





# **FCC Radio Test Report**

FCC ID: 2AJYB-S1955XE

This report concerns: Original Grant

**Project No.** : 2311C048

**Equipment**: Network Audio Streaming Module

Brand Name : StreamUnlimited
Test Model : Stream1955xE

Series Model : N/A

**Applicant**: StreamUnlimited Engineering GmbH

Address : StreamUnlimited Engineering GmbH, Gutheil Schoder Gasse 10, Vienna

A1100, Vienna

Manufacturer : StreamUnlimited Engineering GmbH

Address : StreamUnlimited Engineering GmbH, Gutheil Schoder Gasse 10, Vienna

A1100, Vienna

Factory : StreamUnlimited Engineering GmbH

Address : StreamUnlimited Engineering GmbH, Gutheil Schoder Gasse 10, Vienna

A1100, Vienna

Date of Receipt : Nov. 10, 2023

**Date of Test** : Nov. 15, 2023 ~ Jan. 09, 2024

**Issued Date** : Mar. 07, 2024

Report Version: R01

**Test Sample**: Engineering Sample No.: DG2023111059 for other conducted,

DG2023111057 for power, DG2023111060 for radiated.

Standard(s) : FCC CFR Title 47, Part 15, Subpart E

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Prepared by

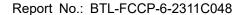
Antony Liang

Approved by

We**∕l**l∕v Zhou

Room 108, Building 2, No. 1, Yile Road, Songshan Lake Zone, Dongguan City, Guangdong 523000 China

Tel: +86-769-8318-3000 Web: www.newbtl.com Service mail: btl\_qa@newbtl.com





#### **Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The 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.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

**BTL**'s laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

#### Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective. Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.



Table of Contents	Page
REPORT ISSUED HISTORY	6
1 . APPLICABLE STANDARDS	7
2 . SUMMARY OF TEST RESULTS	7
2.1 TEST FACILITY	8
2.2 MEASUREMENT UNCERTAINTY	8
2.3 TEST ENVIRONMENT CONDITIONS	9
3 . GENERAL INFORMATION	10
3.1 GENERAL DESCRIPTION OF EUT	10
3.2 TEST MODES	12
3.3 PARAMETERS OF TEST SOFTWARE	13
3.4 DUTY CYCLE	14
3.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	15
3.6 SUPPORT UNITS	15
4 . AC POWER LINE CONDUCTED EMISSIONS	16
4.1 LIMIT	16
4.2 TEST PROCEDURE	16
4.3 DEVIATION FROM TEST STANDARD	16
4.4 TEST SETUP	17
4.5 EUT OPERATION CONDITIONS	17
4.6 TEST RESULTS	17
5 . RADIATED EMISSIONS	18
5.1 LIMIT	18
5.2 TEST PROCEDURE	19
5.3 DEVIATION FROM TEST STANDARD	20
5.4 TEST SETUP	20
5.5 EUT OPERATION CONDITIONS 5.6 TEST RESULTS - 9 KHZ TO 30 MHZ	21 21
5.6 TEST RESULTS - 9 KHZ TO 30 MHZ  5.7 TEST RESULTS - 30 MHZ TO 1000 MHZ	21
5.8 TEST RESULTS - ABOVE 1000 MHZ	21
6 . BANDWIDTH 6.1 LIMIT	<b>22</b> 22
6.1 LIMIT 6.2 TEST PROCEDURE	22
6.2 TEST PROCEDURE  6.3 DEVIATION FROM STANDARD	22
OIG DEVIATION FROM GIANDAND	<b>~~</b>



Table of Contents	Page
6.4 TEST SETUP	22
6.5 EUT OPERATION CONDITIONS 6.6 TEST RESULTS	22 22
7 . MAXIMUM E.I.R.P.	23
7.1 LIMIT	23
7.2 TEST PROCEDURE	23
7.3 DEVIATION FROM STANDARD 7.4 TEST SETUP	23
7.4 TEST SETUP  7.5 EUT OPERATION CONDITIONS	23 23
7.6 TEST RESULTS	23
	-
8 . MAXIMUM POWER SPECTRAL DENSITY (E.I.R.P.)	24
8.1 LIMIT	24
8.2 TEST PROCEDURE	24
8.3 DEVIATION FROM STANDARD  8.4 TEST SETUP	24 24
8.4 TEST SETUP  8.5 EUT OPERATION CONDITIONS	24
8.6 TEST RESULTS	24
9 . IN-BAND EMISSION (MASK)	25
9.1 LIMIT	25
9.2 TEST PROCEDURE  9.3 DEVIATION FROM STANDARD	26 26
9.4 TEST SETUP	26
9.5 EUT OPERATION CONDITIONS	26
9.6 TEST RESULTS	26
10 . CONTENTION BASED PROTOCOL	27
10.1 LIMIT	27
10.2 TEST PROCEDURE	27
10.3 DEVIATION FROM STANDARD	28
10.4 TEST SETUP	28
10.5 EUT OPERATION CONDITIONS	28
10.6 TEST RESULTS	28
11 . FREQUENCY STABILITY	29
11.1 LIMIT	29
11.2 TEST PROCEDURE	29
	20



Table of Contents	Page
11.3 DEVIATION FROM STANDARD	29
11.4 TEST SETUP	29
11.5 EUT OPERATION CONDITIONS	29
11.6 TEST RESULTS	29
12 . MEASUREMENT INSTRUMENTS LIST	30
13 . EUT TEST PHOTOS	34
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS	39
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ	42
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	47
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ	50
APPENDIX E - BANDWIDTH	81
APPENDIX F - MAXIMUM E.I.R.P.	88
APPENDIX G - MAXIMUM POWER SPECTRAL DENSITY (E.I.R.P.)	95
APPENDIX H - IN-BAND EMISSION (MASK)	102
APPENDIX I - CONTENTION BASED PROTOCOL	109
APPENDIX J - FREQUENCY STABILITY	120



# **REPORT ISSUED HISTORY**

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-6-2311C048	R00	Original Report.	Feb. 07, 2024	Invalid
BTL-FCCP-6-2311C048	R01	Modified the comments of TCB.	Mar. 07, 2024	Valid



# 1. APPLICABLE STANDARDS

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of NVLAP:

KDB 987594 D02 U-NII 6GHz EMC Measurement v02r01

KDB 789033 D02 General UNII Test Procedures New Rules v02r01

KDB 662911 D01 Multiple Transmitter Output v02r01

#### 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

	FCC CFR Title 47, Part 15, Subpart E				
Standard(s) Section	Test Item	Test Result	Judgment	Remark	
15.207 15.407(b)	AC Power Line Conducted Emissions	APPENDIX A	PASS		
15.407(b) 15.205(a) 15.209(a)	15.205(a) Radiated Emissions APPENDIX 0		PASS		
15.407(a)	Bandwidth	APPENDIX E	PASS		
15.407(a)	Maximum e.i.r.p.	APPENDIX F	PASS		
15.407(a)	Maximum Power Spectral Density (e.i.r.p.)	APPENDIX G	PASS		
15.407(b)	In-Band Emission (Mask)	APPENDIX H	PASS		
15.407(d)	Contention Based Protocol	APPENDIX I	PASS		
15.407(g) Frequency Stability APPENDIX J		PASS			
15.203 15.407(a)	Antenna Requirements		PASS	NOTE (2)	

#### Note:

(1)	"N/A" denotes test is not applicable in this test report.
(2)	The devices connected to antennas using non-standard jack are considered sufficient to comply with
	15.203.
(3)	Device Type:
	☐ Indoor access point
	☐ Subordinate device (operating under control of a low-power indoor access point)
	M. Indeer client (energting under central of a law power indeer access point)

☐ Dual client (operating under control of either a low-power indoor access point or standard power
access point)
☐ Standard power access point

Standard client (operating under control of a Standard power access point)

☐ Fixed client (operating under control of a Standard power access point)



#### 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong 523792.

BTL's Registration Number for FCC: 162128 BTL's Designation Number for FCC: CN5042

#### 2.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

The BTL measurement uncertainty as below table:

#### A. AC power line conducted emissions test:

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-C02	CISPR	150kHz ~ 30MHz	2.88

#### B. Radiated emissions test:

Test Site	Method	Measurement Frequency Range	<i>U</i> ,(dB)
DG-CB01	CISPR	9kHz ~ 30MHz	2.36

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03 (3m)	CISPR	30MHz ~ 200MHz	V	4.40
		30MHz ~ 200MHz	Н	3.62
		200MHz ~ 1,000MHz	V	4.58
		200MHz ~ 1,000MHz	Н	3.98

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03 (3m)	· · · I CISPR F	1GHz ~ 6GHz	4.08
		6GHz ~ 18GHz	4.62

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03 (1m)	CISPR	18 ~ 26.5 GHz	3.36
		26.5 ~ 40 GHz	3.58



# C. Other Measurement test:

Test Item	Uncertainty
Bandwidth	0.90 %
Maximum e.i.r.p.	1.3 dB
Maximum Power Spectral Density (e.i.r.p.)	1.4 dB
Frequency Stability	2.7 ppm
Temperature	0.8 °C
Humidity	2.2 %

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

# 2.3 TEST ENVIRONMENT CONDITIONS

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	22°C	53%	AC 120V/60Hz	Hayden Chen
Radiated Emissions-9kHz to 30MHz	19°C	45%	AC 120V/60Hz	Ha□den Chen
Radiated Emissions-30MHz to 1000MHz	24°C	42%	AC 120V/60Hz	Berton Luo
Radiated Emissions-Above 1000 MHz	24°C	42%	AC 120V/60Hz	Berton Luo
Bandwidth	23°C	49%	DC 5V	Terry Deng
Maximum e.i.r.p.	24°C	58%	DC 5V	Oliver Wang
Maximum Power Spectral Density (e.i.r.p.)	23°C	49%	DC 5V	Terry Deng
In-Band Emission (Mask)	23°C	49%	DC 5V	Terry Deng
Contention Based Protocol	18°C	49%	DC 5V	Terry Deng
Frequency Stability	Normal & Extreme	47%	Normal & Extreme	Terry Deng



# 3. GENERAL INFORMATION

# 3.1 GENERAL DESCRIPTION OF EUT

Equipment	Network Audio Streaming Module
Brand Name	StreamUnlimited
Test Model	Stream1955xE
Series Model	N/A
Model Difference(s)	N/A
Hardware Version	version L4
Software Version	version yocto4.0
Power Source	Supplied from external power supply.
Power Rating	DC 5V
Operation Frequency Band(s)	UNII-5: 5925 MHz ~ 6425 MHz
Operation Frequency Band(s)	UNII-6: 6425 MHz ~ 6525 MHz
Modulation Type	IEEE 802.11ax: OFDMA
Bit Rate of Transmitter	IEEE 802.11ax: up to 1201 Mbps
Maximum e.i.r.p.	IEEE 802.11ax(HE80): 13.78 dBm (0.024 W)
_UNII-5	1222 002.11dx(11200). 10.10 dbitt (0.024 VV)
Maximum e.i.r.p.	IEEE 802.11ax(HE80): 13.71 dBm (0.023 W)
_UNII-6	.=== 002

# Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

# 2. Channel List:

armor Elot.						
	UNII-5					
		IEEE 802.	11ax(HE20)			
Channel	Channel Frequency (MHz) Channel Frequency (MHz) Frequency (MHz)					
1	5955	33	6115	65	6275	
5	5975	37	6135	69	6295	
9	5995	41	6155	73	6315	
13	6015	45	6175	77	6335	
17	6035	49	6195	81	6355	
21	6055	53	6215	85	6375	
25	6075	57	6235	89	6395	
29	6095	61	6255	93	6415	

	UNII-5				
		IEEE 802.	11ax(HE40)		
Channel Frequency (MHz) Channel Frequency (MHz) Frequency (MHz)					Frequency (MHz)
3	5965	35	6125	67	6285
11	6005	43	6165	75	6325
19	6045	51	6205	83	6365
27	6085	59	6245	91	6405

UNII-5					
	IEEE 802.11ax(HE80)				
Channel Frequency (MHz) Channel Frequency (MHz) Frequency (MHz)					
7	5985	39	6145	71	6305
23	6065	55	6225	87	6385



UNII-6					
	IEEE 802.11ax(HE20)				
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
97	6435	105	6475	113	6515
101	6455	109	6495		

UNII-6					
IEEE 802.11ax(HE40)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
99	6445	107	6485	115	6525

UNII-6					
	IEEE 802.11ax(HE80)				
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
103	6465				

#### 3. Antenna Specification:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	StreamUnlimited Green bey lot Thop	N/A	FPC	MHF4	5.5
2	StreamUnlimited Concessing to Trops	N/A	FPC	MHF4	5.5

# Note:

- 1) This EUT supports CDD, and all antennas have the same gain, Directional gain =  $G_{ANT}$ +Array Gain. For power measurements, Array Gain=0dB ( $N_{ANT} \le 4$ ), so the Directional gain=5.5. For power spectral density measurements,  $N_{ANT}$ =2,  $N_{SS}$  = 1. So the Directional gain= $G_{ANT}$ +Array Gain= $G_{ANT}$ +10log( $N_{ANT}$ / $N_{SS}$ )dBi=5.5+10log(2/1)dBi=8.51.
- 2) The antenna gain is provided by the manufacturer.

