

FCC TEST REPORT

For

Sam Ash Music Corporation

ET100 UHF Transmitter

Test Model: ET100

Prepared for : Sam Ash Music Corporation
Address : 262 Duffy Avenue, Hicksville, NY 11801

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei,
Shajing Street, Baoan District, Shenzhen, 518000, China

Tel : (+86)755-82591330
Fax : (+86)755-82591332
Web : www.LCS-cert.com
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : November 30, 2023
Number of tested samples : 2
Sample No : A08313011-1, A08313011-2
Serial number : Prototype
Date of Test : November 30, 2023 ~ January 05, 2024
Date of Report : January 05, 2024





FCC TEST REPORT
FCC CFR 47 PART 74

Report Reference No. : LCSA08313011EA

Date of Issue : December 26, 2023

Testing Laboratory Name : Shenzhen LCS Compliance Testing Laboratory Ltd.

Address : 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Testing Location/ Procedure : Full application of Harmonised standards
Partial application of Harmonised standards
Other standard testing method

Applicant's Name : Sam Ash Music Corporation

Address : 262 Duffy Avenue, Hicksville, NY 11801

Test Specification

Standard : FCC CFR 47 PART 74

Test Report Form No. : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen LCS Compliance Testing Laboratory Ltd. is acknowledged as copyright owner and source of the material. Shenzhen LCS Compliance Testing Laboratory Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

EUT Description : ET100 UHF Transmitter

Trade Mark : SAMSON

Test Model : ET100

Ratings : Input: 15V=800mA
For AC Adapter Input: 100-240V~, 50/60Hz, 0.5A
Adapter Output: 15.0V=0.8A, 12.0W Max

Result : Positive

Compiled by:

Jerry chu

Jerry Chu/ Administrator

Supervised by:

Cary Luo

Cary Luo/ Technique principal

Approved by:

Gavin Liang

Gavin Liang/ Manager





FCC -- TEST REPORT

Test Report No. : LCSEA08313011EA	<u>December 26, 2023</u> Date of issue
--	---

Test Model.....	: ET100
EUT.....	: ET100 UHF Transmitter
Applicant.....	: Sam Ash Music Corporation
Address.....	: 262 Duffy Avenue, Hicksville, NY 11801
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: Sam Ash Music Corporation
Address.....	: 262 Duffy Avenue, Hicksville, NY 11801
Telephone.....	: /
Fax.....	: /
Factory.....	: Relacart Electronics Co., LTD.
Address.....	: No.10, Fuxing Road, Enping City, Guangdong Province, China
Telephone.....	: /
Fax.....	: /

Test Result	Positive
--------------------	-----------------

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



Revision History

Revision	Issue Date	Revision Content	Revised By
000	January 05, 2024	Initial Issue	--



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



TABLE OF CONTENTS

- 1. GENERAL INFORMATION..... 6**
 - 1.1. DESCRIPTION OF DEVICE (EUT)..... 6
 - 1.2. SUPPORT EQUIPMENT LIST..... 6
 - 1.3. EXTERNAL I/O CABLE..... 6
 - 1.4. DESCRIPTION OF TEST FACILITY..... 6
 - 1.5. STATEMENT OF THE MEASUREMENT UNCERTAINTY..... 7
 - 1.6. MEASUREMENT UNCERTAINTY..... 7
 - 1.7. DESCRIPTION OF TEST MODES..... 7
 - 1.8. FREQUENCY OF CHANNELS..... 8
- 2. TEST METHODOLOGY..... 9**
 - 2.1. EUT CONFIGURATION..... 9
 - 2.2. EUT EXERCISE..... 9
 - 2.3. GENERAL TEST PROCEDURES..... 9
- 3. SYSTEM TEST CONFIGURATION..... 10**
 - 3.1. JUSTIFICATION..... 10
 - 3.2. EUT EXERCISE SOFTWARE..... 10
 - 3.3. SPECIAL ACCESSORIES..... 10
 - 3.4. BLOCK DIAGRAM/SCHEMATICS..... 10
 - 3.5. EQUIPMENT MODIFICATIONS..... 10
 - 3.6. TEST SETUP..... 10
- 4. SUMMARY OF TEST RESULTS..... 11**
- 5. TEST RESULT..... 12**
 - 5.1. TRANSMITTER OUTPUT POWER..... 12
 - 5.2. OCCUPIED BANDWIDTH AND EMISSION MASK..... 14
 - 5.3. TRANSMITTER UNWANTED EMISSIONS(RADIATED OR CONDUCTED)..... 18
 - 5.5.FREQUENCY STABILITY..... 24
 - 5.6.MODULATION CHARACTERISTICS..... 27
 - 5.7.NECESSARY BANDWIDTH (BN) FOR ANALOGUE SYSTEMS..... 29
- 6. LIST OF MEASURING EQUIPMENTS..... 31**
- 7. TEST SETUP PHOTOGRAPHS OF EUT..... 32**
- 8. EXTERIOR PHOTOGRAPHS OF THE EUT..... 32**
- 9. INTERIOR PHOTOGRAPHS OF THE EUT..... 32**





1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: ET100 UHF Transmitter
Test Model	: ET100
Power Supply	: Input: 15V \Rightarrow 800mA For AC Adapter Input: 100-240V~, 50/60Hz, 0.5A Adapter Output: 15.0V \Rightarrow 0.8A, 12.0W Max
Hardware Version	: Receiver: V4.0; Hand: V4.0; Pocket: V3.2
Software Version	: Receiver: V1.03; Hand: V1.02; Pocket: V1.04

UHF

Operation frequency	: 471.000MHz~500.650MHz
Channel Number	: 180 channels
Modulation Type	: FM
Antenna Type	: Internal Antenna
Antenna Gain	: 3.0dBi
Extreme temp. Tolerance	: -30°C to +50°C

1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	Power supply	GPE018G-1 50080-Z	--	FCC

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
ANTENNA Port	1	N/A
ET100 UHF TRANSMITTER Port	1	N/A
POWER DC IN Port	1	N/A
LOOP OUTPUT BALANCED Port	1	N/A
ANTENNA Port	1	N/A

1.4. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

Test Firm Registration Number: 254912

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



1.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. 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.

1.6. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty	9KHz~30MHz	±3.10dB	(1)
	30MHz~200MHz	±2.96dB	(1)
	200MHz~1000MHz	±3.10dB	(1)
	1GHz~26.5GHz	±3.80dB	(1)
	26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	150kHz~30MHz	±1.63dB	(1)
Power disturbance	30MHz~300MHz	±1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Worst-case mode and channel used for 150 kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, which was determined to be (HCH).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be (HCH).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

Mode of Operations	Transmitting Frequency (MHz)
FM	471.000
	487.700
	500.650
For Conducted Emission	
Test Mode	TX Mode
For Radiated Emission	
Test Mode	TX Mode





