

# FCC Radio Test Report

# FCC ID: ACJ-EAH-AZ80

#### This report concerns: Original Grant

Project No.	:	2208C065
Equipment	:	Digital Wireless Stereo Earphones
Brand Name	:	Technics
Test Model	:	EAH-AZ80
Series Model	:	N/A
Applicant	:	Panasonic Corporation of North America
Address	:	Two Riverfront Plaza, 9th Floor Newark, New Jersey 07102-5490 United States
Manufacturer	:	Panasonic Entertainment & Communication Co., Ltd.
Address	:	1-10-12 Yagumo-higashi-machi, Moriguchi City, Osaka 570-0021, Japan
Factory	:	Panasonic System Networks Malaysia Sdn. Bhd.
Address	:	PLO No.1, Kawasan Perindustrian Senai, K B No. 104, 81400 Senai,
		Johor Darul Takzim. Malaysia
Date of Receipt	:	Aug. 10, 2022
Date of Test	:	Aug. 12, 2022 ~ Aug. 30, 2022
Issued Date	:	Sep. 28, 2022
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG2022081179 for conducted, DG2022081178 for radiated.
Standard(s)	:	FCC CFR Title 47, Part 15, Subpart C FCC KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10-2013

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

Evon To

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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.



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**APPENDIX H - POWER SPECTRAL DENSITY** 



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REPORT ISSUED HISTORY				
Report No.	Version	Description	Issued Date	Note
BTL-FCCP-3-2208C065	R00	Original Report.	Sep. 28, 2022	Valid



# 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC CFR Title 47, Part 15, Subpart C					
Standard(s) Section Test Item Test Result Judgment Rema					
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS		
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX B APPENDIX C APPENDIX D	PASS		
15.247(a)(2)	Bandwidth	APPENDIX E	PASS		
15.247(b)(3)	Maximum Output Power	APPENDIX F	PASS		
15.247(d)	Conducted Spurious Emission	APPENDIX G	PASS		
15.247(e)	Power Spectral Density	APPENDIX H	PASS		
15.203	Antenna Requirement		PASS	Note(2)	

Note:

(1) "N/A" denotes test is not applicable to this device.

(2) The device what use a permanently attached antenna were considered sufficient to comply with the provisions of 15.203.



# 1.1 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 People's Republic of China. BTL's Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

#### **1.2 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 Measurement:

Test Site	Method Measurement Frequency Range		
DG-C02	CISPR	150kHz ~ 30MHz	2.60

B. Radiated emissions Measurement:

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

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)	
DG-CB03 (3m)		30MHz ~ 200MHz	V	4.36	
	CISPR	G-CB03 30MHz ~ 200MHz		Н	3.32
		200MHz ~ 1,000MHz	V	4.08	
		200MHz ~ 1,000MHz	Н	3.96	

Test Site	Method	od Measurement Frequency Range	
DG-CB03 (3m)		1GHz ~ 6GHz	3.80
	CISPR	6GHz ~ 18GHz	4.82

Test Site	Method	hod Measurement Frequency Range	
DG-CB03		18 ~ 26.5 GHz	3.62
(1m)	CISPR	26.5 ~ 40 GHz	4.00

#### C. Other Measurement:

Test Item	Uncertainty
Bandwidth	±3.8 %
Maximum Output Power	±0.95 dB
Conducted Spurious Emission	±2.71 dB
Power Spectral Density	±0.86 dB
Temperature	±0.08 °C
Humidity	±1.5%

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



# **1.3 TEST ENVIRONMENT CONDITIONS**

Test Item	Temperature	Humidity	Test Voltage	Tested By
AC Power Line Conducted Emissions	23°C	53%	AC 120V/60Hz	Burak Luo
Radiated Emissions-9 kHz to 30 MHz	25°C	55%	DC 5V	Farun Liang
Radiated Emissions-30 MHz to 1000 MHz	25°C	55%	DC 5V	Meers Zhang
Radiated Emissions-Above 1000 MHz	25°C	55%	DC 5V	Meers Zhang
Bandwidth	23°C	56%	DC 5V	Ansel Yang
Maximum Output Power	23°C	56%	DC 5V	Ansel Yang
Conducted Spurious Emission	23°C	56%	DC 5V	Ansel Yang
Power Spectral Density	23°C	56%	DC 5V	Ansel Yang



# 2. GENERAL INFORMATION

# 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Digital Wireless Stereo Earphones
Brand Name	Technics
Test Model	EAH-AZ80
Series Model	N/A
Model Difference(s)	N/A
Power Source	For Earphones: 1# Supplied from charging case. 2# Supplied from battery. Model: 1454 For Charging Case:
	<ul> <li>1# Supplied from USB port.</li> <li>2# Supplied from battery. Model: 102427</li> <li>3# Supplied from wireless charging base</li> </ul>
Power Rating	For Earphones: 1# 4.7V===85mA x 2 2# DC 3.7V 0.32Wh For Charging Case: 1# 5.0V===500mA 2# DC 3.7V 700mAh 2.59Wh 3# DC 5V
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	1Mbps, 2Mbps
Max. Output Power	2Mbps: 9.59 dBm (0.0091 W)

Note:

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



#### 2. Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

### 3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1 C	Daisho Denshi	Inverted-F Antenna	FPC	N/A	-6.7

Note: The antenna gain is provided by the manufacturer.



# 2.2 DESCRIPTION OF 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 Mode_1Mbps Channel 00/19/39	
Mode 2	TX Mode_2Mbps Channel 00/19/39	
Mode 3	TX Mode_2Mbps Channel 00	

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 3	TX Mode_2Mbps Channel 00	

Radiated emissions test - Below 1GHz		
Final Test Mode	Description	
Mode 3	TX Mode_2Mbps Channel 00	

Radiated emissions test - Above 1GHz (Bandedge)		
Final Test Mode Description		
Mode 1	TX Mode_1Mbps Channel 00/39	
Mode 2	TX Mode_2Mbps Channel 00/39	

Radiated emissions test - Above 1GHz (Harmonic)		
Final Test Mode Description		
Mode 1	TX Mode_1Mbps Channel 00/19/39	
Mode 2	TX Mode_2Mbps Channel 00/19/39	

Conducted test		
Final Test Mode Description		
Mode 1	TX Mode_1Mbps Channel 00/19/39	
Mode 2	TX Mode_2Mbps Channel 00/19/39	

Note:

- (1) For radiated emission above 1 GHz test, the spurious points of 1GHz~26.5GHz 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.
- (2) For AC power line conducted emissions and radiated emissions below 1 GHz test, the 2Mbps Channel 00 is found to be the worst case and recorded.
- (3) For radiated emission above 1 GHz test: The polarization of vertical and horizontal are evaluated, the worst case is vertical and recorded.





