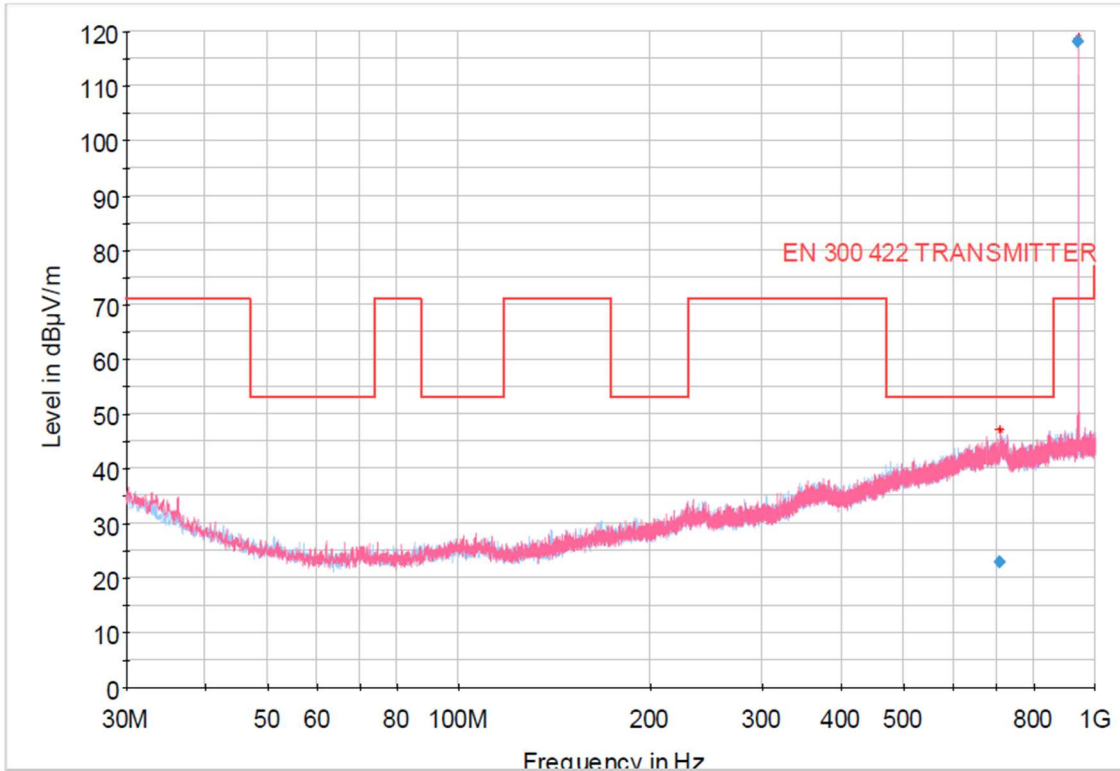


Figure 3: P9T X55 941.625MHz - 30MHz to 1GHz

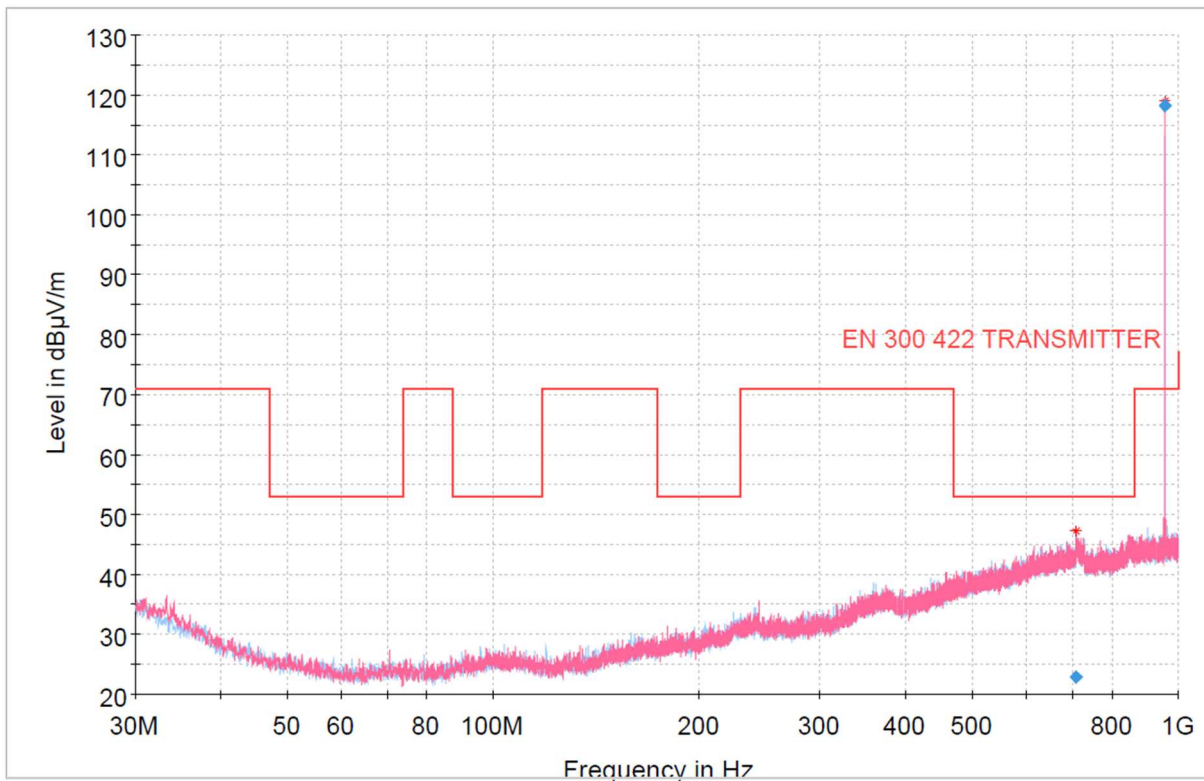


Figure 4: P9T X55 954.550MHz - 30MHz to 1GHz



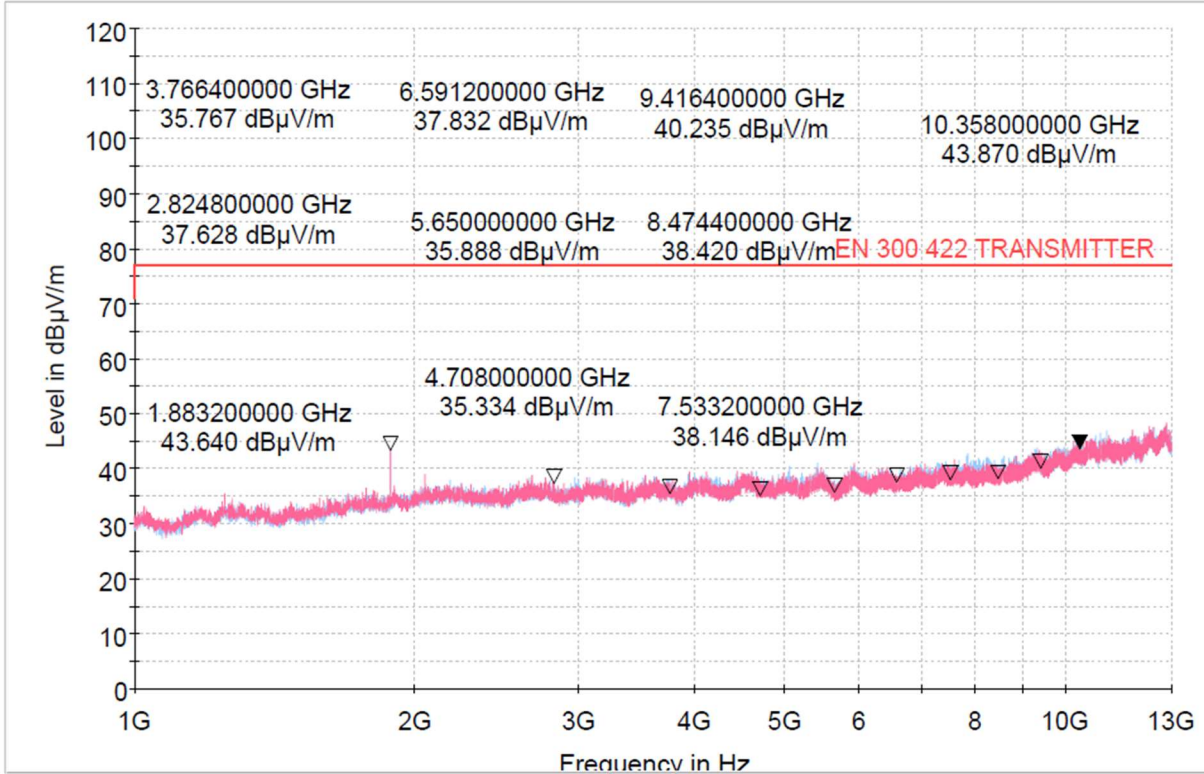


Figure 5: P9T X55 941.625MHz - 1GHz to 13GHz