1.8. Frequency of Channels

Channel

	GR CH	1	2	3	4	5	6	7	8	9	10
470-486MHz (16MHz)	1	471.000	471.075	471.150	471.225	471.300	471.375	471.450	471.525	471.600	471.675
	2	471.700	471.775	471.850	471.925	472.000	472.075	472.150	472.225	472.300	472.375
	3	472.100	472.175	472.250	472.325	472.400	472.475	472.550	472.625	472.700	472.775
	4	472.900	472.975	473.050	473.125	473.200	473.275	473.350	473.425	473.500	473.575
	5	475.225	475.300	475.375	475.450	475.525	475.600	475.675	475.750	475.825	475.900
	6	475.975	476.050	476.125	476.200	476.275	476.350	476.425	476.500	476.575	476.650
	7	477.775	477.850	477.925	478.000	478.075	478.150	478.225	478.300	478.375	478.450
	8	481.300	481.375	481.450	481.525	481.600	481.675	481.750	481.825	481.900	481.975
	9	483.225	483.300	483.375	483.450	483.525	483.600	483.675	483.750	483.825	483.900
486-502MHz (16MHz)	10	487.700	487.775	487.850	487.925	488.000	488.075	488.150	488.225	488.300	488.375
	11	489.300	489.375	489.450	489.525	489.600	489.675	489.750	489.825	489.900	489.975
	12	491.975	492.050	492.125	492.200	492.275	492.350	492.425	492.500	492.575	492.650
	13	495.000	495.075	495.150	495.225	495.300	495.375	495.450	495.525	495.600	495.675
	14	495.700	495.775	495.850	495.925	496.000	496.075	496.150	496.225	496.300	496.375
	15	496.100	496.175	496.250	496.325	496.400	496.475	496.550	496.625	496.700	496.775
	16	496.900	496.975	497.050	497.125	497.200	497.275	497.350	497.425	497.500	497.575
	17	499.225	499.300	499.375	499.450	499.525	499.600	499.675	499.750	499.825	499.900
	18	499.975	500.050	500.125	500.200	500.275	500.350	500.425	500.500	500.575	500.650



Shenzhen LCS Compliance Testing Laboratory Ltd.
 Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
 Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com
 Scan code to check authenticity



2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.26-2015:American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section FCC Rules Part 74.

2.3. General Test Procedures

2.3.1 Power Line Conducted Emissions(N/A)

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.4-2014 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

please refer to radated emission



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition;and transmission frequency by switch button control.

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity



4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 74		
FCC Rules	Description of Test	Result
FCC Part 74.861(e)(1)(ii) FCC Part 2.1046	Maximum Conducted Output Power	Compliant
FCC Part 74.861 (e)(5) FCC Part 2.1049	Occupied Bandwidth	Compliant
FCC Part 74.861 (e)(4) FCC Part 2.1055	Frequency error	Compliant
FCC Part 74.861(e)(6) 2.1053	Transmitter unwanted emissions(radiated or conducted)	Compliant
/	Conducted spurious emission	Compliant
FCC Part 2.1049 FCC Part 2.1047	Modulation characteristic	Compliant
FCC Part 74.861 (e)(7) FCC Part 2.1049	Necessary bandwidth (BN) for analogue systems	Compliant





5. TEST RESULT

5.1. Transmitter output power

5.1.1. Measurement description:

The power may not exceed the following values.

- (i) 54-72, 76-88, and 174-216 MHz bands: 50 mW EIRP
- (ii) 470-608 and 614-698: 250 mW conducted power
- (iii) 600 MHz duplex gap: 20 mW EIRP

5.1.2. Measurement:

Measurement parameter	
Detector:	Peak (worst case) / Average (RMS)
Sweep time:	Auto / 20s
Resolution bandwidth:	> emission bandwidth
Video bandwidth:	> resolution bandwidth
Span:	> 2 times emissions bandwidth
Trace mode:	Max. hold
EUT configuration:	Peak: Unmodulated carrier RMS: Modulate the transmitter with a 2.5 kHz tone at a level 16 dB higher than that required to produce a frequency deviation of ± 75 kHz, or to produce 50% of the manufacturer’s rated deviation, whichever is less.

5.1.3. Limits:

FCC
470 MHz to 608 MHz 250 mW (average) / 24 dBm (average)

5.1.4. Test result:

The EUT was programmed to be in continuously transmitting mode.

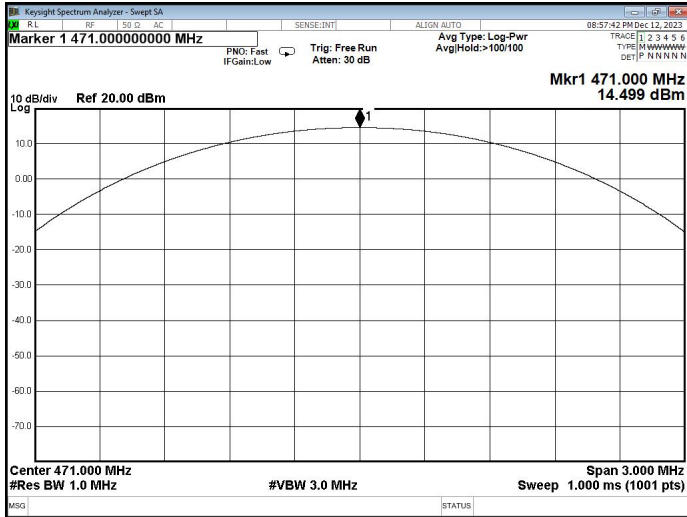




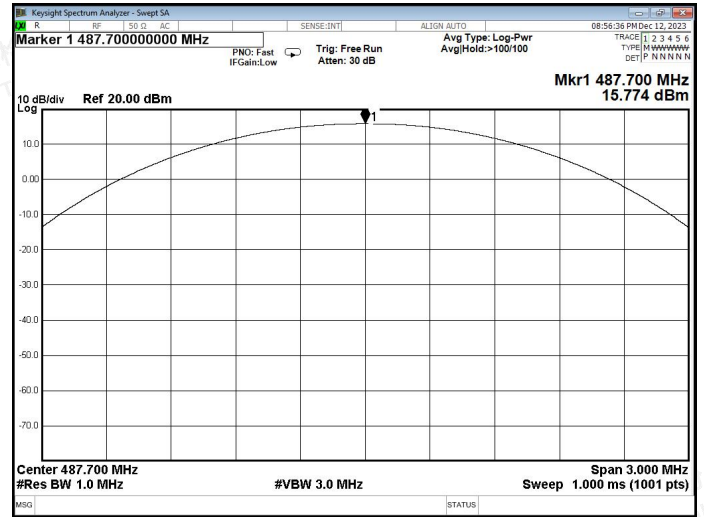
5.1.5. Test result

Test Mode	Frequency (MHz)	Measured Maximum Peak Power(dBm)	Measured Maximum Average Power(dBm)	Limits Average (dBm)	Verdict
FM	471.000	14.499	/	24	PASS
FM	487.700	15.774	/	24	PASS
FM	500.650	16.190	/	24	PASS

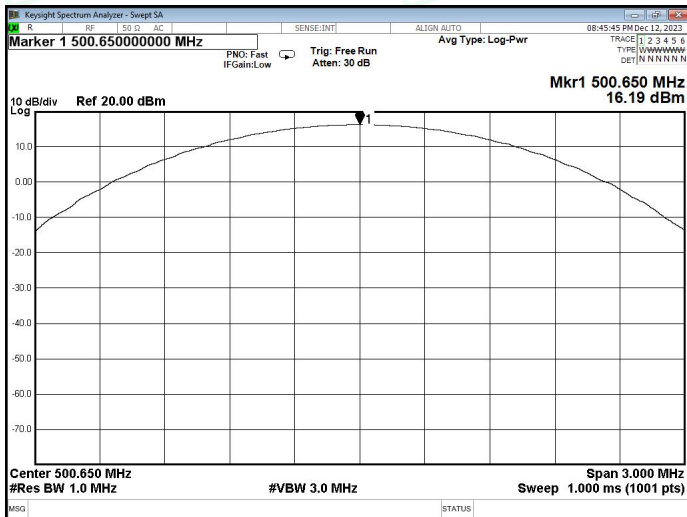
Maximum Peak Output Power



471.000 MHz



487.700 MHz



500.650 MHz





5.2. Occupied bandwidth and Emission Mask

5.2.1. Measurement description:

The operating bandwidth shall not exceed 200 kHz.