# 4. Table for Antenna Configuration:

•	rabio ioi / interina coringarationi	
	Operating Mode TX Mode	2TX
	IEEE 802.11ax(HE20)	V (Ant. 1 + Ant. 2)
	IEEE 802.11ax(HE40)	V (Ant. 1 + Ant. 2)
	IEEE 802.11ax(HE80)	V (Ant. 1 + Ant. 2)



# 3.2 TEST MODES

The test system was pre-tested based on the consideration of all possible combinations of EUT operation mode.

Pretest Mode	Description
Mode 1 TX AX(HE20) Mode Channel 01/45/93 (UNII-5)	
Mode 2 TX AX(HE40) Mode Channel 03/43/91 (UNII-5)	
Mode 3	TX AX(HE80) Mode Channel 07/39/87 (UNII-5)
Mode 4	TX AX(HE20) Mode Channel 97/105/113 (UNII-6)
Mode 5	TX AX(HE40) Mode Channel 99/107 (UNII-6)
Mode 6	TX AX(HE80) Mode Channel 103 (UNII-6)
Mode 7	TX AX(HE80) Mode Channel 39 (UNII-5)

Following mode(s) was (were) found to be the worst case(s) and selected for the final test.

AC power line conducted emissions test	
Final Test Mode	Description
Mode 7	TX AX(HE80) Mode Channel 39 (UNII-5)

Radiated Emissions Test - Below 1GHz	
Final Test Mode	Description
Mode 7	TX AX(HE80) Mode Channel 39 (UNII-5)

Radiated Emissions Test - Above 1GHz	
Final Test Mode	Description
Mode 1 TX AX(HE20) Mode Channel 01/45/93 (UNII-5)	
Mode 2 TX AX(HE40) Mode Channel 03/43/91 (UNII-5)	
Mode 3	TX AX(HE80) Mode Channel 07/39/87 (UNII-5)
Mode 4	TX AX(HE20) Mode Channel 97/105/113 (UNII-6)
Mode 5 TX AX(HE40) Mode Channel 99/107 (UNII-6)  Mode 6 TX AX(HE80) Mode Channel 103 (UNII-6)	

Conducted test			
Final Test Mode Description			
Mode 1	TX AX(HE20) Mode Channel 01/45/93 (UNII-5)		
Mode 2 TX AX(HE40) Mode Channel 03/43/91 (UNII-5)			
Mode 3         TX AX(HE80) Mode Channel 07/39/87 (UNII-5)           Mode 4         TX AX(HE20) Mode Channel 97/105/113 (UNII-6)           Mode 5         TX AX(HE40) Mode Channel 99/107 (UNII-6)			
		Mode 6	TX AX(HE80) Mode Channel 103 (UNII-6)



#### Note:

- (1) For AC power line conducted emissions and radiated emission below 1 GHz test, the IEEE 802.11ax(HE80) channel 39 is found to be the worst case and recorded.
- (2) For radiated emission above 1 GHz test, the spurious points of 1GHz~26.5GHz and 26.5GHz~40GHz have been pre-tested and in this report only recorded the worst case. The remaining spurious points are all below the limit value of 20dB.
- (3) All the bit rate of transmitter have been tested and found the lowest rate is found to be the worst case and recorded.
- (4) IEEE 802.11ax mode only supports full RU, so only the full RU is evaluated and measured inside report.
- (5) For radiated emission above 1 GHz test, the polarization of Vertical and Horizontal are evaluated, the worst case is Horizontal and recorded.

#### 3.3 PARAMETERS OF TEST SOFTWARE

UNII-5			
Test Software Version	IPOP V4.1		
Frequency (MHz)	5955	6175	6415
IEEE 802.11ax(HE20)	2	3	0
Frequency (MHz)	5965	6165	6405
IEEE 802.11ax(HE40)	6	7	5
Frequency (MHz)	5985	6145	6385
IEEE 802.11ax(HE80)	12	12	10

UNII-6			
Test Software Version	IPOP V4.1		
Frequency (MHz)	6435	6475	6515
IEEE 802.11ax(HE20)	2	2	2
Frequency (MHz)	6445	6485	
IEEE 802.11ax(HE40)	6	6	
Frequency (MHz)	6465		
IEEE 802.11ax(HE80)	12		



#### 3.4 DUTY CYCLE

If duty cycle is  $\geq$  98 %, duty factor is not required.

If duty cycle is < 98 %, duty factor shall be considered.

The output power = measured power + duty factor.

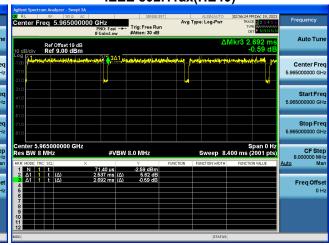
The power spectral density = measured power spectral density + duty factor.

IEEE 802.11ax(HE20)

IEEE 802.11ax(HE40)

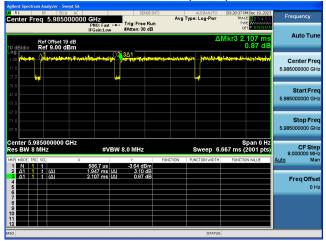


Duty cycle = 1.10 ms / 1.25 ms = 87.89%Duty Factor =  $10 \log(1 / \text{Duty cycle}) = 0.56$ 



Duty cycle = 2.54 ms / 2.69 ms = 94.24% Duty Factor = 10 log(1 / Duty cycle) = 0.26

**IEEE 802.11ax(HE80)** 



Duty cycle = 1.95 ms / 2.11 ms = 92.41% Duty Factor = 10 log(1 / Duty cycle) = 0.34

#### NOTE:

For IEEE 802.11ax(HE20):

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle < 98%).

For IEEE 802.11ax(HE40):

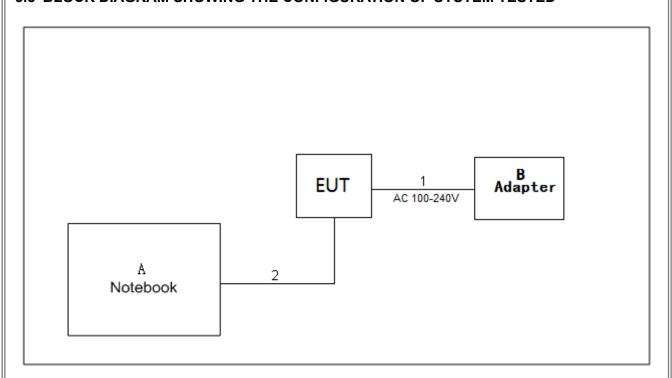
For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle < 98%).

For IEEE 802.11ax(HE80):

For radiated emissions frequency above 1 GHz, the resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1 kHz (Duty cycle < 98%).



# 3.5 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



# 3.6 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
Α	Notebook	HONOR	NbI-WAQ9HNRP	N/A
В	Adapter	Anker	A2678	N/A

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	AC Cable	NO	NO	1.5m
2	USB Cable	NO	NO	1.2m



#### 4. AC POWER LINE CONDUCTED EMISSIONS

#### 4.1 LIMIT

Frequency	Limit (dBµV)	
(MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56*	56 to 46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

#### NOTE:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.
- (3) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor (if use)

Margin Level = Measurement Value - Limit Value

#### **4.2 TEST PROCEDURE**

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item -EUT Test Photos.

The following table is the setting of the receiver:

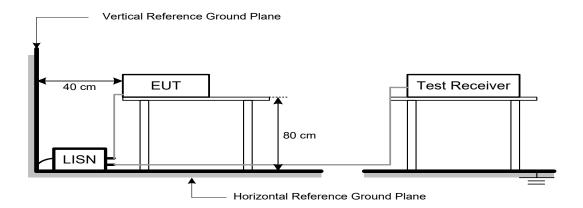
Receiver Parameter	Setting
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

#### 4.3 DEVIATION FROM TEST STANDARD

No deviation



# **4.4 TEST SETUP**



# 4.5 EUT OPERATION CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

The EUT was programmed to be in continuously transmitting/TX mode.

#### **4.6 TEST RESULTS**

Please refer to the APPENDIX A.



# 5. RADIATED EMISSIONS

#### **5.1 LIMIT**

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

LIMITS OF RADIATED EMISSIONS MEASUREMENT (9 kHz to 1000 MHz)

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS (Above 1000 MHz)

Frequency	EIRP Limit	Equivalent Field Strength at 3m		
(MHz)	(dBm/MHz)	(dBµV/m)		
5925-7125	Average: -27	68.2		

#### NOTE:

(1) The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$
 µV/m, where P is the eirp (Watts)

(2)

$$FS_{\text{limit}} = FS_{\text{max}} - 20\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

 $20\log (d_{limit}/d_{measure})=20\log (3/1.5)=6 dB.$ 



#### **5.2 TEST PROCEDURE**

- a. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8m or 1.5m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- e. The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.
- f. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- g. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1 GHz)
- h. All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1 GHz)
- i. For the actual test configuration, please refer to the related Item –EUT Test Photos.

The following table is the setting of the receiver:

Spectrum Parameters	Setting
Start ~ Stop Frequency	9 kHz~150 kHz for RBW 200 Hz
Start ~ Stop Frequency	0.15 MHz~30 MHz for RBW 9 kHz
Start ~ Stop Frequency	30 MHz~1000 MHz for RBW 100 kHz

Spectrum Parameters Setting	
Start Frequency 1000 MHz	
Stop Frequency	10th carrier harmonic or 40 GHz, whichever is lower
RBW / VBW	1 MHz / 3 MHz for PK value
(Emission in restricted band)	1 MHz / 1/T Hz for AVG value

Receiver Parameters	Setting
Start ~ Stop Frequency	9 kHz~90 kHz for PK/AVG detector
Start ~ Stop Frequency	90 kHz~110 kHz for QP detector
Start ~ Stop Frequency	110 kHz~490 kHz for PK/AVG detector
Start ~ Stop Frequency	490 kHz~30 MHz for QP detector
Start ~ Stop Frequency	30 MHz~1000 MHz for QP detector
Start ~ Stop Frequency	1 GHz~40 GHz for PK/AVG detector

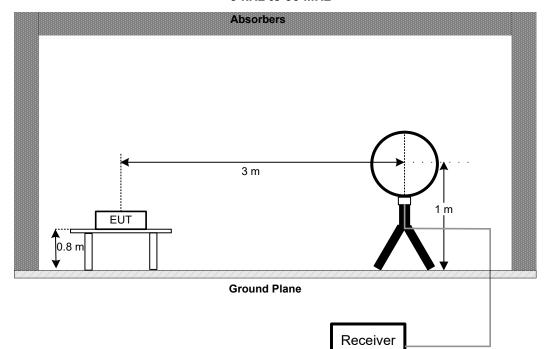


# **5.3 DEVIATION FROM TEST STANDARD**

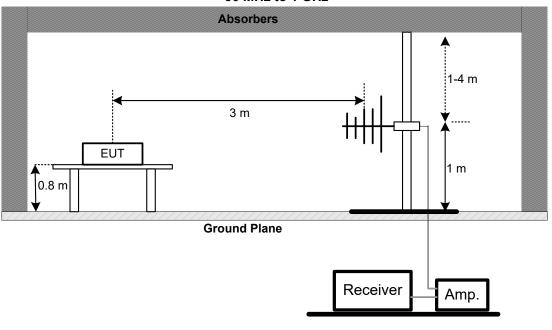
No deviation.