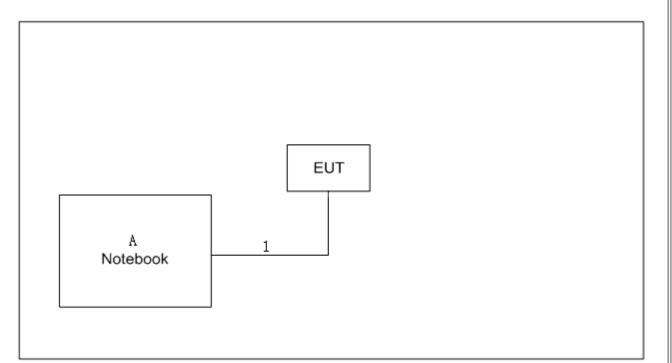
# 2.3 PARAMETERS OF TEST SOFTWARE

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

Test Software Version	Airoha.Tool.Kit_V2.9.2.1		
Frequency (MHz)	2402	2440	2480
1Mbps	59	59	59
2Mbps	59	59	59



# 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



# 2.5 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
А	Notebook	HONOR	NBLK-WAX9X	N/A
Item	Cable Type	Shielded Type	Ferrite Core	Length
1	USB Cable	NO	NO	0.22m



# 3. AC POWER LINE CONDUCTED EMISSIONS

# 3.1 LIMIT

Frequency of Emission (MHz)	Limit (d	BμV)
Frequency of Emission (Minz)	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.

#### 3.2 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:

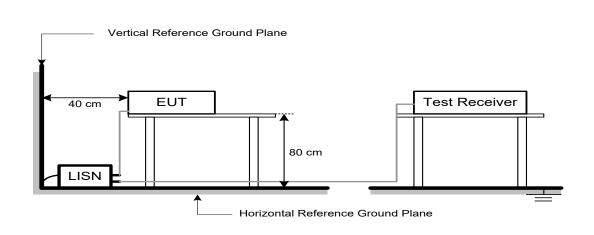
Receiver Parameters	Setting
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

# 3.3 DEVIATION FROM TEST STANDARD

No deviation.



# 3.4 TEST SETUP



# 3.5 EUT OPERATING 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.

# 3.6 TEST RESULTS

Please refer to the APPENDIX A.

Remark:

- (1) All readings are QP Mode value unless otherwise stated AVG in column of [Note]. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform. In this case, a "\*" marked in AVG Mode column of Interference Voltage Measured.
- (2) Measuring frequency range from 150 kHz to 30 MHz.



# 4. RADIATED EMISSIONS

### 4.1 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 EMISSION MEASUREMENT (9 kHz-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 RADIATED EMISSION MEASUREMENT (Above 1000 MHz)

	(dBuV/m at 3 m)	
Frequency (MHz)	Peak	Average
Above 1000	74	54

Note:

(1) The limit for radiated test was performed according to FCC CFR Title 47, Part 15, Subpart C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).



# 4.2 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 1 GHz)
- 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 1 GHz)
- 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.

 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
RBW / VBW	1 MHz / 3 MHz for PK value
(Emission in restricted band)	1 MHz / 1/T Hz for AVG value

Spectrum 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~26.5 GHz for PK/AVG detector

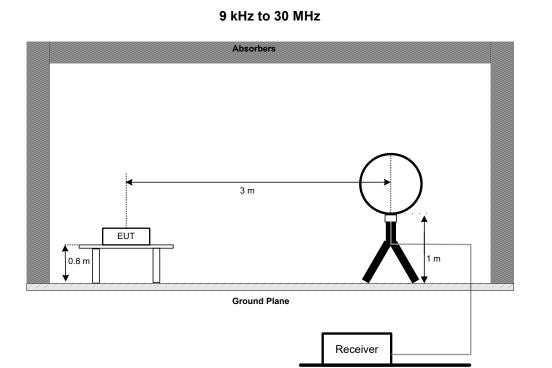
The following table is the setting of the receiver:



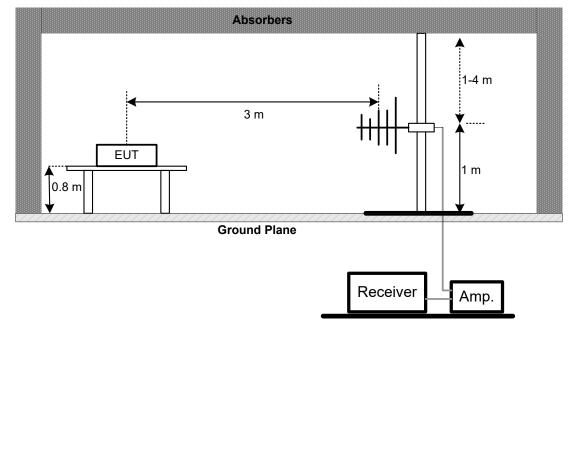
# 4.3 DEVIATION FROM TEST STANDARD

No deviation.

# 4.4 TEST SETUP

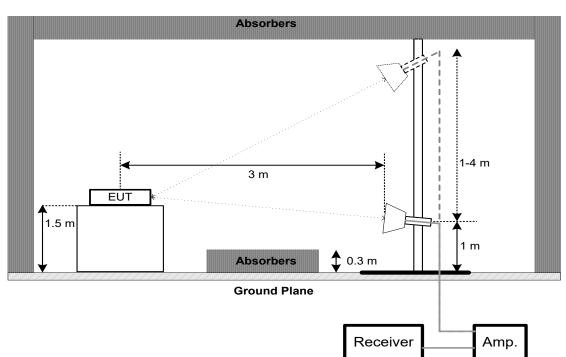


30 MHz to 1 GHz





#### Above 1 GHz



# 4.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

# 4.6 TEST RESULT - 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.

# 4.7 TEST RESULT - 30 MHz TO 1000 MHz

Please refer to the APPENDIX C.