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

- (i) 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;
- (ii) 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;
- (iii) 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.

5.2.2. Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 % to 5 % of the occupied bandwidth
Video bandwidth:	3 x resolution bandwidth
Span:	2 x emission bandwidth
Trace mode:	Max. hold
Analyzer function:	99% power occupied bandwidth function
EUT:	Modulated signal with max. frequency deviation

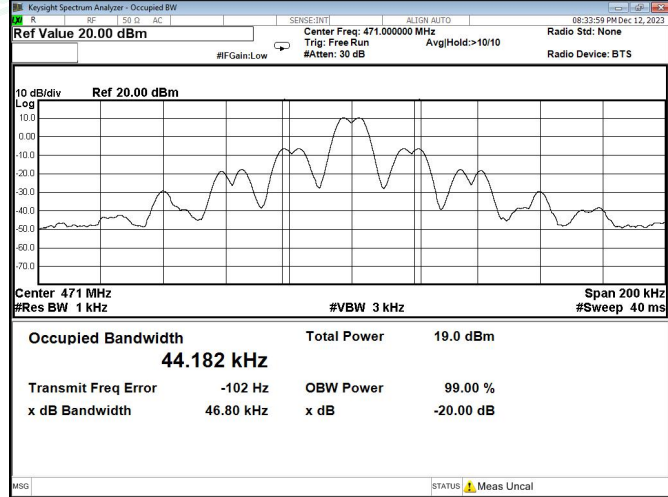
5.2.3. Result:

Test Mode	Frequency (MHz)	99% Bandwidth (KHz)	Limits (KHz)	Verdict
FM	471.000	44.182	200	PASS
FM	487.700	43.886	200	PASS
FM	500.650	43.730	200	PASS