# **5.4 TEST SETUP**

#### 9 kHz to 30 MHz



# 30 MHz to 1 GHz

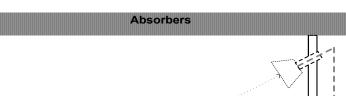


1-4 m

1 m

Amp





**Above 1 GHz** 

# 5.5 EUT OPERATION CONDITIONS

1.5 m

EUT

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

**Absorbers** 

**Ground Plane** 

0.3 m

Receiver

#### 5.6 TEST RESULTS - 9 KHZ TO 30 MHZ

Please refer to the APPENDIX B.

#### Remark:

- (1) Distance extrapolation factor = 40 log (specific distance / test distance) (dB).
- (2) Limit line = specific limits (dBuV) + distance extrapolation factor.

#### 5.7 TEST RESULTS - 30 MHZ TO 1000 MHZ

Please refer to the APPENDIX C.

#### 5.8 TEST RESULTS - ABOVE 1000 MHZ

Please refer to the APPENDIX D.

#### Remark:

(1) No limit: This is fundamental signal, the judgment is not applicable. For fundamental signal judgment was referred to Peak output test.



# 6. BANDWIDTH

# **6.1 LIMIT**

Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.407(a)	26 dB Bandwidth	Maximum 320 MHz	5925-7125

#### **6.2 TEST PROCEDURE**

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. Spectrum Setting:

For 26 dB Bandwidth:

Spectrum Parameter Setting	
Span Frequency	> 26 dB Bandwidth
RBW	Appromiximately 1% of the emission bandwidth
VBW	> RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

For 99% Occupied Bandwidth:

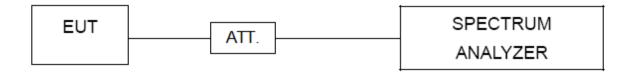
Spectrum Parameter	Setting	
Span Frequency	1.5 times to 5 times the OBW	
RBW	1% to 5% of the OBW	
VBW	≥ 3*RBW	
Detector	Peak	
Trace	Max Hold	
Sweep Time	Auto	

c. Measured the spectrum width with power higher than 26 dB below carrier.

# **6.3 DEVIATION FROM STANDARD**

No deviation.

# **6.4 TEST SETUP**



# **6.5 EUT OPERATION CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

# **6.6 TEST RESULTS**

Please refer to the APPENDIX E.



# 7. MAXIMUM E.I.R.P.

# **7.1 LIMIT**

Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.407(a)	Maximum e.i.r.p.	Standard power access point and fixed client device 36 dBm  Indoor access point 30 dBm  Subordinate device operating under the control of an indoor access point 30 dBm  Client devices operating under the control of a standard power access point 30 dBm  Client devices operating under the control of an indoor access point 30 dBm  Client devices operating under the control of an indoor access point 24 dBm	5925-6425 6525-6875

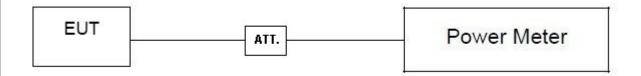
# 7.2 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below.
- b. Test test was performed in accordance with method of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

# 7.3 DEVIATION FROM STANDARD

No deviation.

# 7.4 TEST SETUP



#### 7.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

# 7.6 TEST RESULTS

Please refer to the APPENDIX F.



# 8. MAXIMUM POWER SPECTRAL DENSITY (E.I.R.P.)

# **8.1 LIMIT**

Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.407(a)	Maximum Power Spectral Density (e.i.r.p.)	Standard power access point and fixed client device 23 dBm/MHz  Indoor access point 5 dBm/MHz  Subordinate device operating under the control of an indoor access point 5 dBm/MHz  Client devices operating under the control of a standard power access point 17 dBm/MHz  Client devices operating under the control of an indoor access point 17 dBm/MHz	5925-6425 6525-6875

#### **8.2 TEST PROCEDURE**

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting:

Spectrum Parameter	Setting
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	1 MHz
VBW	3 MHz
Detector	RMS
Trace average	100 trace
Sweep Time	Auto

# **8.3 DEVIATION FROM STANDARD**

No deviation.

# 8.4 TEST SETUP



# **8.5 EUT OPERATION CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

# 8.6 TEST RESULTS

Please refer to the APPENDIX G.



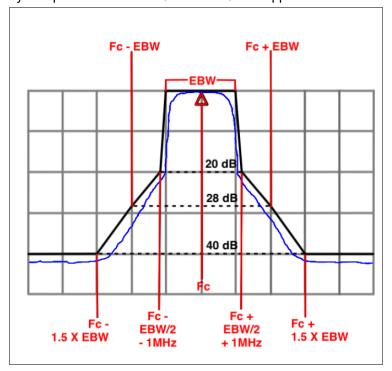
# 9. IN-BAND EMISSION (MASK)

# **9.1 LIMIT**

Section	Test Item	Frequency Range (MHz)	(X) dBc (Note 1)	
		At 1MHz outside of channel edge	20	
		At one channel bandwidth from the channel	28	
	FCC 15.407(b) In-Band Emission (Mask)	center (Note 2)	20	
FCC 15.407(b)		At one- and one-half times the channel	40	
		bandwidth away from channel center (Note 3)	40	
	More than one- and one-half times the channel	40		
		bandwidth	40	

#### Note:

- 1. The power spectral density must be suppressed by "X" dB.
- 2. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression.
- 3. At frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression.





# 9.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting:

Spectrum Parameter	Setting	
Span Frequency	> 26 dB Bandwidth	
RBW	Appromiximately 1% of the emission bandwidth	
VBW	≥3xRBW	
Detector	RMS	
Trace average	100 trace	
Sweep Time	Auto	

# 9.3 DEVIATION FROM STANDARD

No deviation.

#### 9.4 TEST SETUP



# 9.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

# 9.6 TEST RESULTS

Please refer to the APPENDIX H.



#### 10. CONTENTION BASED PROTOCOL

#### **10.1 LIMIT**

Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band (herein referred to as unlicensed devices) are required to use technologies that include a contention-based protocol to avoid co-channel interference with incumbent devices sharing the band. To ensure incumbent co-channel operations are detected in a technology-agnostic manner, unlicensed devices are required to detect co-channel radio frequency energy (energy detect) and avoid simultaneous transmission.

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain. (See note)

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

Note: The EUT with a lowest gain is 5.5dBi. All power injected into EUT should be -62+5.5=-56.5dBm.

#### **10.2 TEST PROCEDURE**

a. Number of times detection threshold:

lf	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} {\leqslant} BW_{Inc}$	Once	Tune incumbent and EUT transmissions $(f_{c1}=f_{c2})$
$BW_{Inc} < BW_{EUT} \le 2BW_{Inc}$	Once	Incumbent transmission is contained within BW <sub>EUT</sub>
2BW <sub>Inc</sub> <bw<sub>EUT&lt;4BW<sub>Inc</sub></bw<sub>	Twice. Incumbent transmission is contained within BW <sub>EUT</sub>	Incumbent transmission is located as closely □s possible to the lower edge and upper edge, respectively, of the EUT channel
BW <sub>EUT</sub> >4BW <sub>Inc</sub>	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible □to the upper edge of the EUT channel

Where:

BW<sub>EUT</sub>: Transmission bandwidth of EUT signal.

BW<sub>Inc</sub>: Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal).

f<sub>c1</sub>: Center frequency of EUT transmission.

f<sub>c2</sub>: Center frequency of simulated incumbent signal.

- b. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use step b table to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
- c. Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 dBm threshold). Connect the AWGN signal source, via a 3-dB splitter, to the signal analyzer and the EUT as show in the block diagram below.
- d. Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer.
- e. Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.

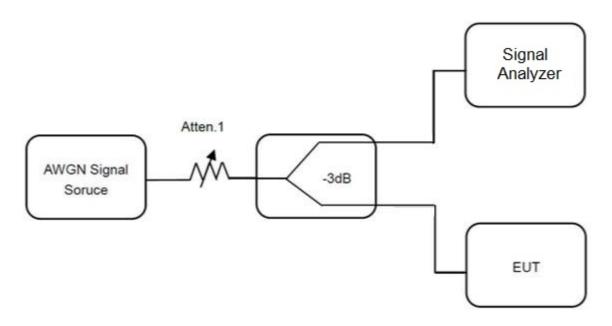


- f. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
- g. Refer to step b table to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step c, choose a different center frequency for the AWGN signal and repeat the process.

# 10.3 DEVIATION FROM STANDARD

No deviation.

#### **10.4 TEST SETUP**



# **10.5 EUT OPERATION CONDITIONS**

The EUT was Configured to be in normally transmitting mode with a constant duty cycle.

#### **10.6 TEST RESULTS**

Please refer to the APPENDIX I.



# 11. FREQUENCY STABILITY

# 11.1 LIMIT

Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.407(g)	Frequency Stability	An emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.	5925-7125

#### 11.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.

b. Spectrum Setting:

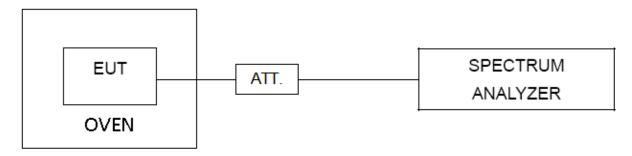
opecarin Colling.				
Setting				
Entire absence of modulation emissions bandwidth				
10 kHz				
10 kHz				
Peak				
Max Hold				
Auto				

- c. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
- d. User manual temperature is 0°C~65°C.

#### 11.3 DEVIATION FROM STANDARD

No deviation.

#### 11.4 TEST SETUP



# 11.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

# 11.6 TEST RESULTS

Please refer to the APPENDIX J.



# 12. MEASUREMENT INSTRUMENTS LIST

	AC Power Line Conducted Emissions							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	EMI Test Receiver	R&S	ESR3	103027	Jun. 16, 2024			
2	TWO-LINE V-NETWORK	R&S	ENV216	101447	Jan. 07, 2024 Dec. 22, 2024			
3	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A			
4	Cable	N/A	RG223	12m	Sep. 13, 2024			
5	643 Shield Room	ETS	6*4*3	N/A	N/A			

	Radiated Emissions - 9 kHz to 30 MHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Active Loop Antenna	Schwarzbeck	FMZB 1513-60B	1513-60 B-034	Apr. 01, 2024			
2	MXE EMI Receiver	Keysight	N9038A	MY56400091	Jan. 07, 2024 Dec. 22, 2024			
3	Cable	N/A	RW2350-3.8A-NMB M-1.5M	N/A	Jun. 10, 2024			
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A			
5	966 Chamber room	ETS	9*6*6	N/A	Jul. 11, 2024			

	Radiated Emissions - 30 MHz to 1 GHz						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	1462	Dec. 14, 2023 Dec. 13, 2024		
2	Attenuator	EMC INSTRUMENT	EMCI-N-6-06	AT-06009	Dec. 14, 2023 Dec. 13, 2024		
3	Preamplifier	EMC INSTRUMENT	EMC001330	980863	Nov. 18, 2023 Nov. 17, 2024		
4	Cable	RegalWay	LMR400-NMNM-12 .5m	N/A	Jul. 04, 2024		
5	Cable	RegalWay	LMR400-NMNM-3 m	N/A	Jul. 04, 2024		
6	Cable	RegalWay	LMR400-NMNM-0. 5m	N/A	Jul. 04, 2024		
7	Receiver	Agilent	N9038A	MY52130039	Dec. 23, 2023 Dec. 22, 2024		
8	Positioning Controller	MF	MF-7802	N/A	N/A		
9	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A		
10	966 Chamber room	CM	9*6*6	N/A	May 17, 2024		