# 4.8 TEST RESULT - 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.



# 5. BANDWIDTH

#### 5.1 LIMIT

Section	Test Item	Limit	
	6 dB Bandwidth	>= 500 kHz	
FCC 15.247(a)(2)	99% Emission Bandwidth	-	

### 5.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

For 6 dB Bandwidth:

Spectrum Parameters	Setting
Span Frequency	> Measurement Bandwidth
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### For 99% Emission Bandwidth:

Spectrum Parameters	Setting
Span Frequency	Between 1.5 times and 5.0 times the OBW
RBW	30 kHz
VBW	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

**5.3 DEVIATION FROM STANDARD** 

No deviation.

# 5.4 TEST SETUP



# 5.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 5.6 TEST RESULTS

Please refer to the APPENDIX E.



# 6. MAXIMUM OUTPUT POWER

#### 6.1 LIMIT

Section	Test Item	Limit
FCC 15.247(b)(3)	Maximum Output Power	1.0000 watt or 30.00 dBm

#### 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. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	≥ 3×RBW
RBW	3 MHz
VBW	3 MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

# 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 F.



# 7. CONDUCTED SPURIOUS EMISSION

# 7.1 LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak Output Power limits. If the transmitter complies with the Output Power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

# 7.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Start Frequency	30 MHz
Stop Frequency	26.5 GHz
RBW	100 kHz
VBW	300 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

# 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 G.



# 8. POWER SPECTRAL DENSITY

#### 8.1 LIMIT

Section	Test Item	Limit
FCC 15.247(e)	Power Spectral Density	8 dBm (in any 3 kHz)

#### 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.

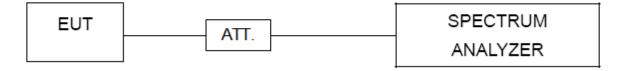
b. The following table is the setting of the spectrum analyzer:

Spectrum Parameters	Setting
Span Frequency	2 MHz (1 Mbps) / 4 MHz (2 Mbps)
RBW	3 kHz
VBW	10 kHz
Detector	Peak
Trace	Max Hold
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 H.



# 9. 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	ESCI	100382	Jan. 22, 2023					
2	LISN	EMCO	3816/2	52765	Jan. 23, 2023					
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Jan. 23, 2023					
4	50Ω Terminator	SHX	TF5-3	15041304	Jan. 22, 2023					
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A					
6	Cable	N/A	RG223	12m	Mar. 08, 2023					
7	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	MXE EMI Receiver	Keysight	N9038A	MY56400091	Jan. 22, 2023					
2*	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Aug. 23, 2024					
3	Cable	N/A	RG 213/U(9kHz~1GHz)	N/A	Jun. 17, 2023					
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. 17, 2023					

	Radiated Emissions - 30 MHz to 1 GHz									
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until					
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 03, 2023					
2	Amplifier	HP	8447D	2944A08742	Jan. 22, 2023					
3	Cable	emci	LMR-400	N/A	Nov. 30, 2022					
4	Controller	СТ	SC100	N/A	N/A					
5	Controller	MF	MF-7802	MF780208416	N/A					
6	Receiver	Agilent	N9038A	MY52130039	Jan. 22, 2023					
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A					
8	966 Chamber Room	RM	9*6*6	N/A	Jul. 24, 2023					

	Radiated Emissions - Above 1 GHz									
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until					
1	Double Ridged Horn Antenna	ARA	DRG-118A	16554	Apr. 18, 2023					
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	May 27, 2023					
3	Amplifier	Agilent	8449B	3008A02584	Jul. 03, 2023					
4	Controller	СТ	SC100	N/A	N/A					
5	Controller	MF	MF-7802	MF780208416	N/A					
6	Receiver	Agilent	N9038A	MY52130039	Jan. 22, 2023					
7	EXA Spectrum Analyzer	Keysight	N9010A	MY56480488	Jan. 22, 2023					
8*	Low Noise Amplifier	CONNPHY	CLN-18G40G-4330 -K	619413	Jul. 05, 2025					
9	Cable	Talent microwave	A81-SMAMSMAM- 12.5M	N/A	Oct. 15, 2022					
10	Cable	Talent microwave	A40-2.92M2.92M-2. 5M	N/A	Nov. 30, 2022					
11	Filter	STI	STI15-9912	N/A	Jul. 03, 2023					
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A					
13	966 Chamber Room	RM	9*6*6	N/A	Jul. 24, 2023					



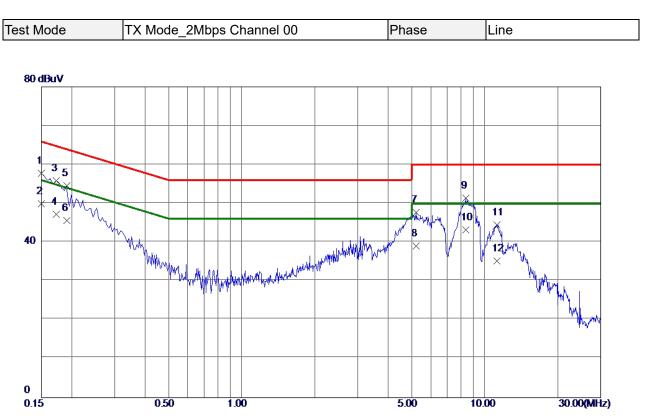
		Maxim Power	Bandwidth & um Output Power & Spectral Density & ed Spurious Emissio		
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 03, 2023
2	Attenuator	WOKEN	6SM3502	VAS1214NL	N/A
3	RF Cable	Tongkaichuan	N/A	N/A	N/A
4	DC Block	Mini	N/A	N/A	N/A

Remark: "N/A" denotes no model name, serial no. or calibration specified. "\*" calibration period of equipment list is three year. Except \* item, all calibration period of equipment list is one year.