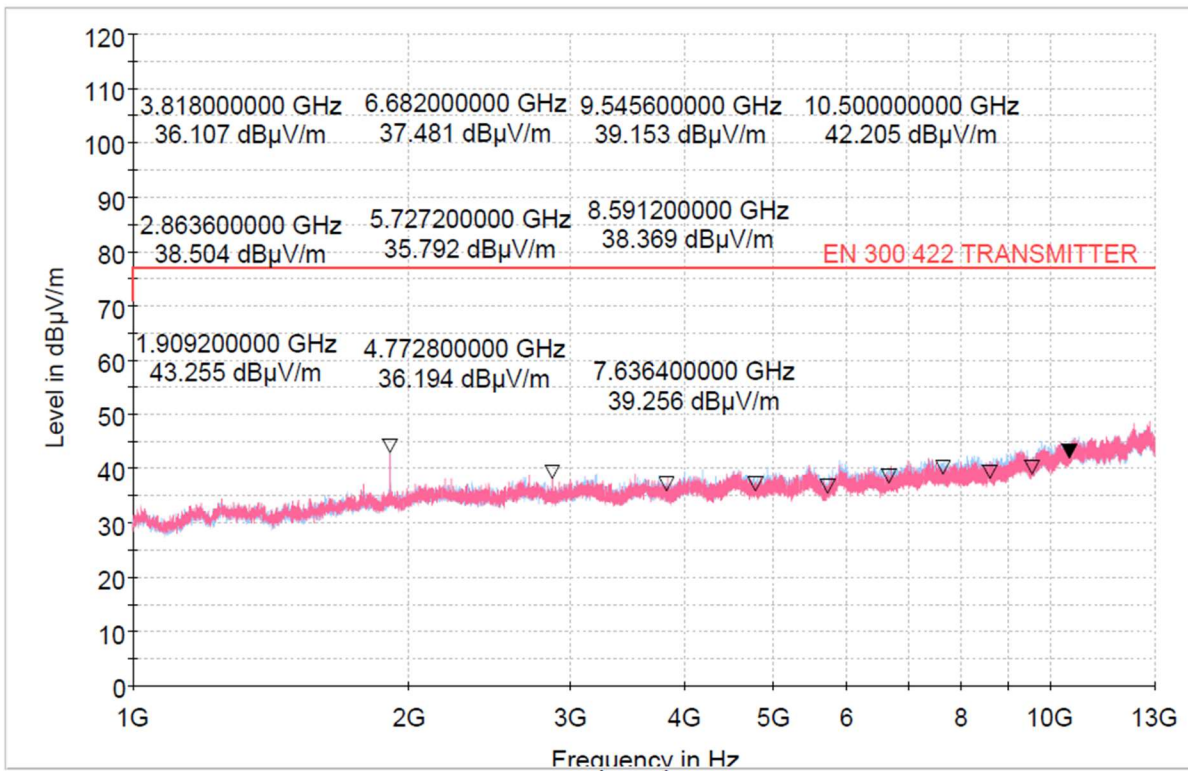


Figure 6: P9T X55 954.550MHz - 1GHz to 13GHz

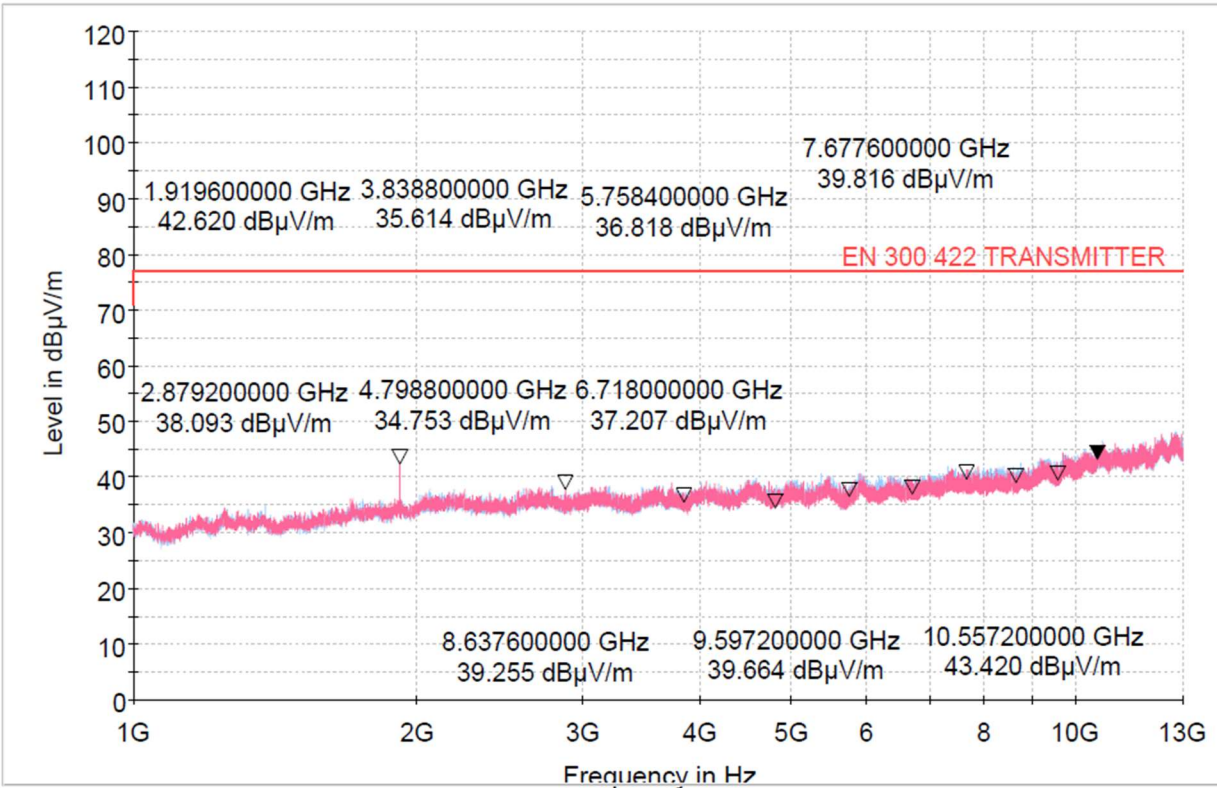


Figure 7: P9T X55 959.725MHz - 1GHz to 13 GHz

### A.7. Conclusion

It was shown by the test that the P10T X55 complies with both FCC Part 74.861 (d)(4)(i) and RSS 210.9 Annex G.3.4



## Appendix B: Necessary Bandwidth

### B.1. Purpose:

This test was performed to determine if the EUT meets the necessary bandwidth requirements of FCC Part 74.861(d)(4)(i) and RSS 210 Issue 9, Annex G.3.1.