	Radiated Emissions - Above 1 GHz						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	Receiver	Agilent	N9038A	MY52130039	Dec. 23, 2023 Dec. 22, 2024		
2	Preamplifier	EMC INSTRUMENT	EMC118A45SE	980888	Nov. 18, 2023 Nov. 17, 2024		
3	EXA Spectrum Analyzer	Keysight	N9010A	MY55150209	Jun. 16, 2024		
4	Double Ridged Guide Antenna	ETS	3115	75789	May 31, 2024		
5	Cable	RegalWay	A81-SMAMSMAM- 12.5M	N/A	Aug. 08, 2024		
6	Cable	RegalWay	RWLP50-4.0A-NM RASM-2.5M	N/A	Aug. 08, 2024		
7	Cable	RegalWay	RWLP50-4.0A-NM RASMRA-0.8M	N/A	Aug. 08, 2024		
8	Low Noise Amplifier	CONNPHY	CLN-18G40G-4330 -K	619413	Jul. 06, 2024		
9	Cable	RegalWay	RWLP50-2.6A-2.92 M2.92M-1.1M	N/A	Jul. 26, 2024		
10	Cable	Tonscend	HF160-KMKM-3M	N/A	Jul. 26, 2024		
11	Broad-Band Horn Antenna	Schwarzbeck	BBHA9170(3m)	9170-319	Jun. 20, 2024		
12	966 Chamber room	CM	9*6*6	N/A	May 17, 2024		
13	Attenuator	Talent Microwave	TA10A2-S-18	N/A	N/A		
14	Filter	COM-MW	ZBSF6-C6425-652 5-1106	N/A	Jun. 16, 2024		
15	Filter	COM-MW	ZBSF6-C6525-687 5-1107	N/A	Jun. 16, 2024		
16	Positioning Controller	MF	MF-7802	N/A	N/A		
17	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A		

	Bandwidth & Maximum Power Spectral Density (e.i.r.p.) & In-Band Emission (Mask)							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Jan. 07, 2024 Jan. 06, 2025			
2	4TX Mimo Power Test Set	Keysight	X8750A	MY59400118	N/A			
3	USB Peak and Average Power Sensor	Keysight	U2063XA	MY58000233	Jun. 17, 2024			
4	Attenuator	Talent Microwave	TA10A0-S-26.5	N/A	N/A			
5	USB Peak and Average Power Sensor	Keysight	U2063XA	MY58000237	Jun. 17, 2024			
6	Cable	RegalWay	S02-181212-208	N/A	N/A			
7	Cable	RegalWay	S02-190322-034	N/A	N/A			
8	PWP50-402-SMSM-							
9	Measurement Software	keysight	IOT0047A	N/A	N/A			
10	Attenuator	Talent Microwave	TA10A0-S-26.5	N/A	N/A			
11	Attenuator	Talent Microwave	TA10A0-S-26.5	N/A	N/A			



	Maximum e.i.r.p.							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Peak Power Analyzer	Keysight	8990B	MY51000506	Jun. 17, 2024			
2	Wideband power sensor	Keysight	N1923A	MY58310004	Jun. 17, 2024			
3	Attenuator	Talent Microwave	TA10A2-S-18	N/A	N/A			

	Contention Based Protocol						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Jan. 07, 2024 Jan. 06, 2025		
2	MXG Vector Signal Generator	Keysight	N5182B	MY57300568	Jun. 17, 2024		
3	Frequency Extender	Keysight	N5182BX07	MY59362506	Jun. 17, 2024		
4	Cable	RegalWay	S02-181212-208	N/A	N/A		
5	Cable	RegalWay	S02-190322-034	N/A	N/A		
6	Cable	RegalWay	20210802 016	RWP50-402-SMSM- 1M	N/A		
7	Cable	RegalWay	20210802 002	RWP50-402-SMSM- 1M	N/A		
8	Cable	RegalWay	20210802 005	RWP50-402-SMSM- 1M	N/A		
9	Measurement Software	BTL	WIFI6E TestSystem	N/A	N/A		
10	Power divider	N/A	PD-2SF-2080	N/A	Jan. 07, 2024 Jan. 06, 2025		



	Frequency Stability						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Jan. 07, 2024 Jan. 06, 2025		
2	4TX Mimo Power Test Set	Keysight	X8750A	MY59400118	N/A		
3	USB Peak and Average Power Sensor	Keysight	U2063XA	MY58000233	Jun. 17, 2024		
4	Attenuator	Talent Microwave	TA10A0-S-26.5	N/A	N/A		
5	USB Peak and Average Power Sensor	Keysight	U2063XA	MY58000237	Jun. 17, 2024		
6	Cable	RegalWay	S02-181212-208	N/A	N/A		
7	Cable	RegalWay	S02-190322-034	N/A	N/A		
8	Cable	RegalWay	20210802 016	RWP50-402-SMSM- 1M	N/A		
9	Measurement Software	keysight	IOT0047A	N/A	N/A		
10	Attenuator	Talent Microwave	TA10A0-S-26.5	N/A	N/A		
11	Attenuator	Talent Microwave	TA10A0-S-26.5	N/A	N/A		
12	Table top type high and low temperature test chamber	CEPREI	CEEC-M64T-40	15-008	Jan. 07, 2024 Jan. 06, 2025		
13	Multi-output DC Power Supply	GW Instek	GPC-3030DN	EK880675	Jul. 07, 2024		

Remark: "N/A" denotes no model name, serial no. or calibration specified. All calibration period of equipment list is one year.



# 13. EUT TEST PHOTOS

# **AC Power Line Conducted Emissions Test Photos**

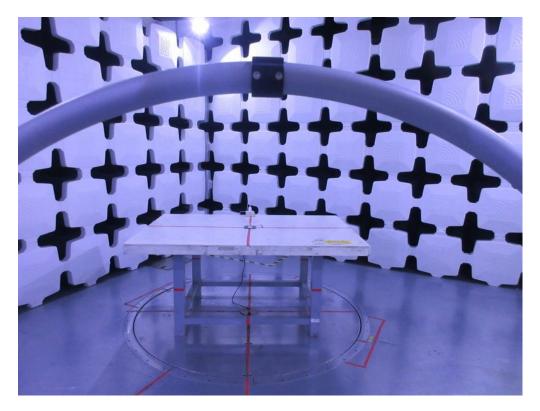


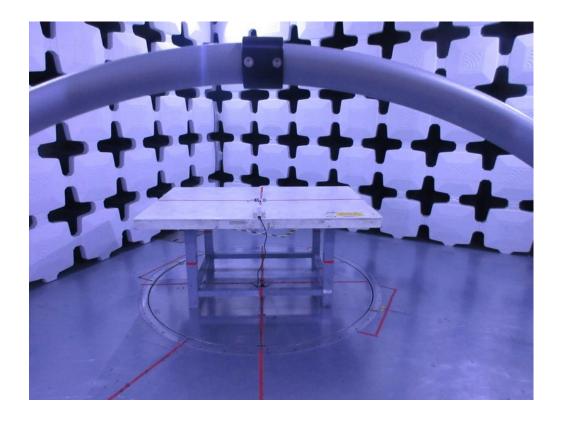




# **Radiated Emissions Test Photos**

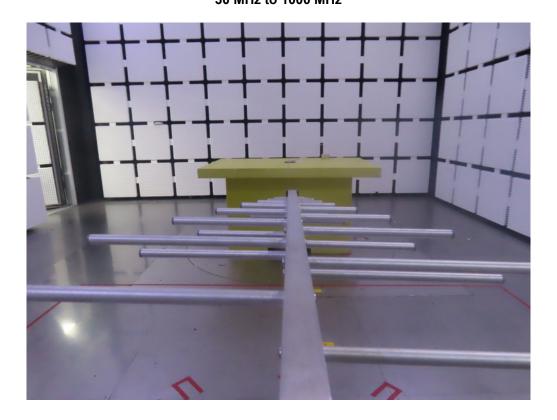
9 kHz to 30 MHz

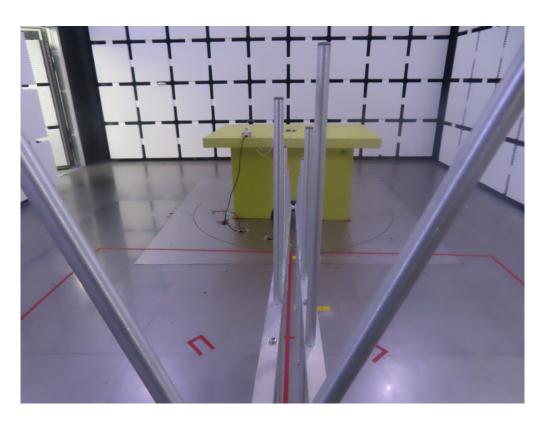






# Radiated Emissions Test Photos 30 MHz to 1000 MHz

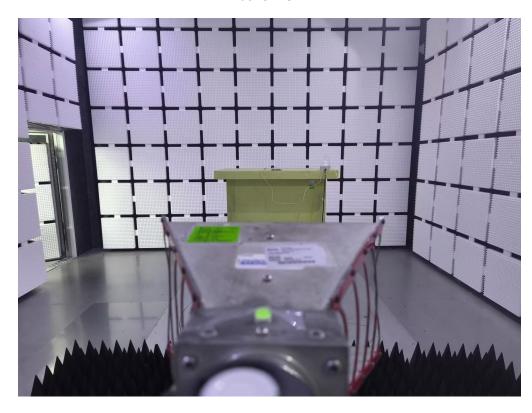


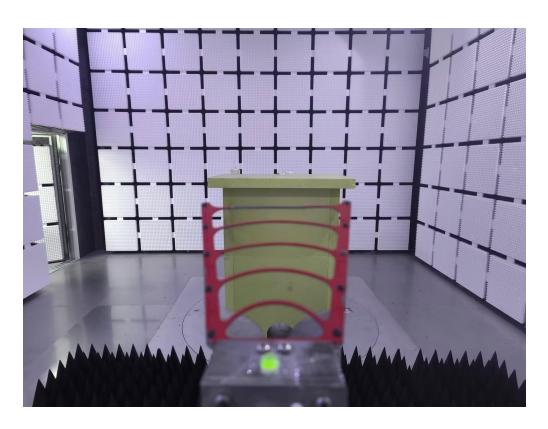




# **Radiated Emissions Test Photos**

# Above 1 GHz







# **Conducted Test Photos**

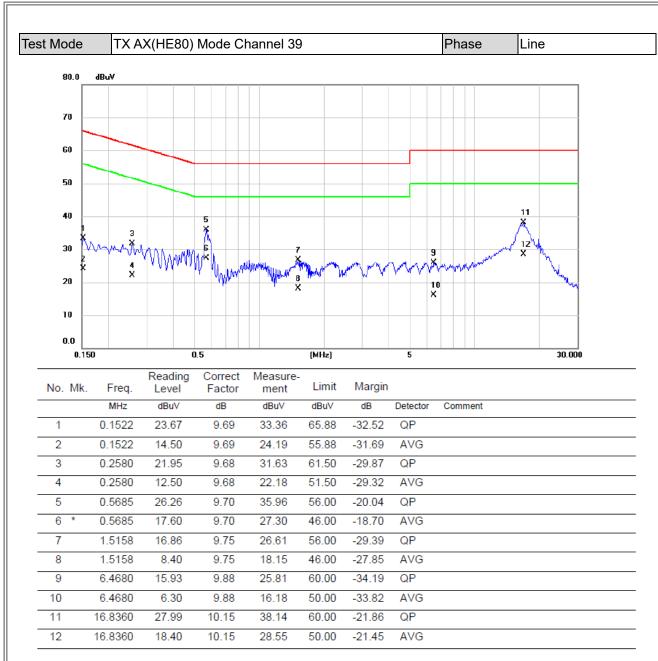






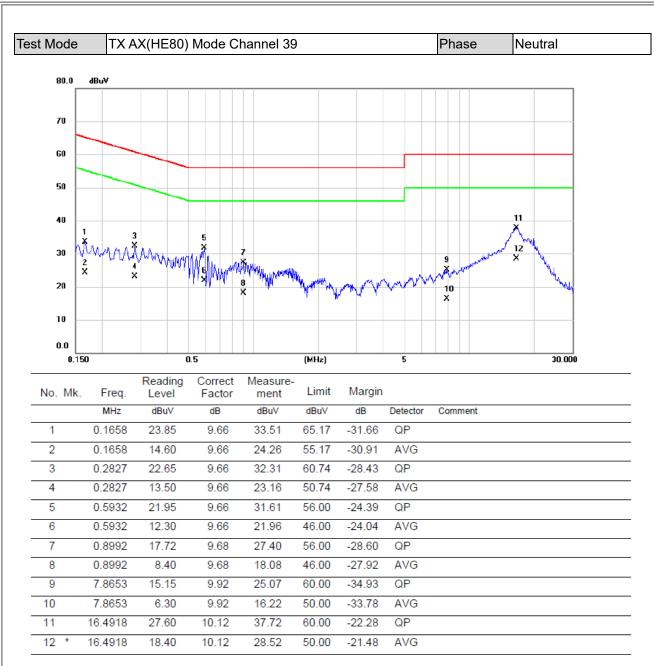
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS
Page 30 of 122





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.
- (3) The test result has included the cable loss.