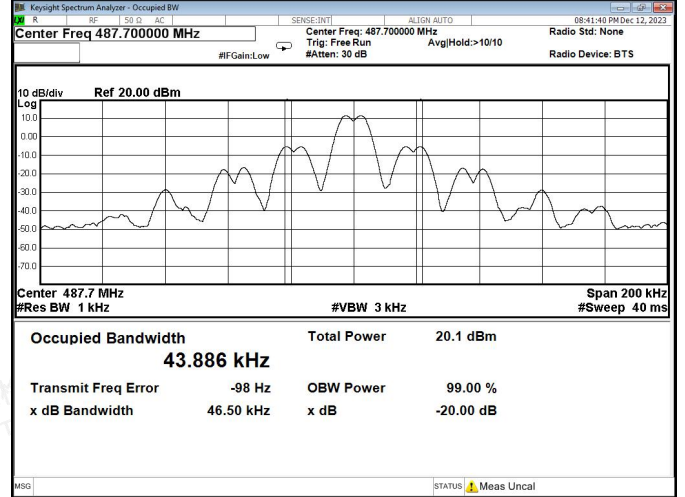




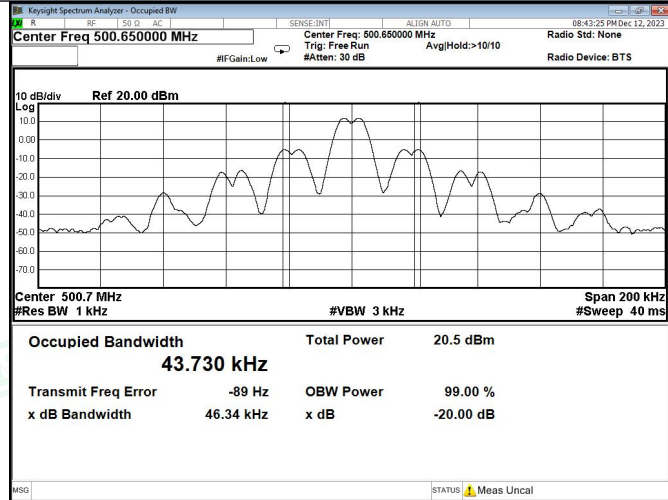
99% Bandwidth



99% Bandwidth



471.000 MHz



487.700 MHz

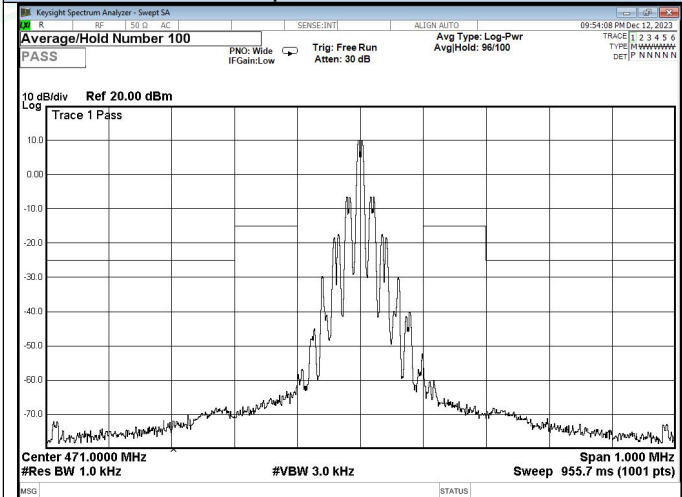


500.650 MHz



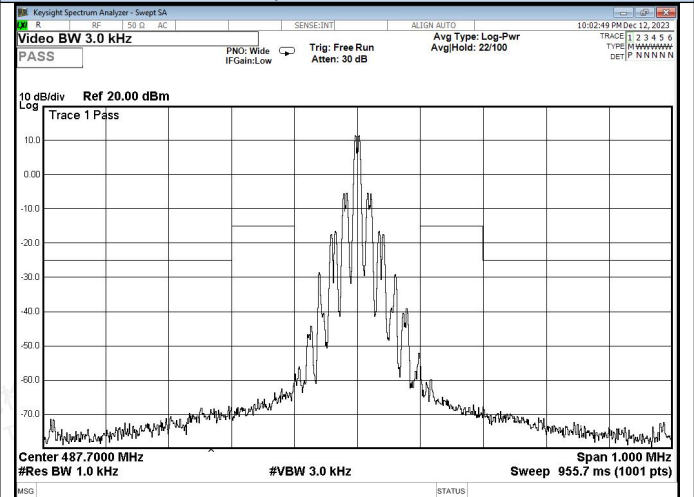


Spectrum mask

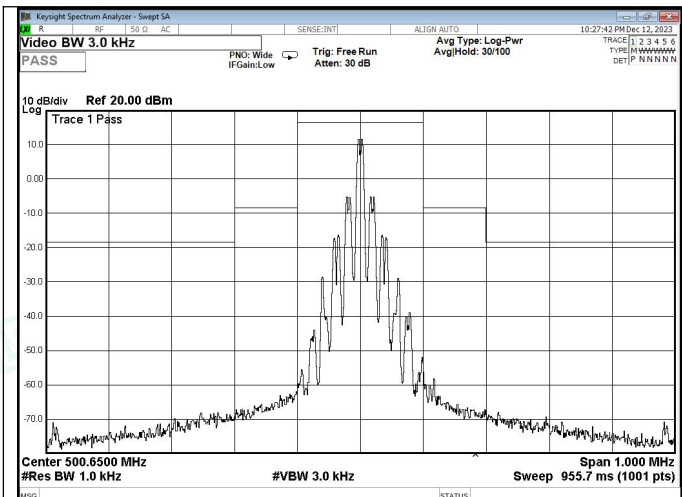


471.000 MHz

Spectrum mask



487.700 MHz

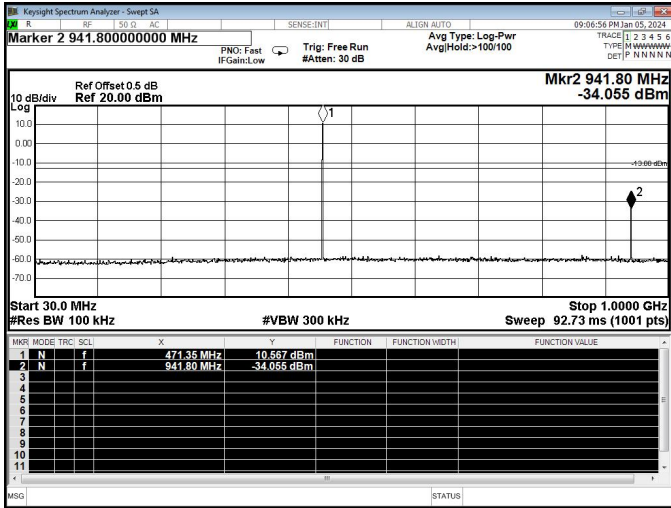


500.650 MHz

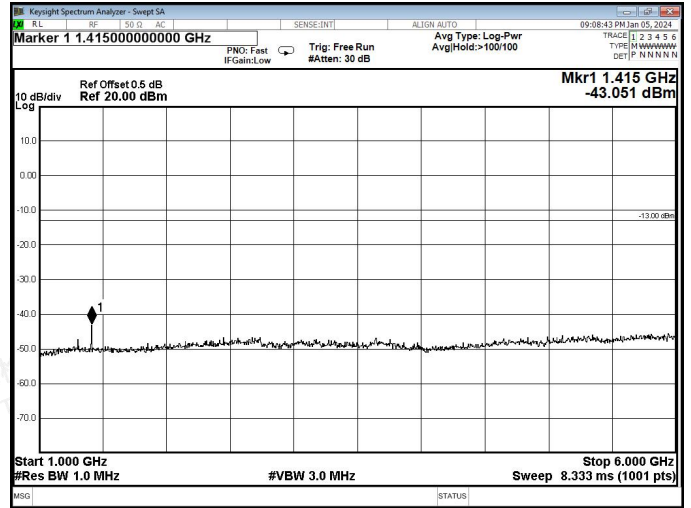




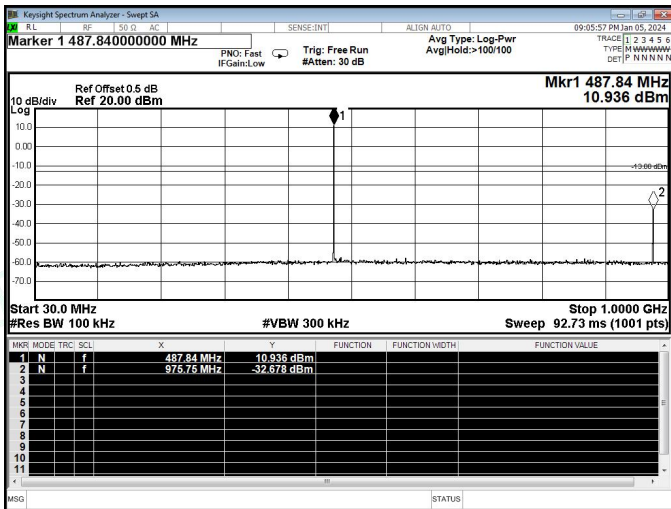
spurious emissions



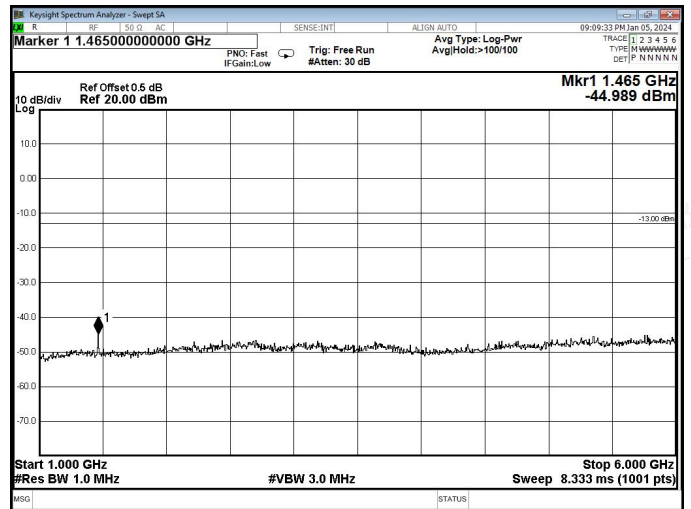
471.000 MHz



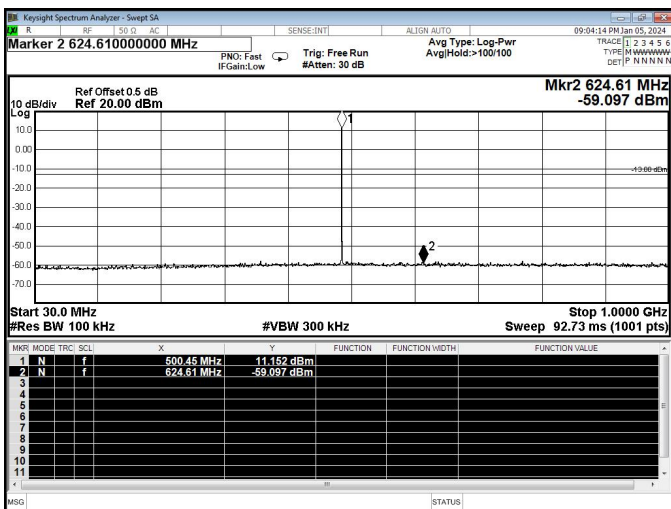
471.000 MHz



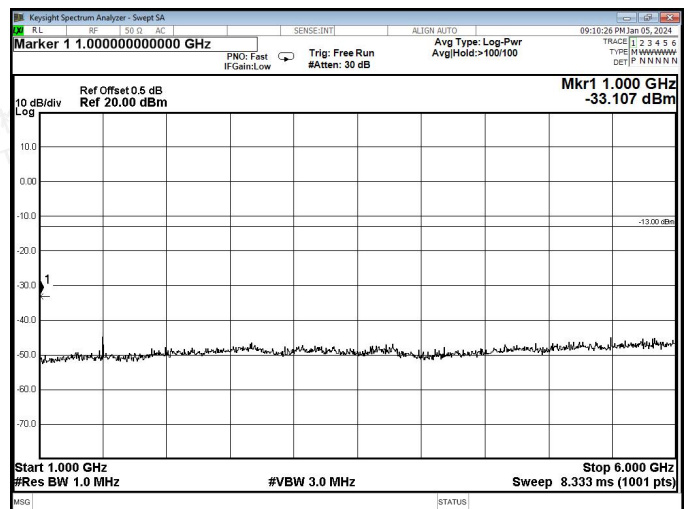
487.700 MHz



487.700 MHz



500.650 MHz



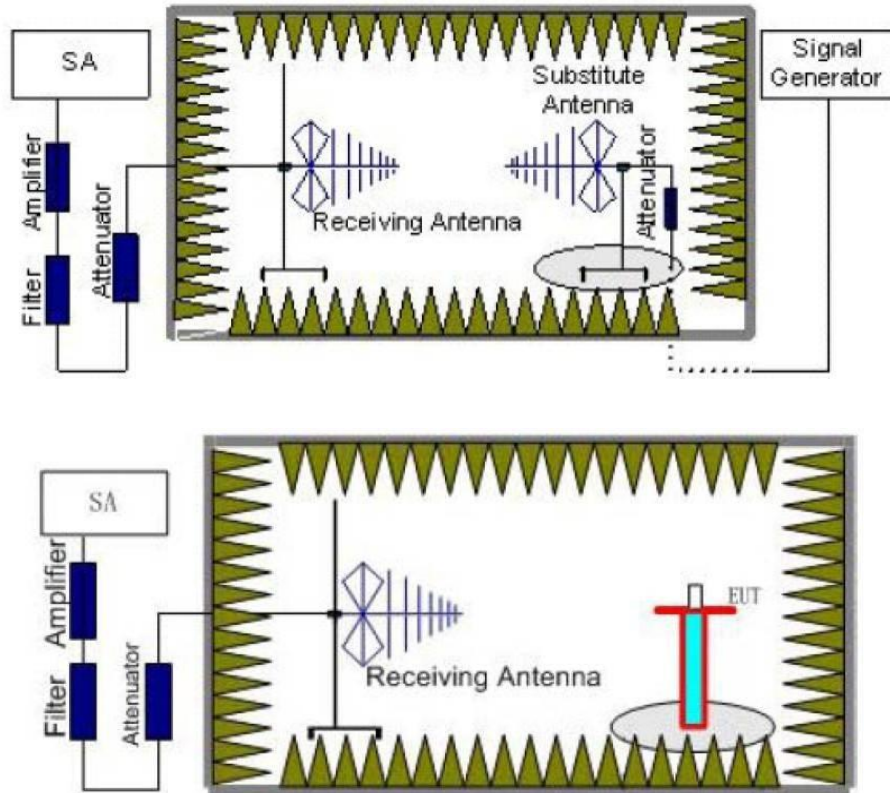
500.650 MHz



5.3. Transmitter unwanted emissions(radiated or conducted)

5.3.1. Measurement description:

TEST CONFIGURATION



TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, And the maximum value of the receiver should be recorded as (P_r).





4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P_{cl}), the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
The measurement results are obtained as described below:
 $Power(EIRP)=P_{Mea}- P_{Ag} - P_{cl} + G_a$
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15dBi$.
8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

TEST LIMITS

FCC & IC (according to ETSI EN 300 422-1 V2.1.2 (2017-01))			
State	Max. spurious level		
	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz	Other frequencies ≤ 1000 MHz	All frequencies > 1000 MHz
Operating	4.0 nW	250 nW	1.00 μW
Standby	2.0 nW	2.0 nW	20.0 nW

FCC & IC	
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	25 dB
On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of	35 dB