### B.2. Requirements:

As stated in paragraph 74.861(d)(4)(i), for low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

“For the 653-657 MHz, 941.5-944 MHz, 944-952 MHz, 952.850-956.250 MHz, 956.45-959.85 MHz, 1435-1525 MHz, 6875-6900 MHz and 7100-7125 MHz bands, analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08),”

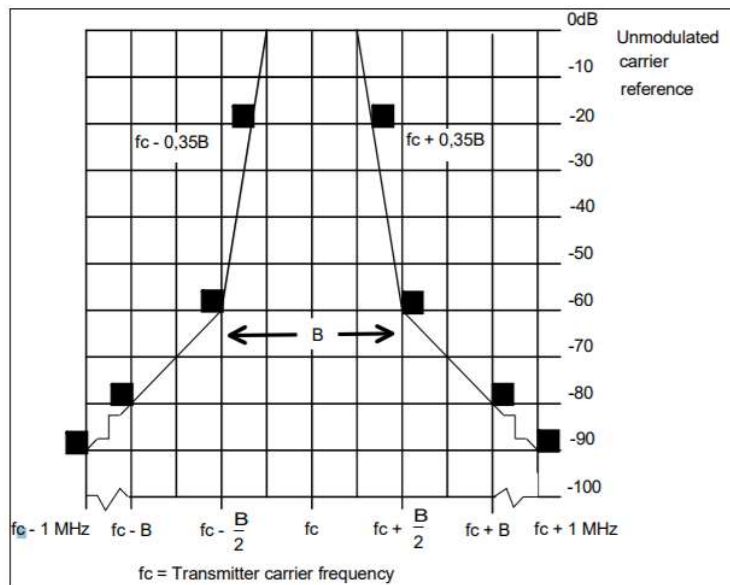


Figure 8: Spectrum mask for analogue systems in all bands - ETSI EN 300 422-1

The limits for RSS 210 Issue 9, Annex G.3.1 are shown in table G1 below:

**Table G1 — Specification for Low-Power Radio Apparatus**

Frequency Bands (MHz)	Transmit e.i.r.p. (mW)	Authorized Bandwidth (kHz)	Frequency Stability (ppm)
54-72 76-88 174-216	50	200	± 50
470-608 614-698 <sup>Note</sup>	250	200	± 50

### B.3. 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):

Expanded Uncertainty ( $U_{95}$ ):	Std uncertainty	
	+u(%)	-u(%)
	<b>0.130</b>	<b>0.130</b>

These values can be found in the document titled 'Occupied Bandwidth Max Input Freq Above 3kHz.xlsx' located at \\shure.com\organization\Quality\Product Conformance-Lab Services\Global Compliance\Shure EMC Lab\Controlled Documents\Measurement Uncertainties.

### B.4. Test Setup and Instrumentation:

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





### B.5. EUT Operation:

The device was powered on and set to three frequencies using the buttons on the front of the device: 941.650MHz, 954.550MHz, and 959.725MHz.

### B.6. Specific Test Procedures:

The device was tested using procedures outlined in EN 300 422-1 part 8.3.2.1 as listed below.

“The arrangement of test equipment as shown in figure B.1 shall be used. Note that the noise meter conforms to (quasi peak) without weighting filter (flat).

With the Low Frequency (LF) audio signal generator set to 500 Hz, the audio input level to the DUT shall be adjusted to 8 dB below the limiting threshold (-8 dB (lim)) as declared by the manufacturer.

The corresponding audio output level from the demodulator shall be measured and recorded.

The input impedance of the noise meter shall be sufficiently high to avoid more than 0,1 dB change in input level when the meter is switched between input and output.

The audio input level shall be increased by 20 dB, i.e. to +12 dB (lim), and the corresponding change in output level shall be measured.

It shall be checked that the audio output level has increased by  $\leq 10$  dB.

If this condition is not met, the initial audio input level shall be increased from -8 dB (lim) in 1 dB steps until the above condition is fulfilled, and the input level recorded in the test report. This level replaces the value derived from the manufacturer's declaration and is defined as -8 dB (lim).

Measure the input level at the transmitter required to give +12 dB (lim).

The LF generator shall be replaced with the weighted noise source to Recommendation ITU-R BS.559-2 [i.3], band-limited to 15 kHz as described in IEC 60244-13 [2], and the level shall be adjusted such that the measured input to the transmitter corresponds to +12 dB (lim).

If the transmitter incorporates any ancillary coding or signalling channels (e.g. pilot-tones), these shall be enabled prior to any spectral measurements.

If the transmitter incorporates more than one audio input, e.g. stereo systems, the second and subsequent channels shall be simultaneously driven from the same noise source, attenuated to a level of -6 dB (lim).

The transmitter RF output spectrum shall be measured, using a spectrum analyser with the following settings:

- centre frequency:  $f_c$ : Transmitter (Tx) nominal frequency;
- dispersion (Span):  $f_c - 1$  MHz to  $f_c + 1$  MHz;
- Resolution BandWidth (RBW): 1 kHz;
- Video BandWidth (VBW): 1 kHz;
- detector: Peak hold.