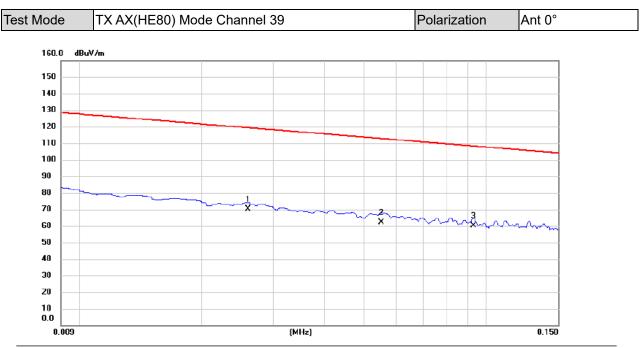


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.
- (3) The test result has included the cable loss.



# **APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ**

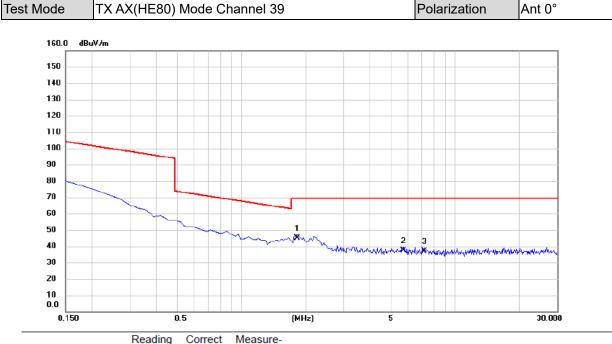




No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.0260	50.36	20.02	70.38	119.31	-48.93	AVG	
2	0.0553	42.36	19.82	62.18	112.75	-50.57	AVG	
3 *	0.0931	40.36	19.86	60.22	108.23	-48.01	QP	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.

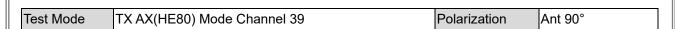


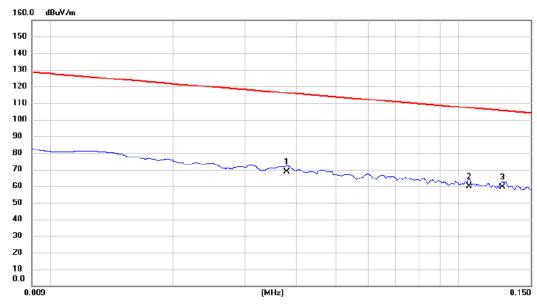


No. Mk	Freq.		Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	1.8216	25.36	19.81	45.17	69.54	-24.37	QP	
2	5.7170	17.62	19.96	37.58	69.54	-31.96	QP	
3	7.1647	16.84	20.03	36.87	69.54	-32.67	QP	

- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.



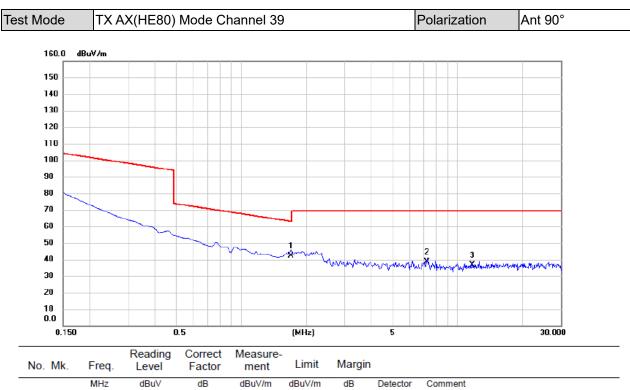




No. Mk.	Freq.		Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBu∀	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.0380	48.63	19.80	68.43	116.01	-47.58	AVG	
2	0.1060	40.15	19.83	59.98	107.10	-47.12	QP	
3 *	0.1278	39.63	19.83	59.46	105.48	-46.02	AVG	

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





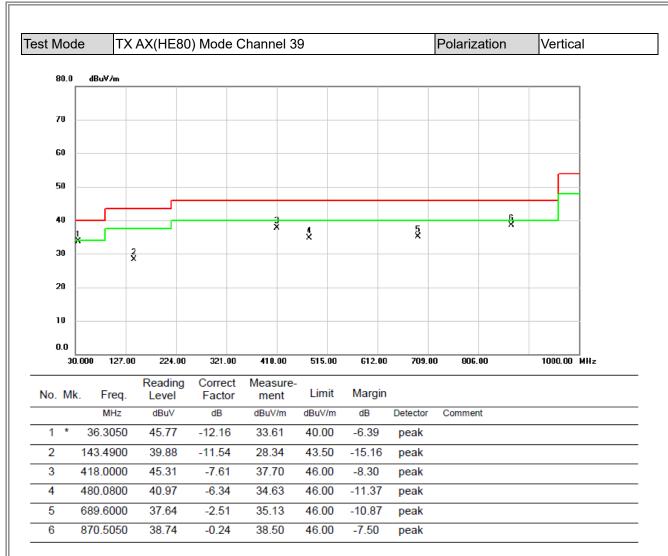
### 1 1.7022 22.51 19.81 42.32 62.98 -20.66 QP 7.2095 18.63 38.66 QP 2 20.03 69.54 -30.88 20.23 3 11.6572 16.54 36.77 69.54 -32.77 QP

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



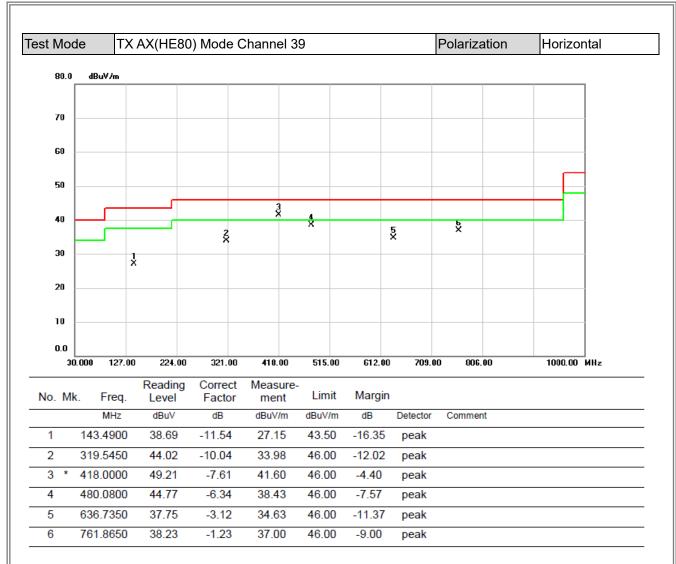
APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



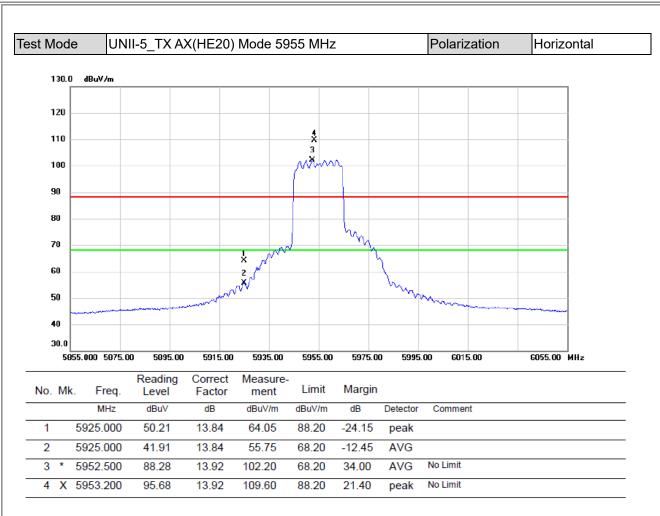


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



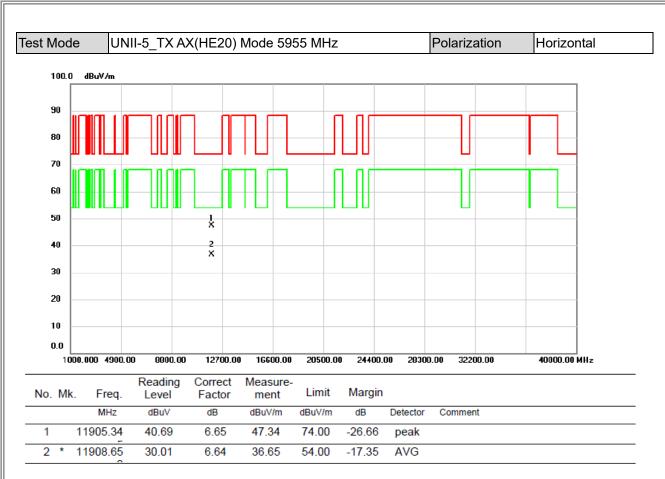
APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ





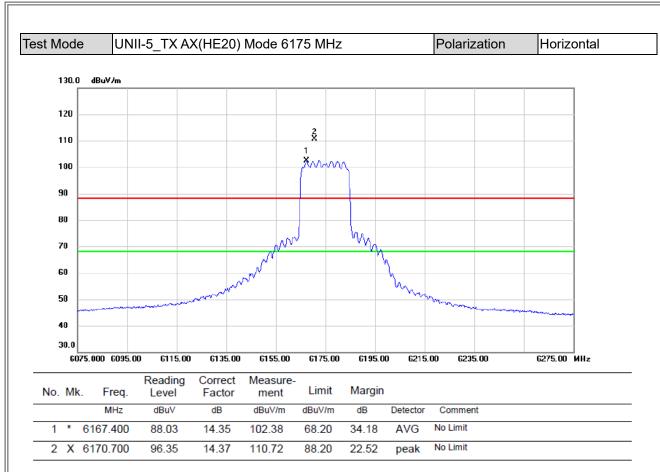
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





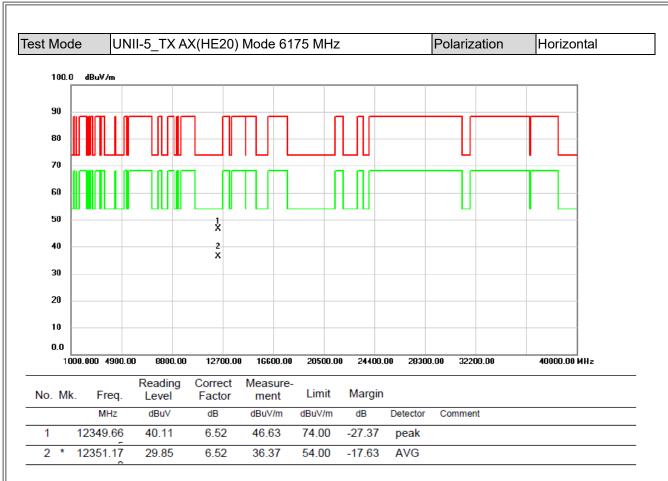
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





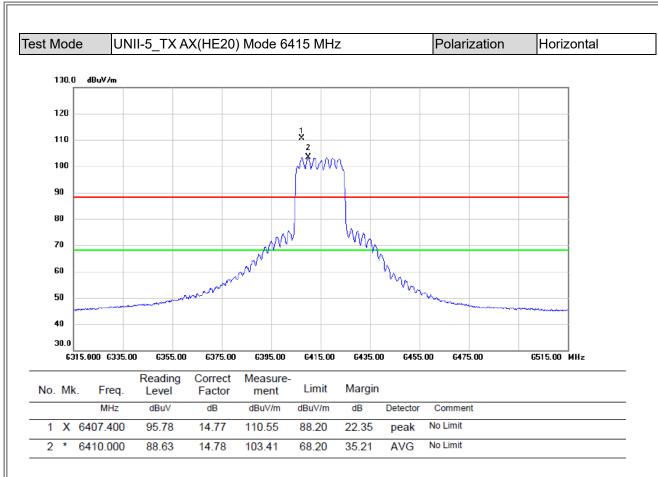
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