# **APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS**

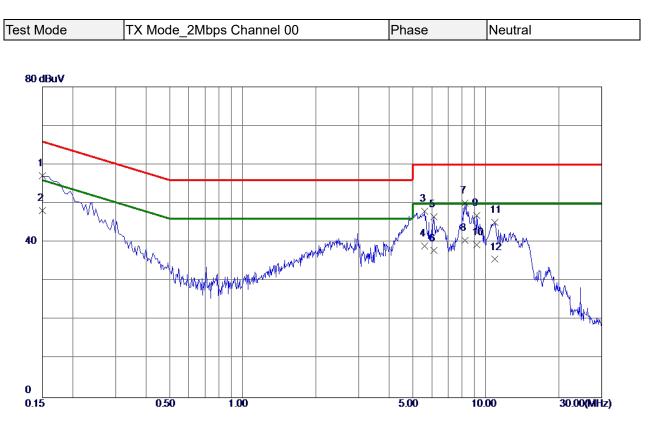




No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1500	48.08	9.65	57.73	66.00	-8.27	QP	
2 *	0.1500	40.21	9.65	49.86	<b>56.00</b>	-6.14	AVG	
3	0.1725	46.24	9.67	55.91	64.84	- <b>8. 9</b> 3	QP	
4	0.1725	37.60	9.67	47.27	54.84	-7.57	AVG	
5	0.1905	44.82	9.68	54. 50	<b>64.01</b>	- <b>9.</b> 51	QP	
6	0.1905	35.91	9.68	45.59	54. 01	-8.42	AVG	
7	5.2125	37. 53	10. 14	47.67	60.00	-12.33	QP	
8	5.2125	28.90	10.14	39.04	50.00	-10.96	AVG	
9	8.3580	41.01	10.38	51.39	60.00	-8.61	QP	
10	8.3580	32.80	10.38	43.18	50.00	-6.82	AVG	
11	11. 2065	33.97	10. 51	44. 48	60.00	-15.52	QP	
12	11.2065	24.70	10. 51	35.21	50.00	-14. 79	AVG	

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





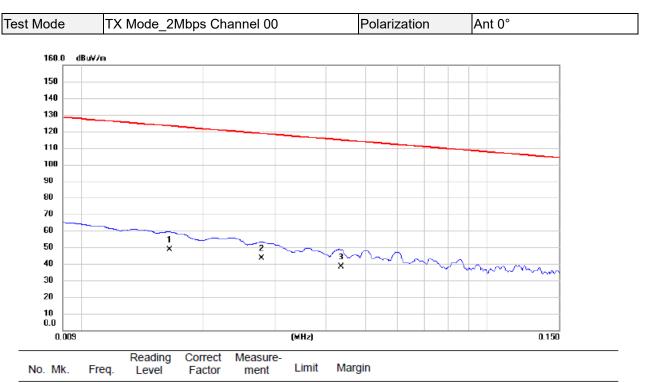
No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	0.1500	47.35	9.70	<b>57.05</b>	66.00	-8.95	QP	
2 *	0.1500	38.41	9.70	48.11	<b>56.00</b>	-7.89	AVG	
3	5.6040	37.77	10.20	47.97	60.00	-12.03	QP	
4	5.6040	28 <b>. 90</b>	10.20	39.10	50.00	-10. 90	AVG	
5	6. 1215	36.37	10.24	46.61	60.00	-13. 39	QP	
6	6. 1215	27.60	10.24	37.84	50.00	-12.16	AVG	
7	8.2094	39.72	10.38	50.10	60.00	-9.90	QP	
8	8. 2094	30.10	10.38	40.48	50.00	<b>-9.</b> 52	AVG	
9	9.2084	36.45	10.43	46.88	60.00	-13.12	QP	
10	9.2084	28.90	10. 43	39. 33	50.00	-10.67	AVG	
11	10. 9095	34.60	10. 50	45.10	60.00	-14. 90	QP	
12	10. 9095	25.10	10. 50	35.60	50.00	-14. 40	AVG	

- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.



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



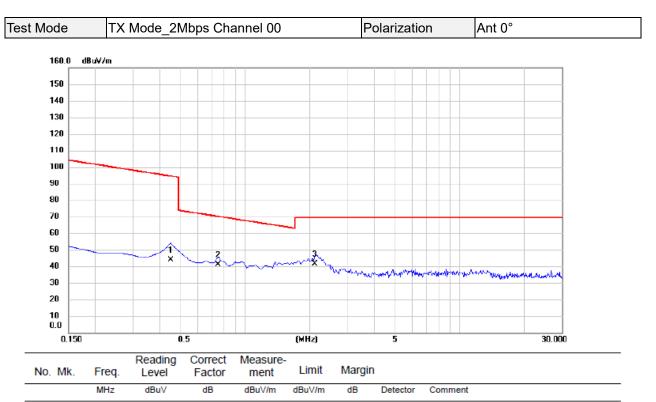


NO.	IVIK.	Freq.	Level	Factor	ment	LIIIII	maryin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0165	65.25	-16.78	48.47	123.26	-74.79	AVG	
2		0.0278	61.03	-17.79	43.24	118.72	-75.48	AVG	
3		0.0435	56.49	-18.15	38.34	114.84	-76.50	AVG	

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



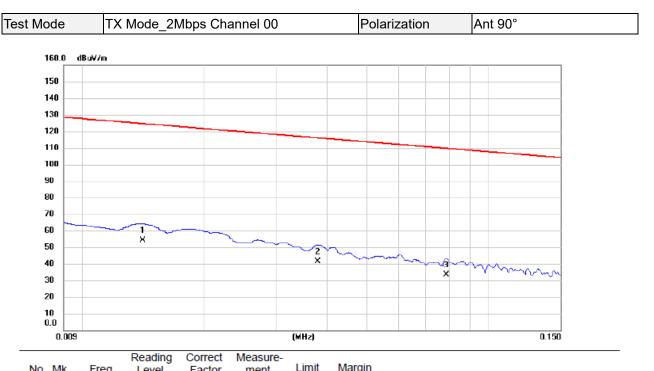




	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.4485	62.14	-18.44	43.70	94.57	-50.87	AVG	
2	0.7470	59.63	-18.74	40.89	70.14	-29.25	QP	
3 *	2.1201	61.39	-19.84	41.55	69.54	-27.99	QP	