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





5.3.2. Results for Radiated Emissions

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
471.000 MHz					
146.45	H	-44.70	-36.00	-8.70	PK
67.17	V	-60.32	-54.00	-6.32	PK
324.49	H	-44.42	-36.00	-8.42	PK
705.44	V	-60.63	-54.00	-6.63	PK
4926.10	H	-41.12	-30.00	-11.12	PK
4930.29	V	-34.42	-30.00	-4.42	PK
7385.58	H	-33.88	-30.00	-3.88	PK
7384.25	V	-40.35	-30.00	-10.35	PK

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
487.700 MHz					
149.14	H	-44.79	-36.00	-8.79	PK
65.29	V	-56.68	-54.00	-2.68	PK
324.80	H	-38.41	-36.00	-2.41	PK
705.18	V	-57.79	-54.00	-3.79	PK
4924.94	H	-42.37	-30.00	-12.37	PK
4925.57	V	-33.16	-30.00	-3.16	PK
7390.31	H	-35.89	-30.00	-5.89	PK
7388.39	V	-39.01	-30.00	-9.01	PK

Frequency (MHz)	Polarization (H/V)	Measure Level (dBm)	Limit (dBm)	Margin (dB)	Detector
500.650 MHz					
153.56	H	-43.60	-36.00	-7.60	PK
61.96	V	-60.77	-54.00	-6.77	PK
326.10	H	-40.84	-36.00	-4.84	PK
701.69	V	-63.90	-54.00	-9.90	PK
4926.24	H	-40.68	-30.00	-10.68	PK
4928.02	V	-32.58	-30.00	-2.58	PK
7389.86	H	-34.46	-30.00	-4.46	PK
7386.39	V	-44.82	-30.00	-14.82	PK

Note: 1, All detected emissions are more than 20 dB below the limit, In addition to main frequency.





5.4. Conducted spurious emission

5.4.1. Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

5.4.2. Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Video bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace mode:	Max Hold

5.4.3. Limits:

FCC		
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

5.4.4. Results:

Temperature	23.5°C	Humidity	53.6%
Test Engineer	Summer Wu		

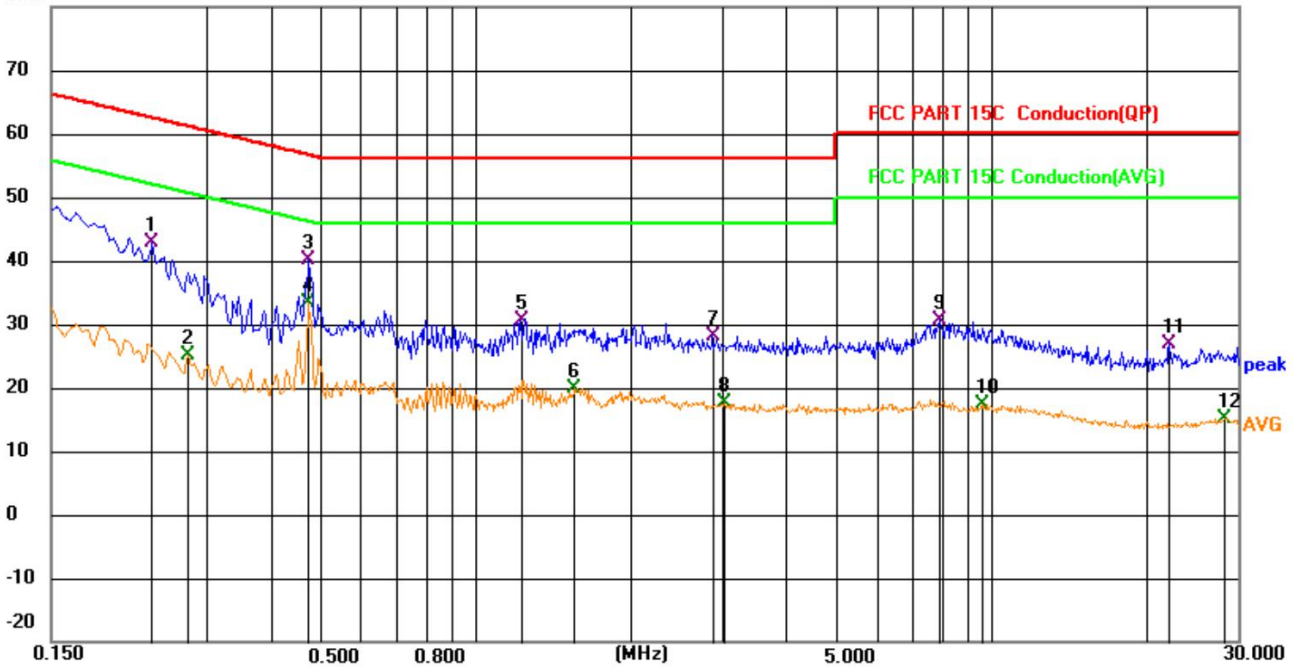
PASS.

The test data please refer to following page.