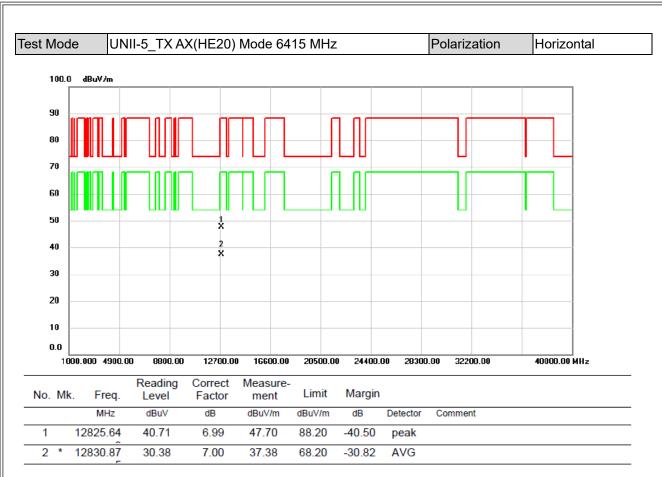
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





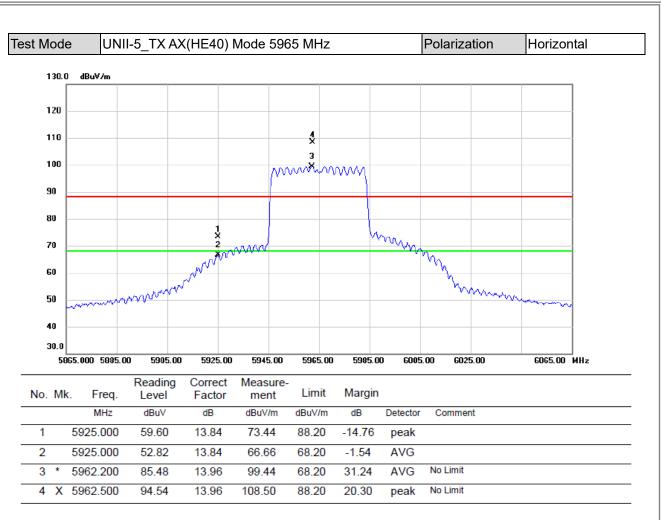
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





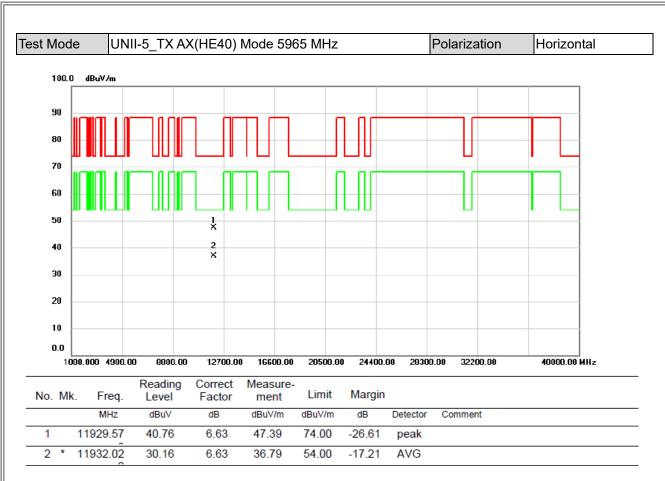
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.





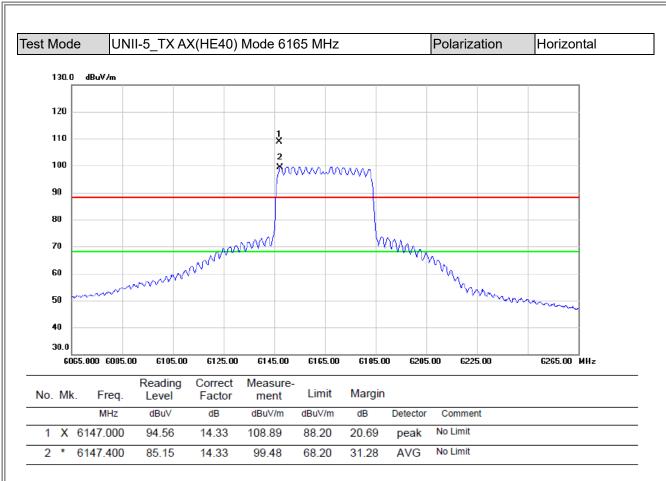
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





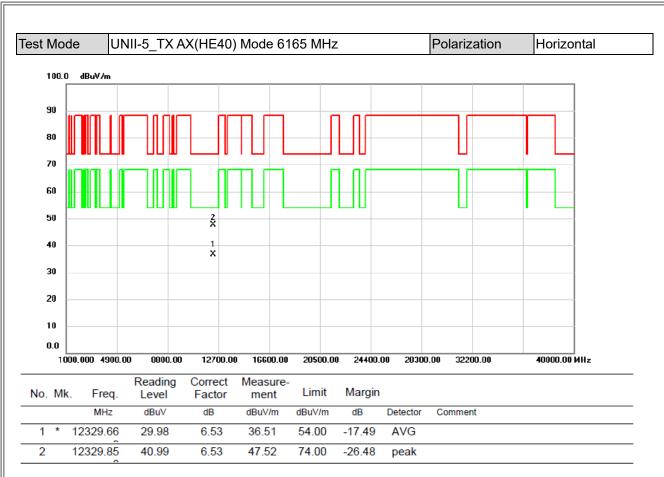
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





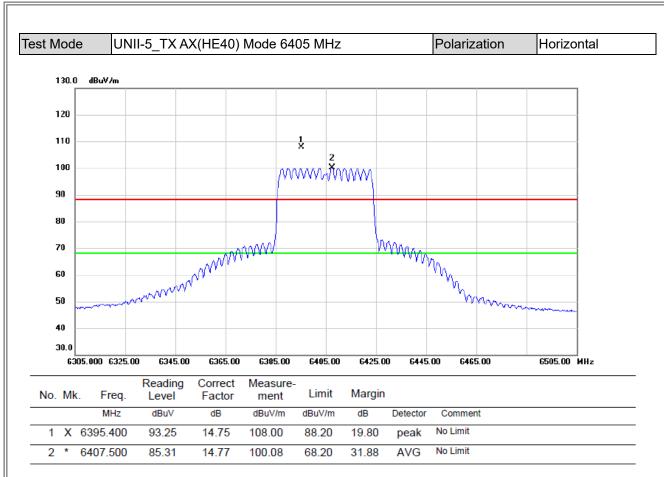
- (1) Measurement Value = Reading Level + Correct Factor.(2) Margin Level = Measurement Value Limit Value.





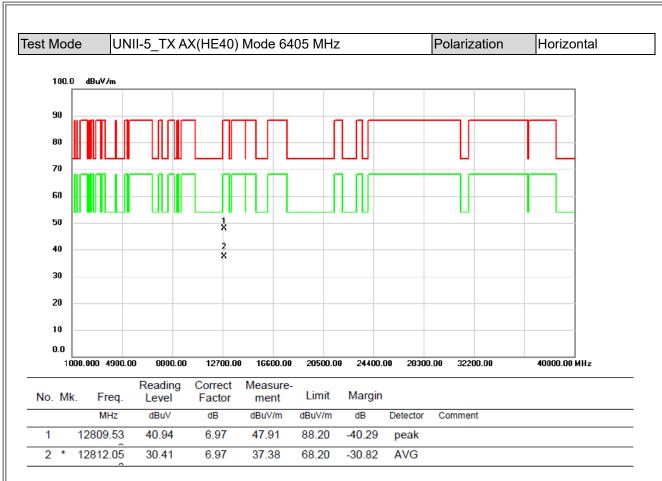
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





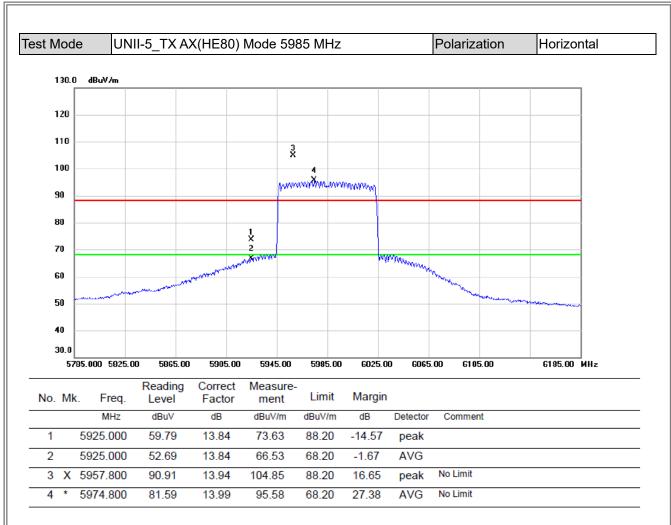
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





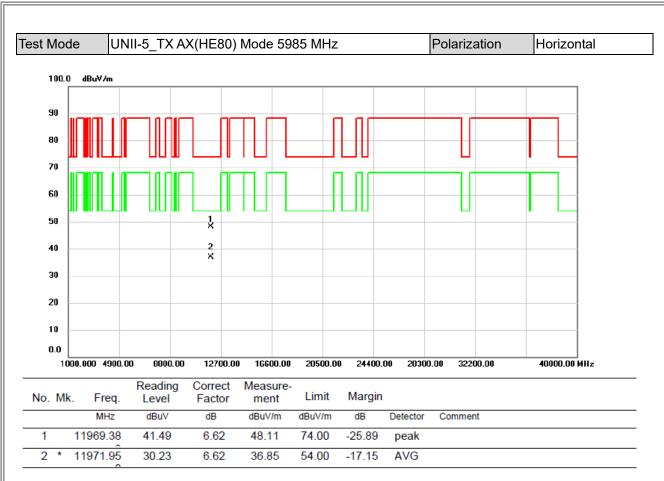
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





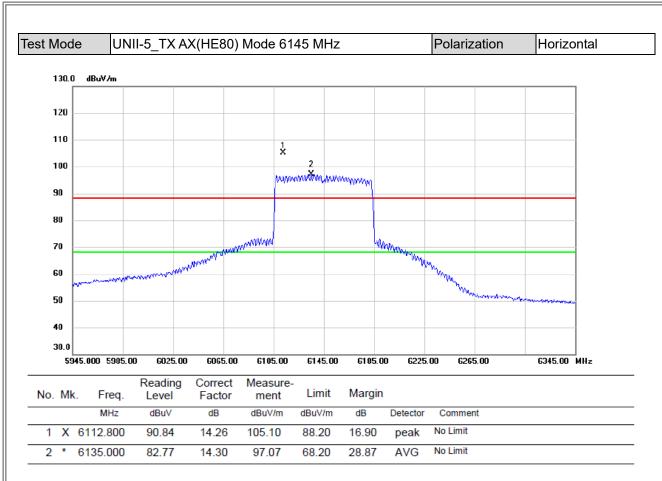
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





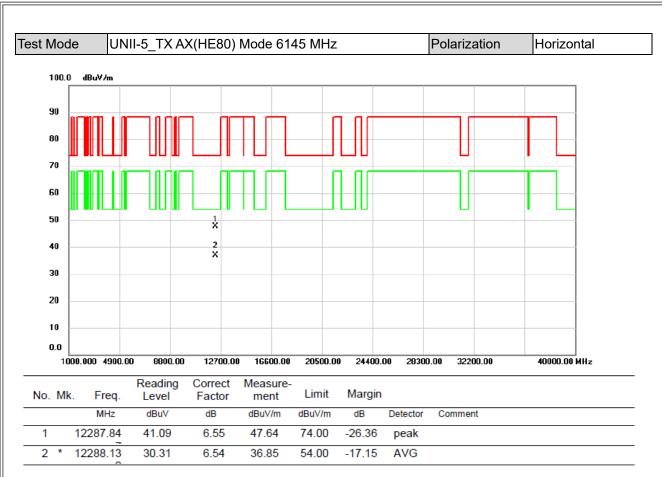
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