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



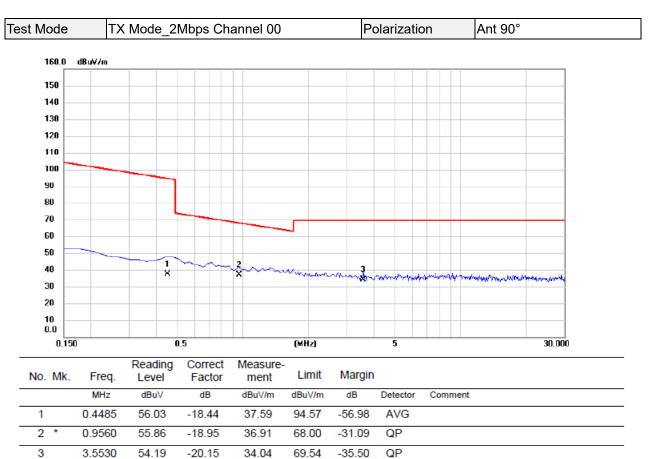


NO. MK.	Freq.	Level	Factor	ment	LIIIII	margin		
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	0.0141	70.25	-16.09	54.16	124.62	-70.46	AVG	
2	0.0380	59.31	-18.02	41.29	116.01	-74.72	AVG	
3	0.0785	51.74	-18.26	33.48	109.71	-76.23	AVG	

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





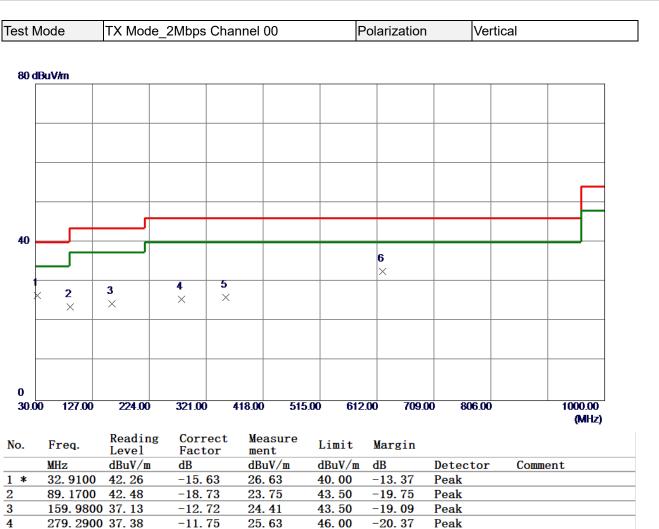


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



# APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ





46.00

46.00

-19.95

-13.39

Peak

Peak

**REMARKS**:

5

6

353.9800 36.17

621.7000 37.06

(1) Measurement Value = Reading Level + Correct Factor.

-10.12

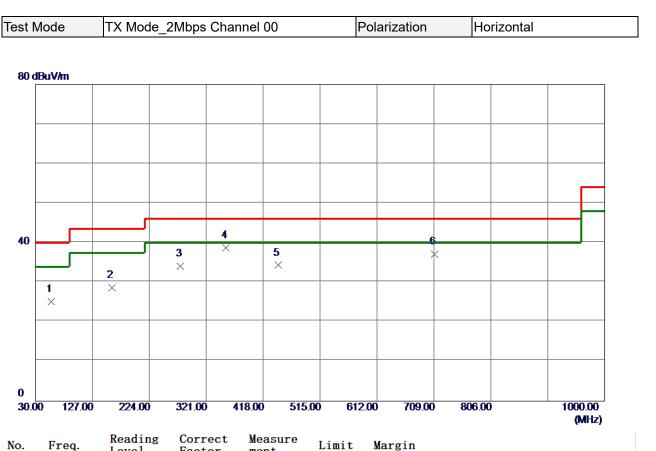
-4.45

26.05

32.61

(2) Margin Level = Measurement Value - Limit Value.





No.	Freq.	Level	Factor	ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	57.1600	39.70	-14. 54	25.16	40.00	-14.84	Peak	
2	159. 9800	41.33	-12.72	28.61	<b>43. 50</b>	-14.89	Peak	
3	277. 3500	45.97	-11.87	34.10	46.00	-11. 90	Peak	
4 *	354. 9500	48.75	-10. 09	38. <b>66</b>	46.00	-7.34	Peak	
5	444. 1900	41.99	-7.67	34. 32	46.00	-11.68	Peak	
6	709. 9699	39.83	-2.72	37.11	46.00	-8.89	Peak	

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



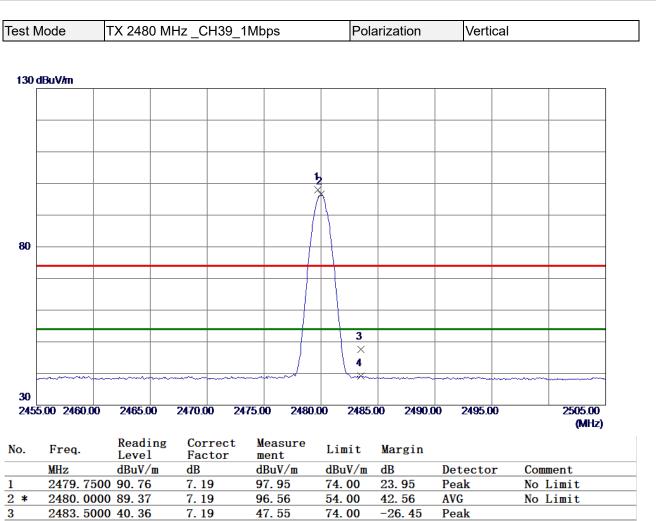
## **APPENDIX D - RADIATED EMISSION - ABOVE 1000 MHZ**



				Ва	andedge			
Test N	/lode	TX 2402 M	Hz_CH00			arization	Vertical	
130	dBuV/m							
[								
					<u> </u>			
					(   \			
80								
			1 ×					
			2					
30						~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		
	7.00 2382.0	0 2387.00	2392.00	2397.00 2402	2.00 2407	.00 2412	00 2417.00	2427.00
		Reading	Correc	t Measure				(MHz)
No.	Freq.	Level	Factor	ment	Limit	Margin		
1	MHz	dBuV/m 000 41.36	dB 7.17	dBuV/m	dBuV/m 74.00	dB -25. 47	Detector Peak	Comment
1 2		000 41. 36	7.17	48. 53 38. 66	<u>74.00</u> 54.00	-25. 47	AVG	
3 *		000 88.15	7.17	95. 32	54.00	41. 32	AVG	No Limit
4		500 89. 52	7.17	96.69	74.00	22.69	Peak	No Limit

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





74.00

54.00

-14.84

Peak

AVG

**REMARKS**:

3

4

2483. 5000 40. 36

2483. 5000 31. 97

(1) Measurement Value = Reading Level + Correct Factor.