Line
dBuV

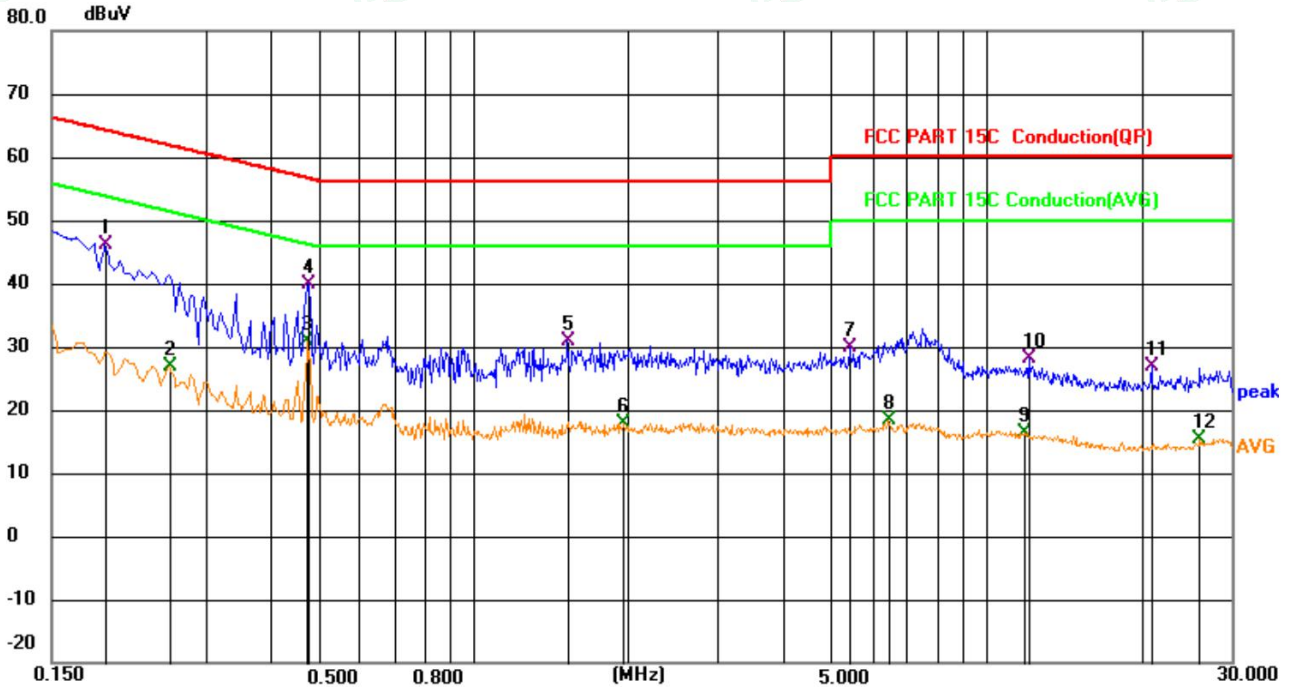


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.2356	23.14	19.63	42.77	62.25	-19.48	QP	
2		0.2761	5.45	19.63	25.08	50.93	-25.85	AVG	
3		0.4741	20.37	19.64	40.01	56.44	-16.43	QP	
4	*	0.4741	13.77	19.64	33.41	46.44	-13.03	AVG	
5		1.2164	10.87	19.66	30.53	56.00	-25.47	QP	
6		1.5540	0.28	19.67	19.95	46.00	-26.05	AVG	
7		2.8771	8.54	19.68	28.22	56.00	-27.78	QP	
8		3.0301	-1.97	19.70	17.73	46.00	-28.27	AVG	
9		7.9351	10.96	19.77	30.73	60.00	-29.27	QP	
10		9.5551	-2.37	19.83	17.46	50.00	-32.54	AVG	
11		22.1326	6.85	20.08	26.93	60.00	-33.07	QP	
12		28.1671	-4.88	20.07	15.19	50.00	-34.81	AVG	





Neutra



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1		0.1906	26.60	19.63	46.23	64.01	-17.78	QP	
2		0.2536	7.35	19.63	26.98	51.64	-24.66	AVG	
3	*	0.4741	11.25	19.64	30.89	46.44	-15.55	AVG	
4		0.4786	20.33	19.64	39.97	56.36	-16.39	QP	
5		1.5225	11.20	19.67	30.87	56.00	-25.13	QP	
6		1.9635	-1.88	19.68	17.80	46.00	-28.20	AVG	
7		5.4016	9.99	19.80	29.79	60.00	-30.21	QP	
8		6.4411	-1.52	19.82	18.30	50.00	-31.70	AVG	
9		11.8366	-3.48	19.84	16.36	50.00	-33.64	AVG	
10		12.0751	8.26	19.84	28.10	60.00	-31.90	QP	
11		20.9311	6.65	20.15	26.80	60.00	-33.20	QP	
12		26.0701	-4.58	20.02	15.44	50.00	-34.56	AVG	

***Note: 1).Pre-scan all modes and recorded the worst case results in this report (Low Channel).
 2). Measurement = Reading + Correct, Margin = Measurement – Limit, Correct Factor=Lisn Factor+Cable Factor





5.5.Frequency Stability

Test Requirement:FCC CFR 47 Part 74.e) 4)

Test Method:FCC CFR 47 Part 2.1055

Requirements:+/-50 ppm

(e) For low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

(4) The frequency tolerance of the transmitter shall be 0.005 percent.

Test Procedure:

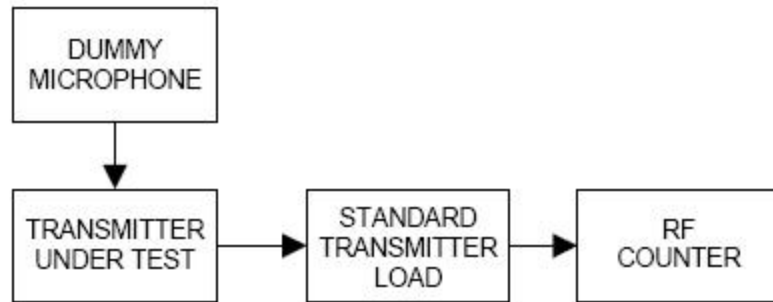
Frequency stability versus Environmental Temperature

The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through attenuators.

The EUT was placed inside the temperature chamber. After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.

Frequency Stability versus Input Voltage

At room temperature ($25 \pm 5^{\circ}\text{C}$), an external variable DC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage. For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.





Test Result:

Assigned Frequency: 471.000 MHz		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 28.025 kHz
50	15	+2.79
40	15	+2.28
30	15	+2.05
20	15	+1.73
10	15	-1.05
0	15	-1.58
-10	15	-1.93
-20	15	-2.23
-30	15	-2.41
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 28.025 kHz
25	13.5	+2.01
25	15	-1.85
25	16.5	-2.16

Assigned Frequency: 487.700 MHz		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 28.025 kHz
50	15	+2.63
40	15	+2.32
30	15	+2.06
20	15	+1.72
10	15	-1.03
0	15	-1.51
-10	15	-1.85
-20	15	-2.23
-30	15	-2.46
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 28.025 kHz
25	13.5	+2.13
25	15	-1.85
25	16.5	-2.14





Assigned Frequency: 500.650 MHz

Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 28.025 kHz
50	15	+2.51
40	15	+2.26
30	15	+2.01
20	15	+1.63
10	15	-1.02
0	15	-1.56
-10	15	-1.82
-20	15	-2.26
-30	15	-2.41
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 28.025 kHz
25	13.5	+2.01
25	15	-1.73
25	16.5	-2.06

Battery end point: 15Vdc

The results: The unit does meet the FCC requirements.