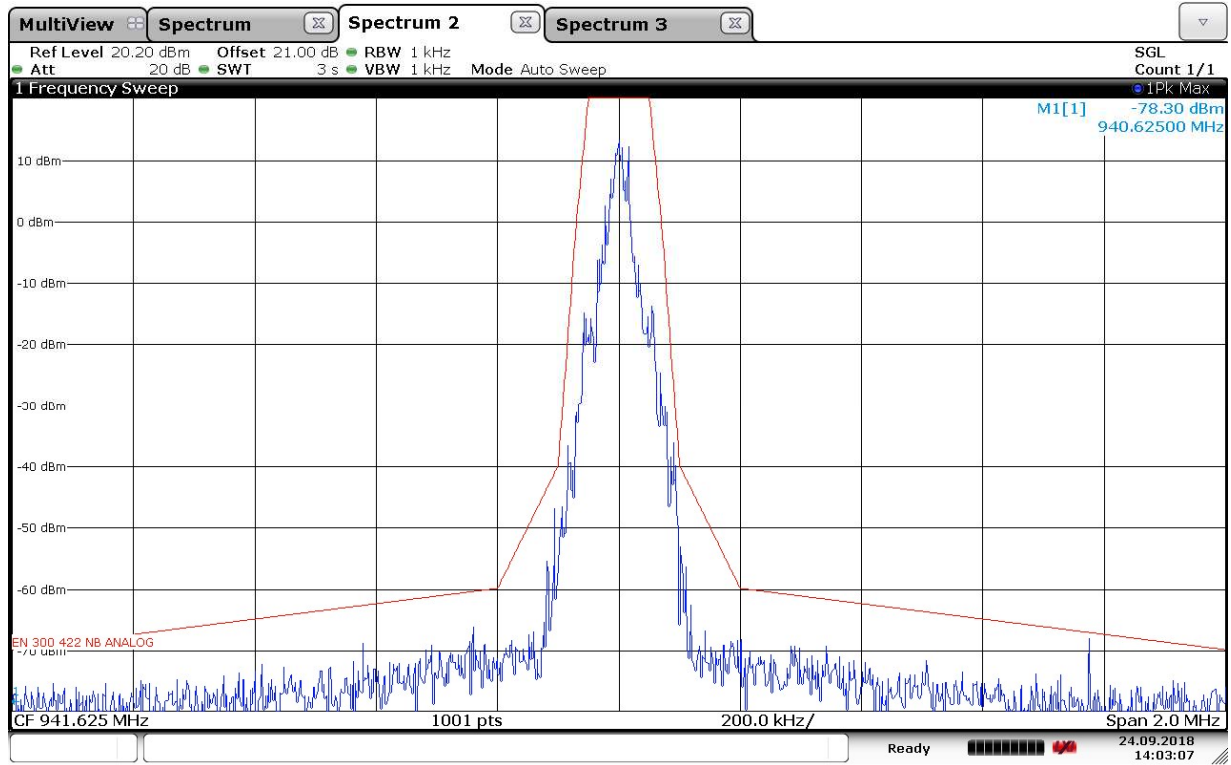
Figure 8 shows the spectrum mask for all analogue systems in the band. The -90 dBc point shall be  $\pm 1$  MHz from  $f_c$  measured with an average detector. To comply, a measured value shall fall below the mask limit.”

A +12dB level of -28dBV and a -8dB level of -48dBV were chosen using the first set of instructions, and the output RF power was measured with inputs of -28dBV for the +12dB level and -46dBV for the -6dB level.

## B.7. Results:

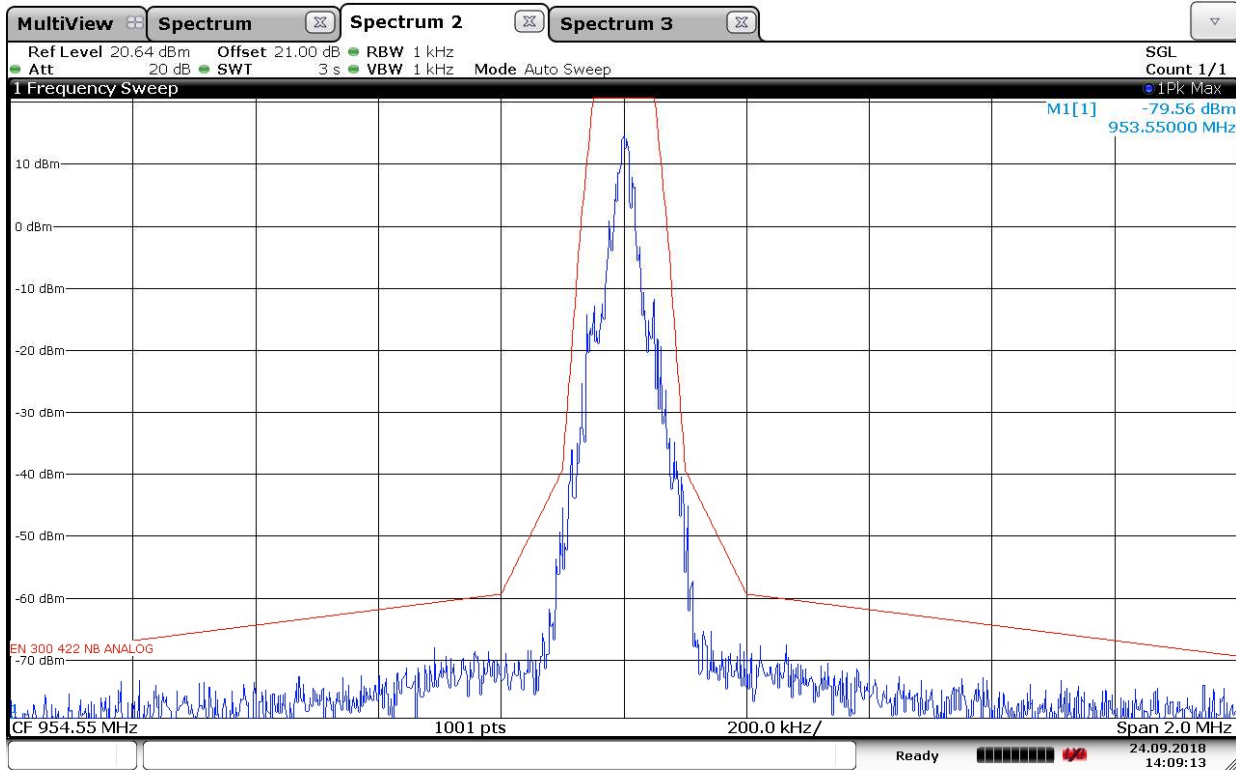
The necessary bandwidth data are presented on the following pages. Data are shown as the maximum relative level of the output level within the emission mask.