7.19

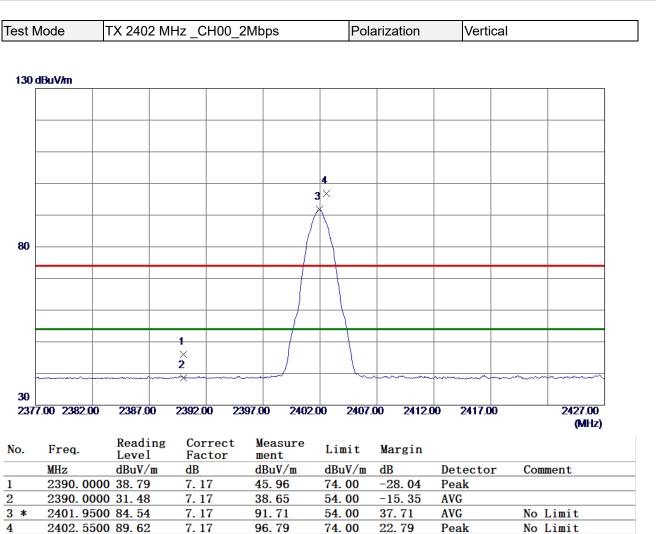
7.19

47.55

39.16

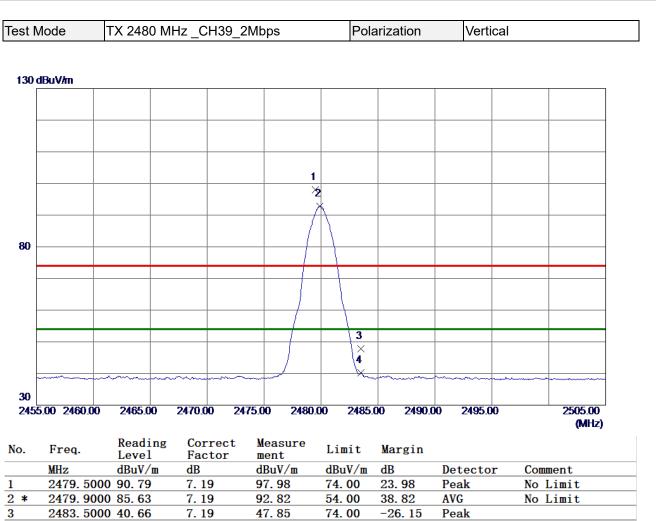
(2) Margin Level = Measurement Value - Limit Value.





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





54.00

-13.86

AVG

**REMARKS**:

4

2483. 5000 32. 95

(1) Measurement Value = Reading Level + Correct Factor.

7.19

40.14

(2) Margin Level = Measurement Value - Limit Value.



	est Mode	TX 2402 N	/Hz_CH00_		armonic Pola	arization	Vertical	
2         2					1			
×       ×       ×       ×       ×       ×         1       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         0       ×       ×       ×       ×       ×       ×       ×       ×       ×       ×         000.00       3550.00       6100.00       8650.00       11200.00       13750.00       16300.00       18850.00       21400.00       26500.00         (MHz)       Kevel       Freq.       Reading Factor       Correct 	80 dBuV/m							
×       ×       ×       ×       ×       ×         1       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         0       ×       ×       ×       ×       ×       ×       ×       ×       ×       ×         000.00       3550.00       6100.00       8650.00       11200.00       13750.00       16300.00       18850.00       21400.00       26500.00         (MHz)       Kevel       Freq.       Reading Factor       Correct 								
×       ×       ×       ×       ×       ×         1       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         0       ×       ×       ×       ×       ×       ×       ×       ×       ×       ×         000.00       3550.00       6100.00       8650.00       11200.00       13750.00       16300.00       18850.00       21400.00       26500.00         (MHz)       Kevel       Freq.       Reading Factor       Correct 								
×       ×       ×       ×       ×       ×         1       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         ×       ×       ×       ×       ×       ×       ×       ×       ×         0       ×       ×       ×       ×       ×       ×       ×       ×       ×       ×         000.00       3550.00       6100.00       8650.00       11200.00       13750.00       16300.00       18850.00       21400.00       26500.00         (MHz)       Kevel       Freq.       Reading Factor       Correct 								
×       ×								
1        1 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
×       ×								
0         0	10							
D00.00         3550.00         6100.00         8650.00         11200.00         13750.00         16300.00         18850.00         21400.00         26500.00         (MHz)           Freq.         Reading         Correct         Measure         Limit         Margin           MHz         dBuV/m         dB         dBuV/m         dBuV/m         dB         Detector         Comment           4805.5099         28.48         4.17         32.65         54.00         -21.35         AVG	J							
D00.00         3550.00         6100.00         8650.00         11200.00         13750.00         16300.00         18850.00         21400.00         26500.00         (MHz)           Freq.         Reading         Correct         Measure         Limit         Margin           MHz         dBuV/m         dB         dBuV/m         dBuV/m         dB         Detector         Comment           4805.5099         28.48         4.17         32.65         54.00         -21.35         AVG								
D00.00         3550.00         6100.00         8650.00         11200.00         13750.00         16300.00         18850.00         21400.00         26500.00         (MHz)           Freq.         Reading         Correct         Measure         Limit         Margin           MHz         dBuV/m         dB         dBuV/m         dBuV/m         dB         Detector         Comment           4805.5099         28.48         4.17         32.65         54.00         -21.35         AVG								
D00.00         3550.00         6100.00         8650.00         11200.00         13750.00         16300.00         18850.00         21400.00         26500.00         (MHz)           Freq.         Reading         Correct         Measure         Limit         Margin           MHz         dBuV/m         dB         dBuV/m         dBuV/m         dB         Detector         Comment           4805.5099         28.48         4.17         32.65         54.00         -21.35         AVG								
D00.00         3550.00         6100.00         8650.00         11200.00         13750.00         16300.00         18850.00         21400.00         26500.00         (MHz)           Freq.         Reading         Correct         Measure         Limit         Margin           MHz         dBuV/m         dB         dBuV/m         dBuV/m         dB         Detector         Comment           4805.5099         28.48         4.17         32.65         54.00         -21.35         AVG								
D00.00         3550.00         6100.00         8650.00         11200.00         13750.00         16300.00         18850.00         21400.00         26500.00         (MHz)           Freq.         Reading         Correct         Measure         Limit         Margin           MHz         dBuV/m         dB         dBuV/m         dBuV/m         dB         Detector         Comment           4805.5099         28.48         4.17         32.65         54.00         -21.35         AVG					_			
Freq.       Reading Level       Correct Factor       Measure ment       Limit       Margin         MHz       dBuV/m       dB       dBuV/m       dBuV/m       dB       Detector       Comment         4805.5099       28.48       4.17       32.65       54.00       -21.35       AVG	0							
Freq.Reading LevelCorrect FactorMeasure mentLimitMarginMHzdBuV/mdBdBuV/mdBuV/mdBDetectorComment4805.509928.484.1732.6554.00-21.35AVG	00.00 35	50.00 6100.00	8650.00 1	1200.00 1375	0.00 1630	0.00 18850	0.00 21400.00	
MHz         dBuV/m         dB         dBuV/m         dBuV/m         dB         Detector         Comment           4805.5099         28.48         4.17         32.65         54.00         -21.35         AVG	Enco	Reading	Correct	Measure	Limit	Venzin		(min tz.)
4805. 5099 28. 48 4. 17 32. 65 54. 00 -21. 35 AVG		Level					Detector	Comment
4806. 0800 40. 06 4. 17 44. 23 74. 00 -29. 77 Peak	4805	. 5099 28. 48	4.17	32.65	54.00	-21.35	AVG	Commerre
	4806	. 0800 40. 06	4. 17	44.23	74.00	-29.77	Peak	
	1000							
	1000							
	1000							
	1000							
	4000							
	4000							