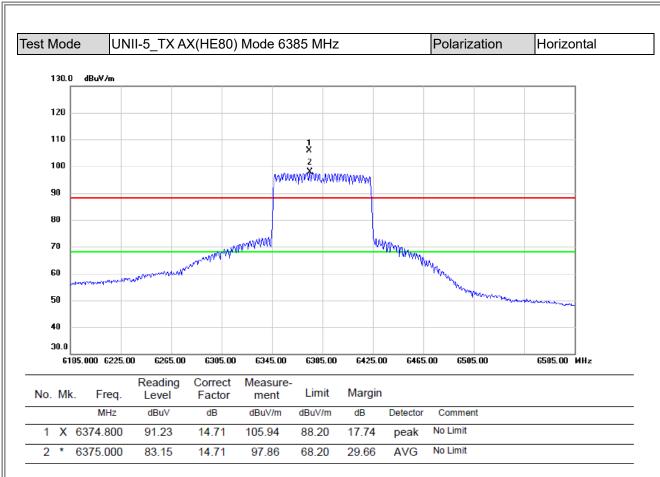
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





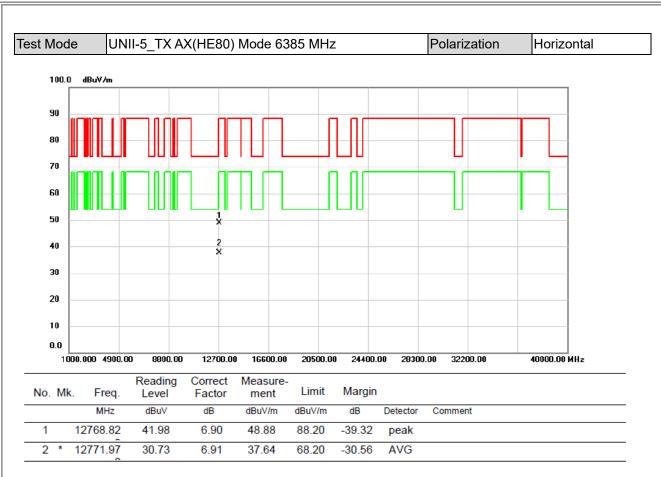
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





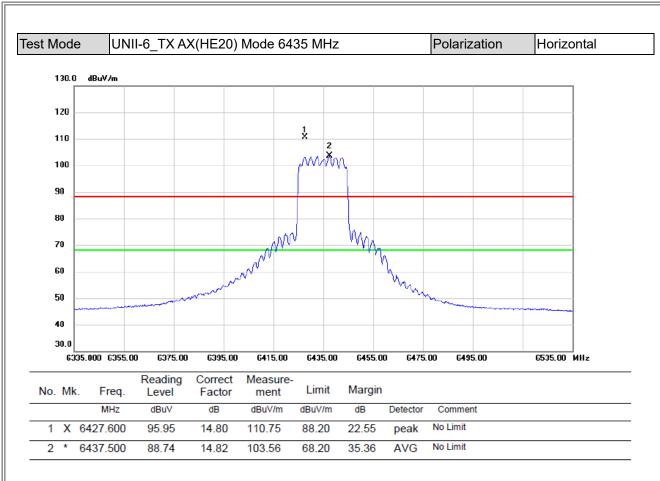
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





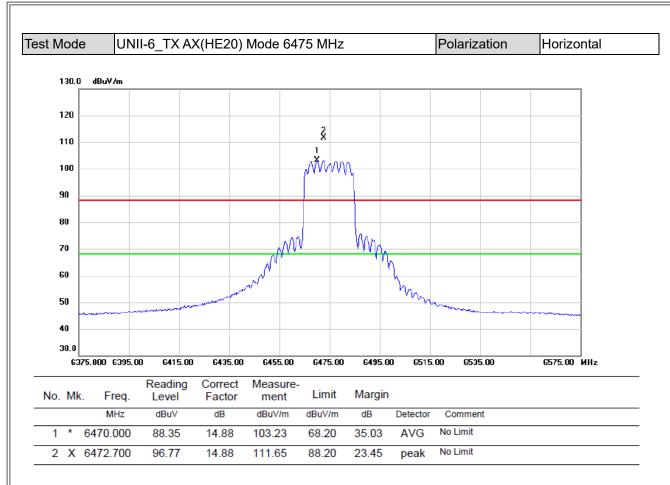
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





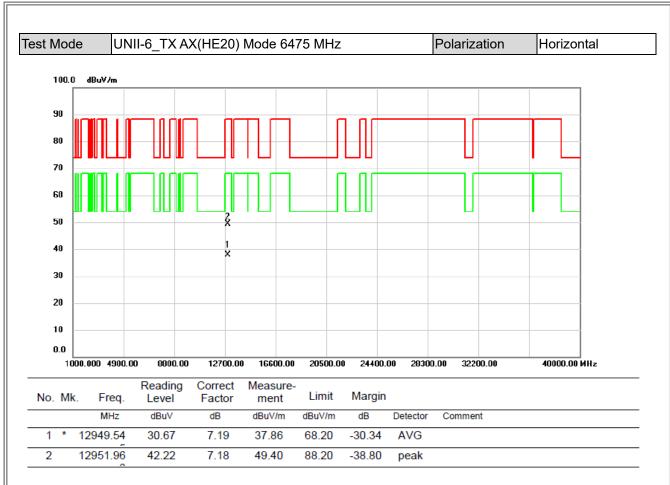
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





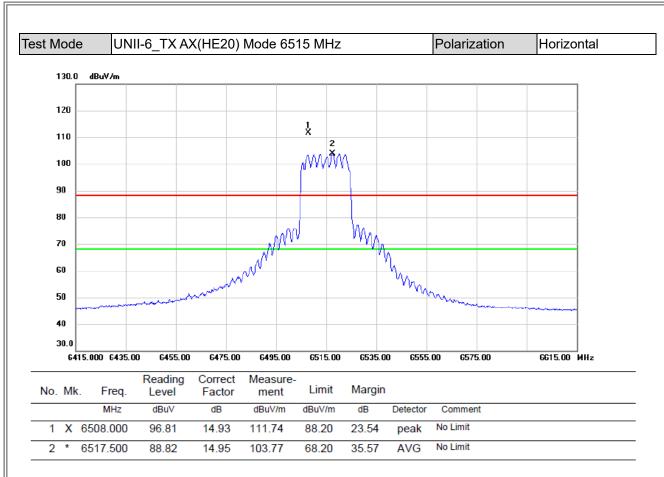
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





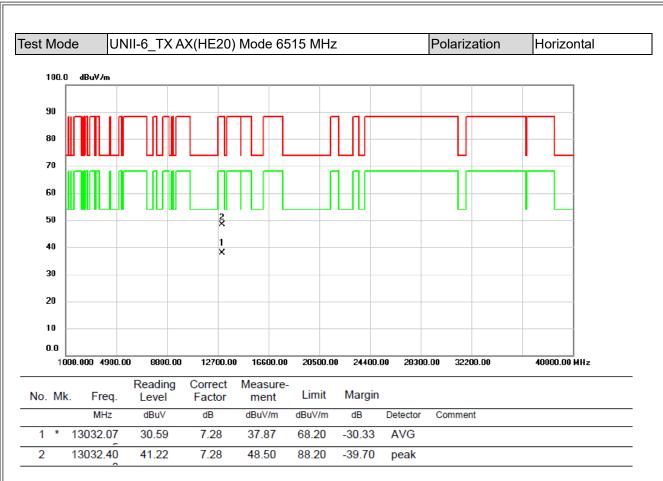
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





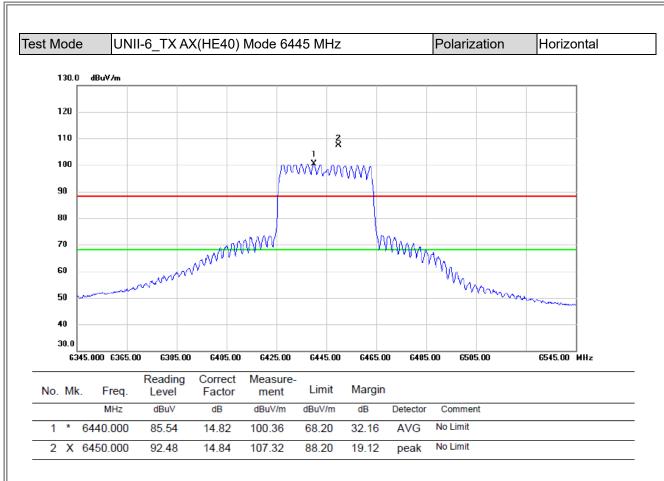
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





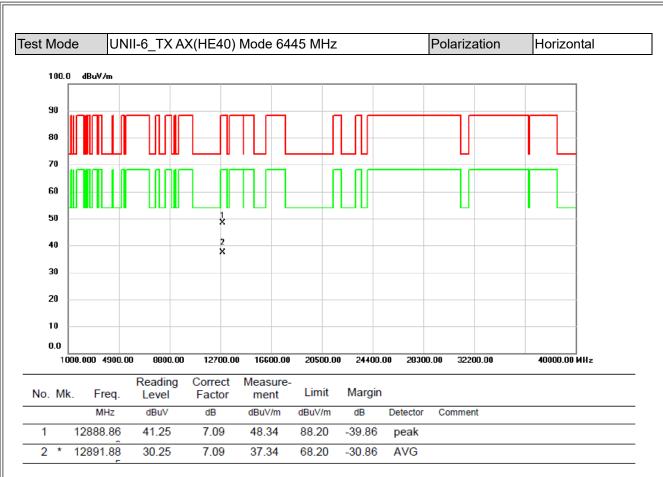
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





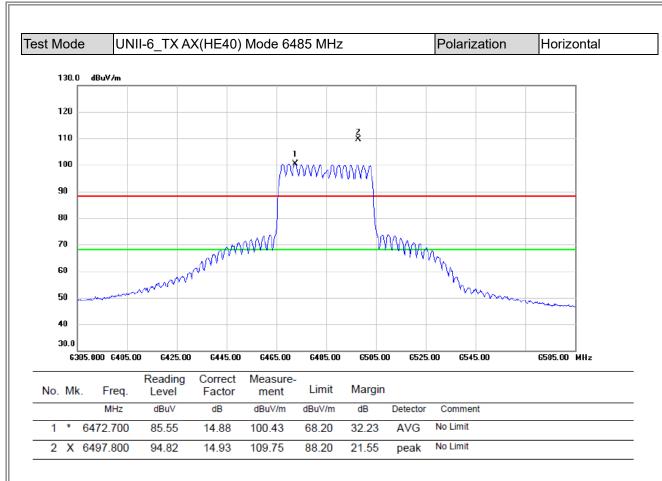
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





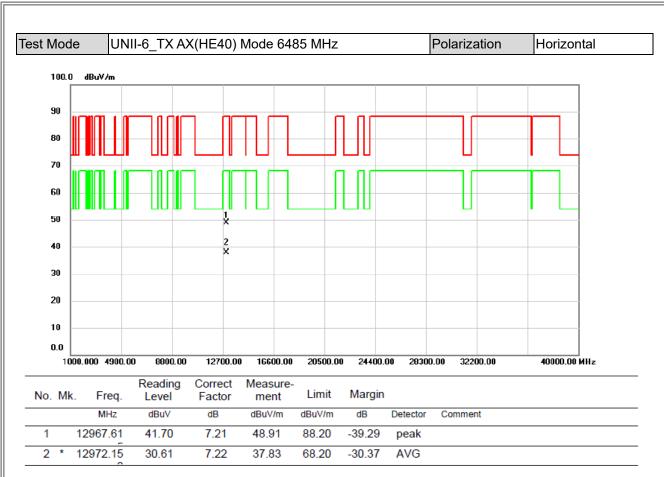
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





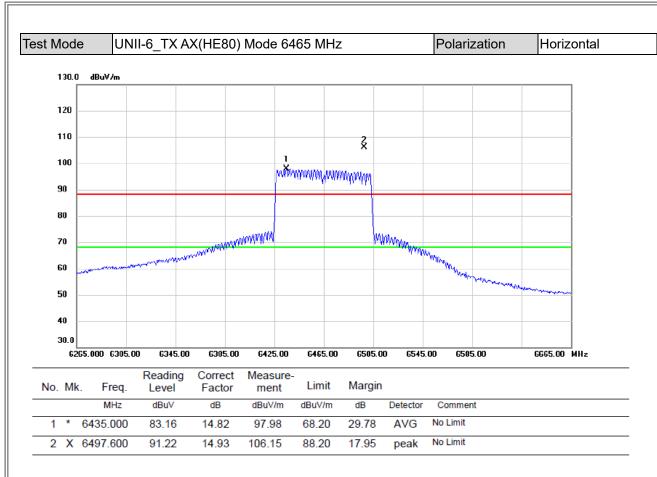
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