5.6.Modulation Characteristics

Test Requirement:FCC CFR 47 Part 74.e) 3)

Test Method:FCC CFR 47 Part 2.1047 & TIA/EIA 603 E 2016:Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

Requirements:

(e) For low power auxiliary stations operating in the bands allocated for TV broadcasting, the following technical requirements apply:

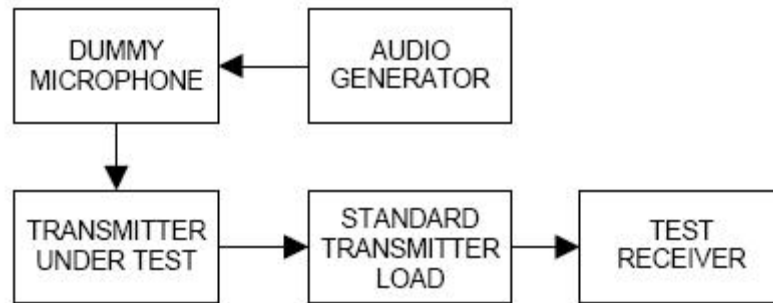
(3) Any form of modulation may be used. A maximum deviation of ± 75 kHz is permitted when frequency modulation is employed.

Test Procedure:

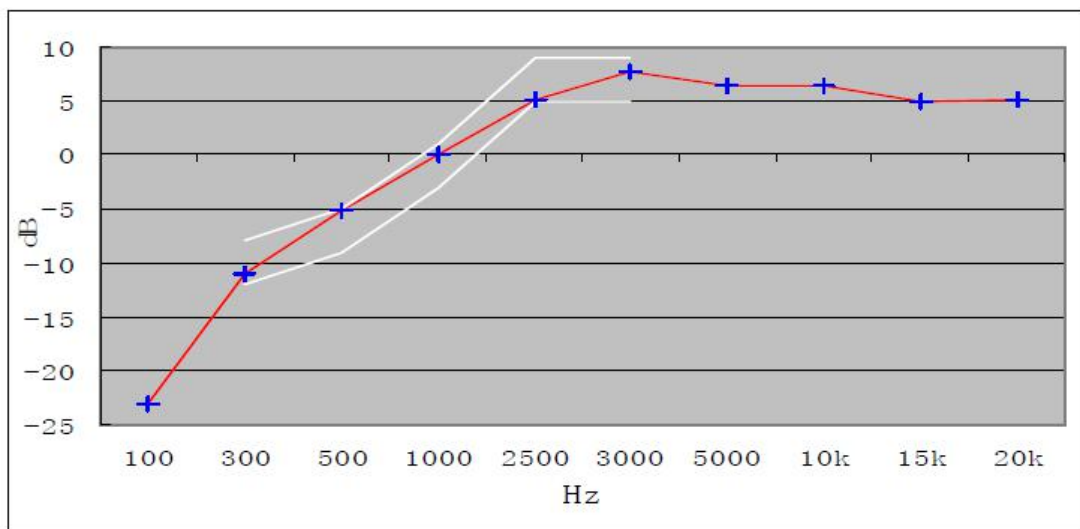
Audio Frequency Response

The RF output of the transceiver was connected to the input of FSP 30 with FM deviation module through sufficient attenuation so as not to overload the meter or distort the reading. An audio signal generator was connected to the audio input of microphone.

The audio signal input level was adjusted to obtain 20% of the maximum rated system deviation at 1 kHz, and recorded as DEV REF . With the audio signal generator level unchanged, set the generator frequency between 100 to 5000 Hz. The transmitter deviations (DEV FREQ) were measured and the audio frequency response was calculated as $20\log_{10} [DEV FREQ / DEV REF]$



The plot(s) of Audio Frequency Response is presented hereinafter as reference.



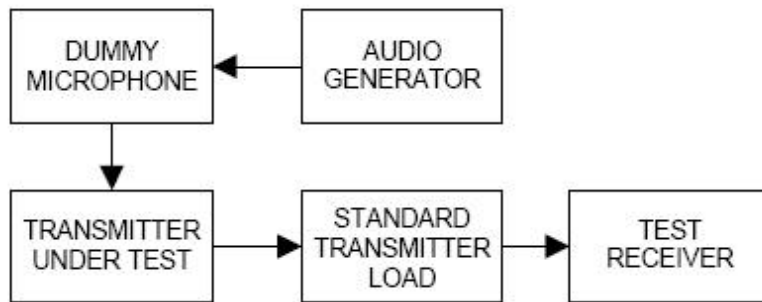
0dB=10mV at 1kHz (20% of the maximum rated system deviation).





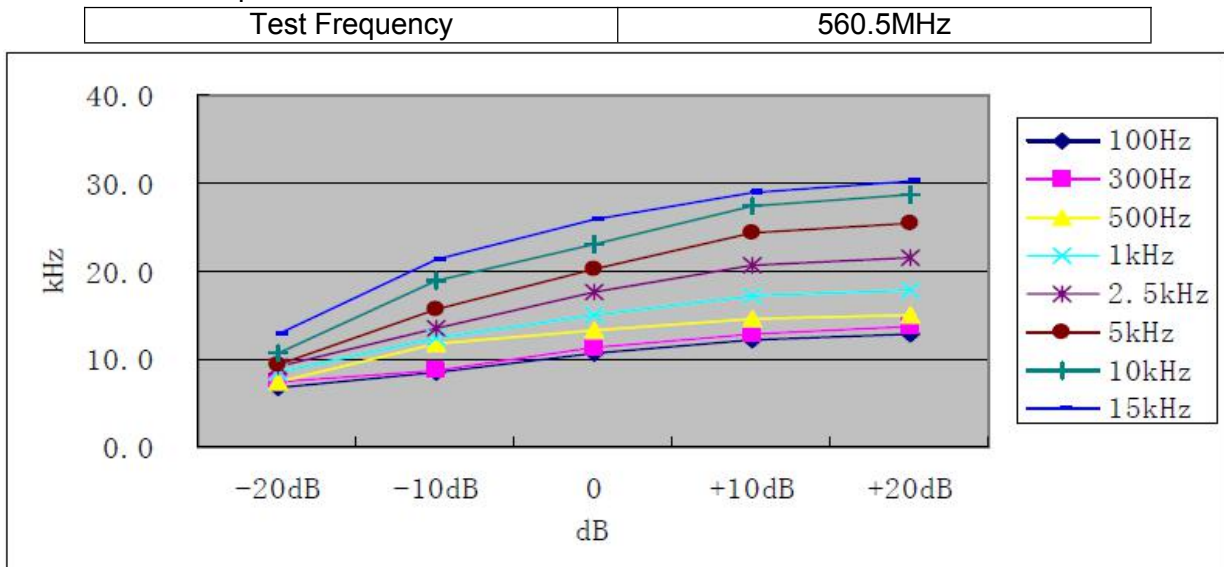
Modulation Limiting

- a) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
 - b) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤ 0.25 Hz to $\geq 15,000$ Hz. Turn the de-emphasis function off.
 - c) Apply a **1000 Hz** modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain **60% of full rated system deviation**.
 - d) Increase the level from the audio frequency generator by 20 dB in one step (rise time between the 10% and 90% points shall be 0.1 second maximum).
 - e) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.
- With the level from the audio frequency generator held constant at the level obtained in step e), slowly vary the audio frequency from 100 to 15k Hz and observe the steady-state deviation. Record the maximum deviation.



Test at five different modulating frequencies (100Hz ,300Hz, 500Hz, 1KHz, 2.5kHz, 5kHz, 10kHz, 15kHz), the output level of the audio generator was varied up to 1V and the FM deviation level was recorded.