st N	Node	TX 2440 M	Hz _CH19_ <sup>^</sup>	1Mbps	Pola	arization	Vertical	
30 d	lBuV/m							
		4						
		1 ×						
		2						
30		×						
-20 100	0.00 3550.00	0 6100.00	8650.00 11	200.00 13750	0.00 16300	0.00 18850	.00 21400.00	26500.00
								(MHz)
<b>)</b> .	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
*		00 39.31 50 28.33	4. 17 4. 18	43. 48 32. 51	74.00 54.00	-30. 52 -21. 49	Peak AVG	
<b>T</b>	4000.39	<u>50 26.55</u>	4. 10	32. 51	54.00	-21.49	AVG	



Test Moo 80 dBu		TX 248	0 MHz _C	H39 1M	ops	Pola	arization	Vert	ical	
80 dBu'			<u></u>							
	ıV/m	]								
		1 ×								
		2 ×								
30										
-20										
1000.00	0 3550.00	6100.0	0 8650.0	0 11200	00 13750	.00 16300	0.00 18850	.00 21400	.00	26500.00 (MHz)
No. H	Freq.	Readi Level	ing Cor Fac		leasure lent	Limit	Margin			
	MHz	dBuV/	′m dB	d	BuV/m	dBuV/m	dB	Detecto	r Con	ment
	4957. 535 4961. 259				3. 56 3. 16	74.00 54.00	-30. 44 -20. 84	Peak AVG		

- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.



		-								
Test	Mode	TX 2402	2 MHz _	CH00_2	Mbps	Pola	arization	Verti	cal	
80 (	dBuV/m									
		2								
		×								
		1								
30		×		_						
- <b>2</b> 0										
100	0.00 3550.0	0 6100.0	0 8650	.00 112	00.00 1375	0.00 1630	0.00 18850	0.00 21400	00	26500.00 (MHz)
lo.	Freq.	Readi Level	Fa	rrect ctor	Measure ment	Limit	Margin			
4	MHz	dBuV/			dBuV/m 32.59	dBuV/m 54.00	dB -21. 41	Detector AVG	r Co	mment
*		00 28.42 00 39.48			43.65	74.00	-30. 35	Peak		

- Measurement Value = Reading Level + Correct Factor.
   Margin Level = Measurement Value Limit Value.



Test N	/lode	TX 2440	MHz C	H19 2	Mbps		P	olariz	ation		Vert	ical			
	iodo	1772110		<u></u>	mope						1.010	lioui			
h 00	Dublin														
80 0	BuV/m														
ŀ															-
															_
															_
-		2													-
		×													
		1													
30		×													_
-					_										-
-															_
-															
-20															
1000	0.00 3550.00	0 6100.00	8650.0	0 112	00.00	13750.	00 163	800.00	18850	0.00	21400	0.00		26500.0 (MH)	
NT	<b>F</b>	Readin	ig Cor	rect	Measu	ure	1	м							-
No.	Freq.	Level	Fac	tor	ment		Limit		rgin	D			0		
1 *	MHz 4878 89	dBuV/m 00 28.45	dB 4.3	9	dBuV/ 32.84		dBuV/1 54.00		1. 16	De AV	tecto G	or	Сош	nent	
2		00 39.37	4.4		43. 77		74.00		0. 23	Pe					



est l	Mode	TX 2480	MHz_CH	139_2Mbp	S	Pola	arization		Verti	cal		
80 (	dBuV/m											
		1 ×										
		2						_				
~~		×										
30												
-20	0.00 2550.00	C100.00	0050.00	44000.0	0 43750.0	0 40300	00 400	0.00	04.400	00		~~~~~
100	0.00 3550.00	) 6100.00	8650.00	) 11200.0	0 13750.0	0 16300	00 188	0.00	21400	00		00.00 MHz)
о.	Freq.	Readin	g Corr	ect Me	asure	Limit	Margin					
	MHz	Level dBuV/m	Fact dB		IIL	dBuV/m	dB	De	tecto	r	Comment	
		50 39.38	4.63			74.00	-29.99		ak		Comment	
*	4961.21	00 00 57	4.63	22	. 20	54.00	-20.80	AV	C.			