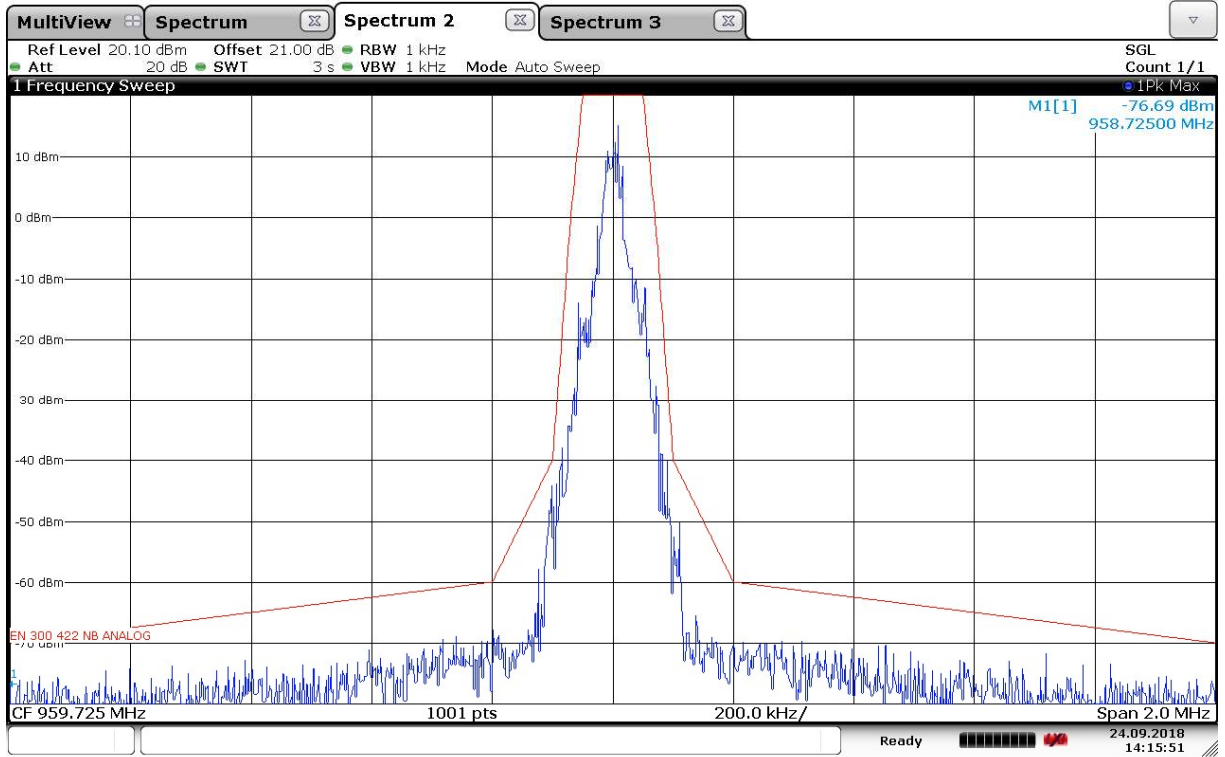
14:03:07 24.09.2018

Figure 9: Necessary Bandwidth Measurement at 941.625MHz



14:09:14 24.09.2018

Figure 10: Necessary Bandwidth Measurement at 954.550MHz



14:15:51 24.09.2018

Figure 11: : Necessary Bandwidth Measurement at 959.725MHz

## B.8. Conclusion

As shown by the test data, the necessary bandwidth of the EUT meets the requirements of FCC Part 74.861(d)(4)(i) and RSS 210 Issue 9, Annex G.3.1.

## Appendix C: RF Output Power

### C.1. Purpose:

This test was performed to determine if the EUT meets the RF power output requirements of FCC Part 74.861(d)(1) and RSS 210 Issue 9, Annex G.3.1.

### C.2. Requirements:

As stated in FCC 74.861(d)(1), for all bands except the 1435-1525 MHz band, the maximum transmitter power which will be authorized is 1 watt.