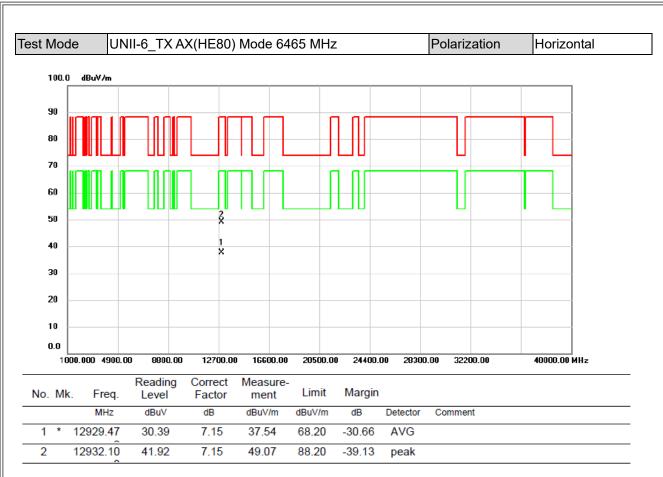
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



APPENDIX E - BANDWIDTH	
Page 81 of 122	

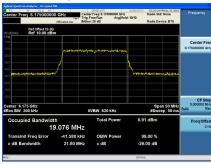


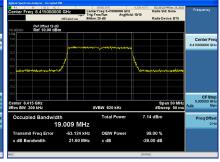
Test Mode	UNII-5	TX AX	(HE20)	) Mode	Ant.	1
100t Wode	CIVII C	_ 1 / \ / / \ / \	(11620	, iviouc_	/ \III.	•

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Limit (MHz)	Result
01	5955	21.51	19.26	320	Complies
45	6175	21.60	19.23	320	Complies
93	6415	21.60	19.18	320	Complies

CH01 CH45 CH93
26 dB Bandwidth

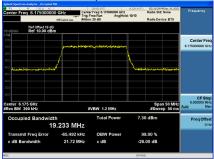


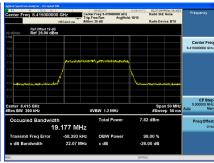




#### 99 % Occupied Bandwidth







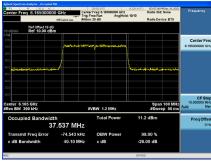


Test Mode	UNII-5_	TX AX(	(HE40)	) Mode	Ant.	1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Limit (MHz)	Result
03	5965	40.04	37.71	320	Complies
43	6165	40.10	37.70	320	Complies
91	6405	40.14	37.79	320	Complies

CH03 CH43 CH91 26 dB Bandwidth

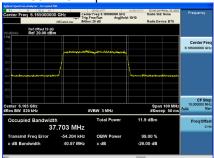


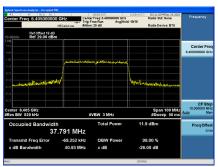




# 99 % Occupied Bandwidth





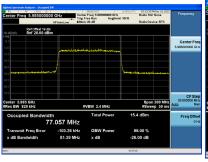


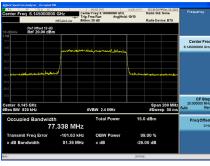


Test Mode	UNII-5	TX AX	(HE80)	) Mode	Ant	1
LEST MORE	OINII-O		(11100	) IVIOUE_		- 1

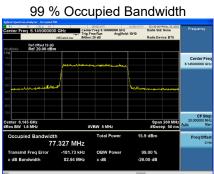
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Limit (MHz)	Result
07	5985	81.39	77.20	320	Complies
39	6145	81.36	77.33	320	Complies
87	6385	83.96	77.79	320	Complies

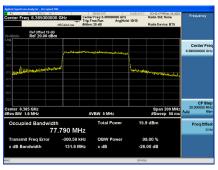
CH07 CH39 CH87 26 dB Bandwidth









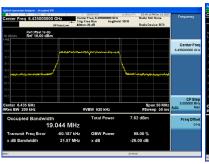


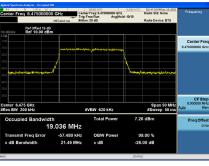


Toot Mode	LINIII G	TV AV	/LIE20	11000	۸ 4	4
Test Mode	O-IIVIO	TX AX	(   EZU	) WOULE	AIII.	- 1

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Limit (MHz)	Result
97	6435	21.57	19.21	320	Complies
105	6475	21.46	19.29	320	Complies
113	6515	21.59	19.23	320	Complies

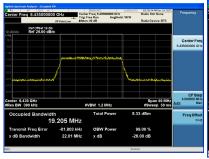
**CH97** CH105 CH113 26 dB Bandwidth

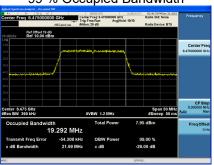


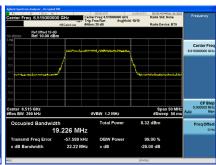




# 99 % Occupied Bandwidth







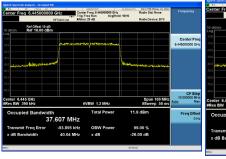


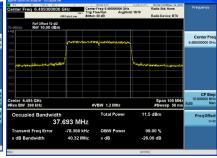
Test Mode	UNII-6	TX AX	(HE40)	) Mode	Ant.	1
100t Wiodo	O : 1 :: 0	1/1///	(	, ivioac	, viic.	•

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Limit (MHz)	Result
99	6445	40.04	37.76	320	Complies
107	6485	40.32	37.78	320	Complies

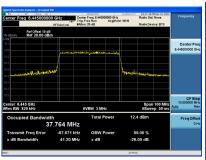
#### **CH99**

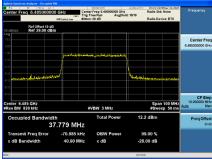
CH107 26 dB Bandwidth





99 % Occupied Bandwidth



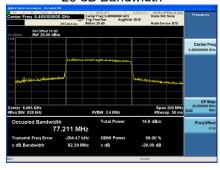




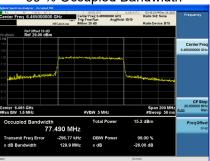
Test Mode	LINII 6 TY AY	(HE80) Mode	Λnt 1
rest iviode	UNII-6_TX AX	(HEOU) IVIOUE	≠_Anı. ı

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	Limit (MHz)	Result
103	6465	82.39	77.49	320	Complies

**CH103** 26 dB Bandwidth



#### 99 % Occupied Bandwidth





APPENDIX F - MAXIMUM E.I.R.P.	
Page 88 of 122	_



#### Test Mode UNII-5\_TX AX(HE20) Mode\_Ant. 1

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
01	5955	-3.05	0.56	3.01	24.00	0.250	Complies
45	6175	-1.76	0.56	4.30	24.00	0.250	Complies
93	6415	-2.54	0.56	3.52	24.00	0.250	Complies

#### Test Mode UNII-5\_TX AX(HE20) Mode\_Ant. 2

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
01	5955	0.52	0.56	6.58	24.00	0.250	Complies
45	6175	1.46	0.56	7.52	24.00	0.250	Complies
93	6415	0.26	0.56	6.32	24.00	0.250	Complies

#### Test Mode UNII-5\_TX AX(HE20) Mode\_Total

Channel	Frequency (MHz)	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
01	5955	8.16	24.00	0.250	Complies
45	6175	9.21	24.00	0.250	Complies
93	6415	8.15	24.00	0.250	Complies



#### Test Mode UNII-5\_TX AX(HE40) Mode\_Ant. 1

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
03	5965	1.63	0.26	7.39	24.00	0.250	Complies
43	6165	2.08	0.26	7.84	24.00	0.250	Complies
91	6405	1.66	0.26	7.42	24.00	0.250	Complies

#### Test Mode UNII-5\_TX AX(HE40) Mode\_Ant. 2

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
03	5965	2.78	0.26	8.54	24.00	0.250	Complies
43	6165	3.57	0.26	9.33	24.00	0.250	Complies
91	6405	2.92	0.26	8.68	24.00	0.250	Complies

#### Test Mode UNII-5\_TX AX(HE40) Mode\_Total

Channel	Frequency (MHz)	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
03	5965	11.01	24.00	0.250	Complies
43	6165	11.66	24.00	0.250	Complies
91	6405	11.10	24.00	0.250	Complies



Test Mode	UNII-5	TX AX(	(HE80	Mode	Ant.	1

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
07	5985	4.57	0.34	10.41	24.00	0.250	Complies
39	6145	4.67	0.34	10.51	24.00	0.250	Complies
87	6385	4.32	0.34	10.16	24.00	0.250	Complies

### Test Mode UNII-5\_TX AX(HE80) Mode\_Ant. 2

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
07	5985	5.26	0.34	11.10	24.00	0.250	Complies
39	6145	4.91	0.34	10.75	24.00	0.250	Complies
87	6385	4.72	0.34	10.56	24.00	0.250	Complies

		Test Mode	UNII-5	TX AX	(HE80)	) Mode	Total
--	--	-----------	--------	-------	--------	--------	-------

Channel	Frequency (MHz)	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
07	5985	13.78	24.00	0.250	Complies
39	6145	13.64	24.00	0.250	Complies
87	6385	13.38	24.00	0.250	Complies



Test Mode	UNII-6	TY AY	(HE20)	Mode	Δnt	1
rest ivioue	ס-וועוט	$I \wedge A \wedge ($	(□⊏∠∪)	wode	Ant.	- 1

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
97	6435	-2.41	0.56	3.65	24.00	0.250	Complies
105	6475	-1.51	0.56	4.55	24.00	0.250	Complies
113	6515	-2.15	0.56	3.91	24.00	0.250	Complies

### Test Mode UNII-6\_TX AX(HE20) Mode\_Ant. 2

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
97	6435	-0.41	0.56	5.65	24.00	0.250	Complies
105	6475	-0.54	0.56	5.52	24.00	0.250	Complies
113	6515	-0.04	0.56	6.02	24.00	0.250	Complies

Channel	Frequency (MHz)	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
97	6435	7.77	24.00	0.250	Complies
105	6475	8.07	24.00	0.250	Complies
113	6515	8.10	24.00	0.250	Complies



	Test Mode	UNII-6	TY AY	(HE40)	AboM (	Δnt	1
ı	rest iviode	O-IIVIO		(□⊑4∪	) ivioue	Ant.	- 1

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
99	6445	1.62	0.26	7.38	24.00	0.250	Complies
107	6485	2.24	0.26	8.00	24.00	0.250	Complies

## Test Mode UNII-6\_TX AX(HE40) Mode\_Ant. 2

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
99	6445	2.57	0.26	8.33	24.00	0.250	Complies
107	6485	2.59	0.26	8.35	24.00	0.250	Complies

Test Mode
-----------

Channel	Frequency (MHz)	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
99	6445	10.89	24.00	0.250	Complies
107	6485	11.19	24.00	0.250	Complies



			<b></b>		
Test Mode	UNII-6	$TX \Delta X$	(HE80)	Mode	Δnt 1
I COL IVIOGO		1/\/\/\	(11600)	IVIOGC	/ \III. I

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
103	6465	4.56	0.34	10.40	24.00	0.250	Complies

#### Test Mode UNII-6\_TX AX(HE80) Mode\_Ant. 2

Channel	Frequency (MHz)	Output Power (dBm)	Duty Factor	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
103	6465	5.14	0.34	10.98	24.00	0.250	Complies

Test Mode	UNII-6	TX AX	(HF80)	Mode	Total
163LIVIOUG	0-111-0		(11100	INIOUC	iolai

Channel	Frequency (MHz)	e.i.r.p. (dBm)	Max. Limit (dBm)	Max. Limit (W)	Result
103	6465	13.71	24.00	0.250	Complies



# APPENDIX G - MAXIMUM POWER SPECTRAL DENSITY (E.I.R.P.)