Positive peak deviation



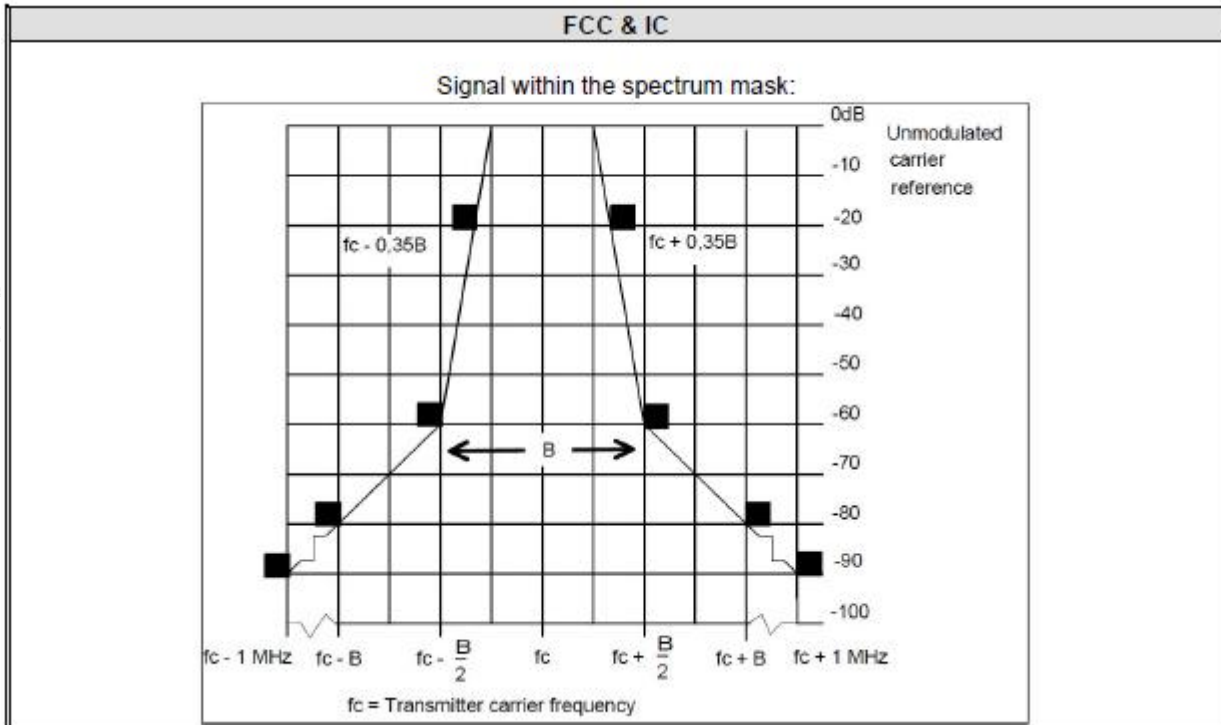


5.7.Necessary bandwidth (BN) for analogue systems

5.7.1.Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	1 kHz
Video bandwidth:	1 kHz
Span:	Fc-1MHz to fc+1MHz(2MHz)
Trace mode:	Max Hold

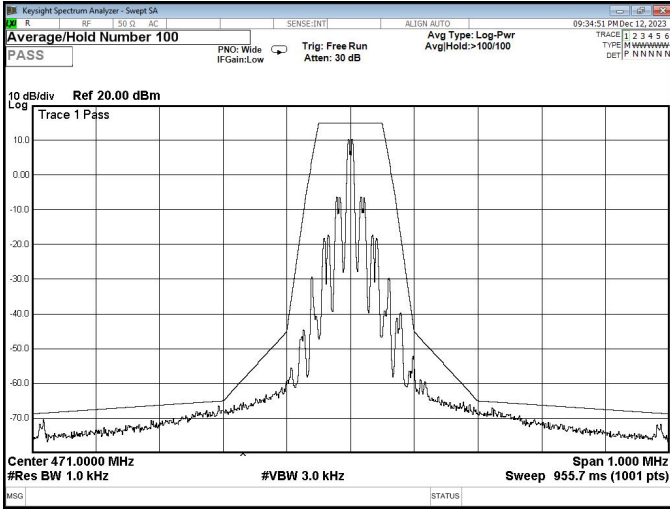
5.7.2.Limits:



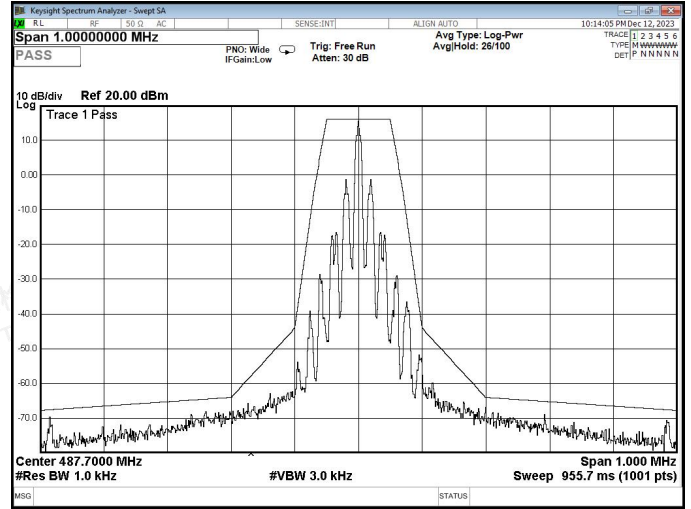


5.7.3. Results:

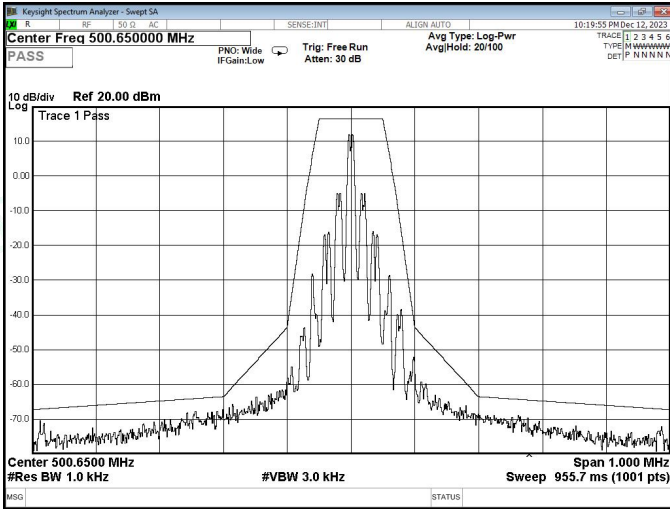
Necessary bandwidth



471.000 MHz



487.700 MHz



500.650 MHz





6. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2023-10-18	2024-10-17
2	DC Power Supply	Agilent	E3642A	N/A	2023-10-18	2024-10-17
3	Temperature & Humidity Chamber	GUANGZHOU GOGNWEN	GDS-100	70932	2023-10-05	2024-10-04
4	EMI Test Software	AUDIX	E3	/	N/A	N/A
5	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2023-06-09	2024-06-08
6	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
7	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2021-08-29	2024-08-28
8	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
9	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
10	EMI Test Receiver	R&S	ESR 7	101181	2023-08-15	2024-08-14
11	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2023-07-17	2024-07-16
12	Low-frequency amplifier	SchwarzZBECK	BBV9745	00253	2023-10-18	2024-10-17
13	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2023-10-18	2024-10-17
14	EMI Test Receiver	R&S	ESPI	101940	2023-08-15	2024-08-14
15	Artificial Mains	R&S	ENV216	101288	2023-06-09	2024-06-08
16	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2023-06-09	2024-06-08
17	EMI Test Software	Farad	EZ	/	N/A	N/A





7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

-----THE END OF REPORT-----