The limits stated in RSS 210 Issue 9, Annex G.3.1 are shown in table G1 below:

**Table G1 — Specification for Low-Power Radio Apparatus**

Frequency Bands (MHz)	Transmit e.i.r.p. (mW)	Authorized Bandwidth (kHz)	Frequency Stability (ppm)
54-72 76-88 174-216	50	200	± 50
470-608 614-698 <sup>Note</sup>	250	200	± 50

### C.3. 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):

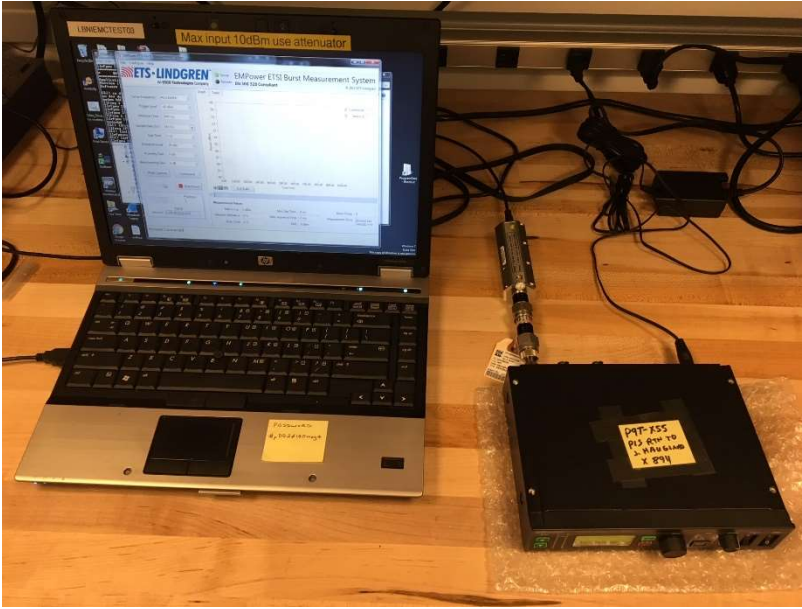
Expanded Uncertainty ( $U_{95}$ ):	Std uncertainty	
	+u(dB)	-u(dB)
	<b>0.461</b>	<b>0.461</b>

These values can be found in the document titled 'Carrier Power w ETS Power Meter (L23-045-36).xlsx' located at \\shure.com\organization\Quality\Product Conformance-Lab Services\Global Compliance\Shure EMC Lab\Controlled Documents\Measurement Uncertainties.

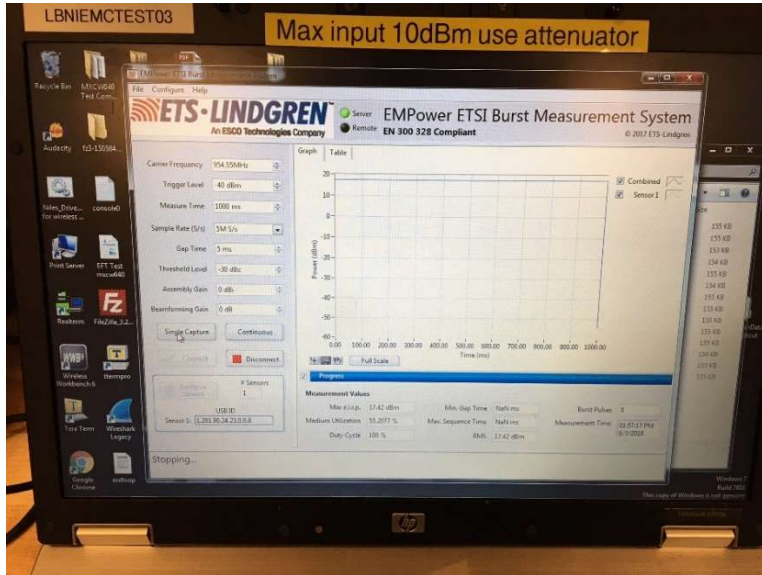
### C.4. Test Setup and Instrumentation:

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









**C.5. EUT Operation:**

The EUT was powered up and three transmit frequencies (941.650MHz, 954.550MHz, and 959.725MHz) and the power output level of the transmitter were selected using the front panel controls.

**C.6. Specific Test Procedures:**

- a. The EUT’s RF Out 1 was connected to an artificial antenna at ambient temperature.
- b. The EUT’s frequency was set at the lowest frequency (941.625 MHz) and the lowest switchable power level (10mW).
- c. The power level was measured and recorded.
- d. Step b) was repeated at all power levels (10mW, 50mW, and 100mW) and at medium (954.550 MHz) and high (959.725 MHz) frequencies.
- e. The above procedure was then repeated for the second RF output.

**C.7. Results:**

The device performed within the bounds set by FCC Part 74.861(d)(1) and RSS 210 Issue 9, Annex G.3.1. The following tables detail the output power at each frequency, tested at 10, 50, and 100mW compared to the FCC Limit. The first table shows the values for RF Output 1 and the second is for RF Output 2 on the stereo device.

Unit#	Frequency (MHz)	Nominal Power (mW)	Measured Power (dBm)	Measured Power (mW)	FCC Limit (mW)	
RF Out1 X55	941.625	10	10.44	11.07	1000	
	954.550	10	10.72	11.80	1000	
	959.725	10	10.12	10.28	1000	
RF Out1 X55	941.625	50	17.34	54.20	1000	
	954.550	50	17.69	58.75	1000	
	959.725	50	17.08	51.05	1000	
RF Out1 X55	941.625	100	20.26	106.17	1000	
	954.550	100	20.58	114.29	1000	

	959.725	100	19.96	99.08	1000	
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## Appendix D: Frequency Stability

### D.1. Purpose:

This test was performed to determine if the EUT meets the frequency stability requirements of FCC Part 74.861(e)(4) and RSS 210.

### D.2. Requirements:

As stated in FCC Part 74.861(e)(4) and RSS-210, the tolerance of the transmitter shall be 0.005%, or 50 ppm.

### D.3. 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):

Expanded Uncertainty (U <sub>95</sub> ):	Std uncertainty ±u(error)
	<b>5.83E-08</b>

These values can be found in the document titled 'Frequency Error\_Stability – 2018\_09\_24.xlsx' located at \\shure.com\organization\Quality\Product Conformance-Lab Services\Global Compliance\Shure EMC Lab\Controlled Documents\Measurement Uncertainties.

- 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.

### D.4. Test Setup and Instrumentation:

The EUT was heated and cooled in an Espec temperature chamber over a temperature range of -30°C to +50°C. The temperature around the EUT was measured and monitored by the built-in thermometer. The EUT's frequency was measured with a spectrum analyzer set to measure signal count at 0.1Hz resolution. The center frequency of the spectrum analyzer was set to the selected transmit frequency of the EUT (Low, Mid or High). Photographs of the test setup are shown below. The test instrumentation can be determined from Table 10-1.



#### **D.5. EUT Operation:**

The device was powered on with RF TX switched on. The three frequencies tested were set using the buttons on the front panel of the device.

#### **D.6. Specific Test Procedures:**

- a. The temperature chamber was set to  $-30^{\circ}\text{C}$  with the EUT inside and powered on.
- b. The EUT was allowed to soak for  $\sim 20$  minutes after the temperature chamber reached the set temperature.
- c. The measured frequency of the transmitter was then recorded in the spreadsheet in section D.7.
- d. The temperature chamber was incremented  $+10^{\circ}\text{C}$  with the EUT inside and powered on.
- e. Steps c. through e. were repeated until the device reached  $+50^{\circ}\text{C}$ .
- f. Steps a. through e. were repeated for representative low, mid and high frequencies within the EUT's operational bands.



**D.7. Results:**

Temperature (°C)	Voltage	Nominal Frequency (MHz)	Measured Frequency (MHz)	Deviation (%)	FCC Limit (%)	Deviation (ppm)	RSS Limit (ppm)	Pass/Fail
<b>941.625MHz, 100mW</b>								
-30	120VAC, 60Hz	941.625	941.625269	0.000029	0.005	0.285676	±50	PASS
-20	120VAC, 60Hz	941.625	941.625189	0.000020	0.005	0.200717	±50	PASS
-10	120VAC, 60Hz	941.625	941.625184	0.000020	0.005	0.195407	±50	PASS
0	120VAC, 60Hz	941.625	941.625158	0.000017	0.005	0.167795	±50	PASS
10	120VAC, 60Hz	941.625	941.625056	0.000006	0.005	0.059472	±50	PASS
20	120VAC, 60Hz	941.625	941.624950	0.000005	0.005	0.0531	±50	PASS
30	120VAC, 60Hz	941.625	941.624870	0.000014	0.005	0.138059	±50	PASS
40	120VAC, 60Hz	941.625	941.624807	0.000020	0.005	0.204965	±50	PASS
50	120VAC, 60Hz	941.625	941.624850	0.000016	0.005	0.159299	±50	PASS
<b>954.550MHz, 100mW</b>								
-30	120VAC, 60Hz	954.550	954.550269	0.000028	0.005	0.281808	±50	PASS
-20	120VAC, 60Hz	954.550	954.550184	0.000019	0.005	0.192761	±50	PASS
-10	120VAC, 60Hz	954.550	954.550190	0.000020	0.005	0.199047	±50	PASS
0	120VAC, 60Hz	954.550	954.550159	0.000017	0.005	0.166571	±50	PASS
10	120VAC, 60Hz	954.550	954.550060	0.000006	0.005	0.062857	±50	PASS
20	120VAC, 60Hz	954.550	954.549957	0.000005	0.005	0.045047	±50	PASS
30	120VAC, 60Hz	954.550	954.549870	0.000014	0.005	0.13619	±50	PASS
40	120VAC, 60Hz	954.550	954.549805	0.000020	0.005	0.204285	±50	PASS
50	120VAC, 60Hz	954.550	954.549855	0.000015	0.005	0.151904	±50	PASS
<b>959.725MHz, 100mW</b>								
-30	120VAC, 60Hz	959.725	959.725270	0.000028	0.005	0.281331	±50	PASS
-20	120VAC, 60Hz	959.725	959.725180	0.000019	0.005	0.187554	±50	PASS
-10	120VAC, 60Hz	959.725	959.725191	0.000020	0.005	0.199015	±50	PASS
0	120VAC, 60Hz	959.725	959.725155	0.000016	0.005	0.161505	±50	PASS
10	120VAC, 60Hz	959.725	959.725062	0.000006	0.005	0.064602	±50	PASS
20	120VAC, 60Hz	959.725	959.724954	0.000005	0.005	0.04793	±50	PASS
30	120VAC, 60Hz	959.725	959.724862	0.000014	0.005	0.143791	±50	PASS
40	120VAC, 60Hz	959.725	959.724806	0.000020	0.005	0.202141	±50	PASS
50	120VAC, 60Hz	959.725	959.724855	0.000015	0.005	0.151085	±50	PASS

**D.8. Conclusion**

It was found that the P9T X55 passed the requirements of FCC part 74 and RSS210 Issue 9.