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

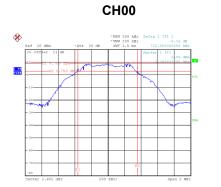


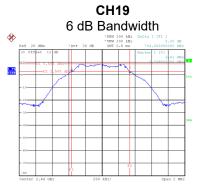
# **APPENDIX E - BANDWIDTH**



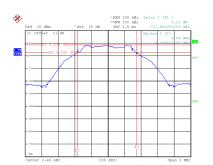


Т	est Mode	TX Mode _1	Mbps			
	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
ĺ	00	2402	0.722	1.040	0.5	Pass
ĺ	19	2440	0.704	1.040	0.5	Pass
	39	2480	0.718	1.044	0.5	Pass

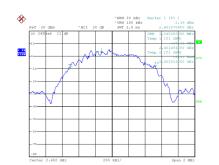




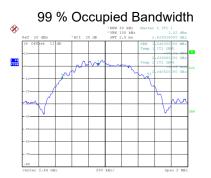
CH39



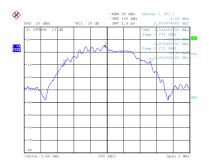
Date: 15.AUG.2022 22:36:41



Date: 15.AUG.2022 22:39:56



Date: 15.AUG.2022 22:42:33



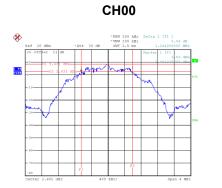
Date: 15.AUG.2022 22:36:14

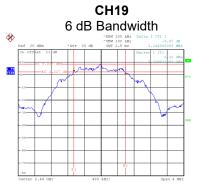
### Date: 15.AUG.2022 22:40:02

Date: 15.AUG.2022 22:42:39

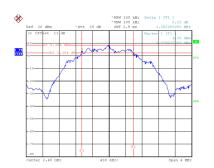


T	est Mode	TX Mode _2	Mbps			
	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
	00	2402	1.244	2.072	0.5	Pass
	19	2440	1.246	2.072	0.5	Pass
	39	2480	1.252	2.064	0.5	Pass

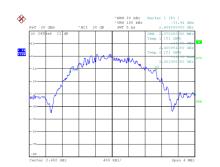




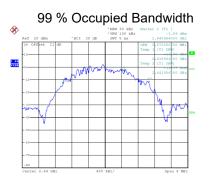
CH39



Date: 15.AUG.2022 22:44:17



Date: 15.AUG.2022 22:45:54



Date: 15.AUG.2022 22:47:27



Date: 15.AUG.2022 22:43:48

### Date: 15.AUG.2022 22:46:00

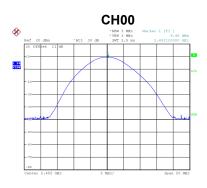
Date: 15.AUG.2022 22:47:34



# **APPENDIX F - MAXIMUM OUTPUT POWER**



Te	est Mode	TX Mode _1Mbps	S			
	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
	2402	9.45	0.0088	30.00	1.0000	Pass
	2440	9.27	0.0085	30.00	1.0000	Pass
	2480	9.32	0.0086	30.00	1.0000	Pass







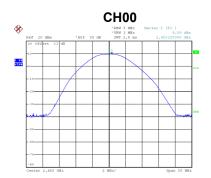
Date: 15.AUG.2022 22:37:29



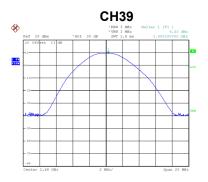
### Test Mode TX

TX Mode \_2Mbps

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	9.59	0.0091	30.00	1.0000	Pass
2440	9.38	0.0087	30.00	1.0000	Pass
2480	9.43	0.0088	30.00	1.0000	Pass







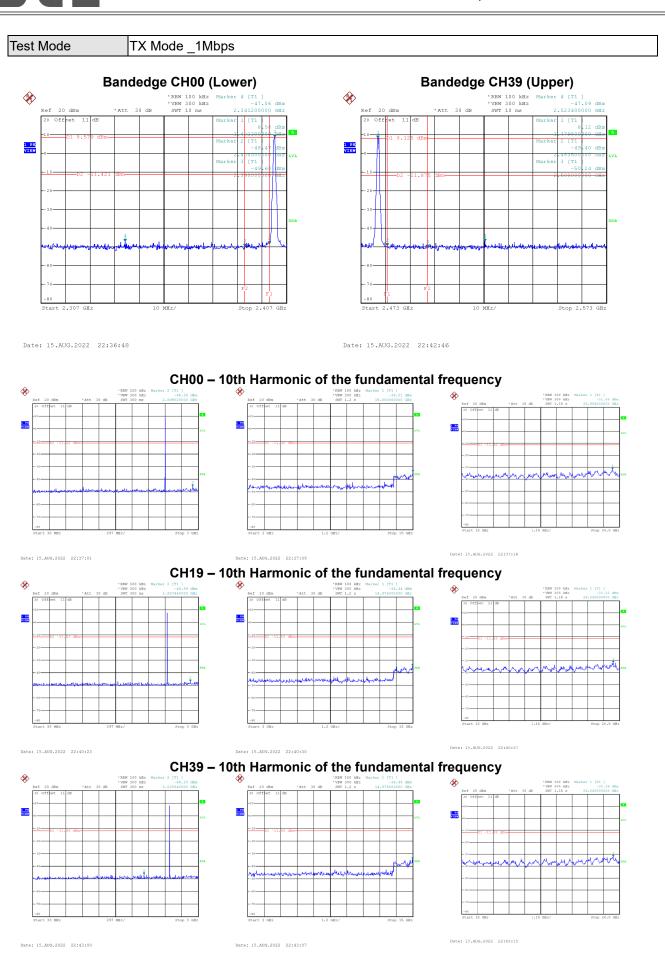
Date: 15.AUG.2022 22:45:05

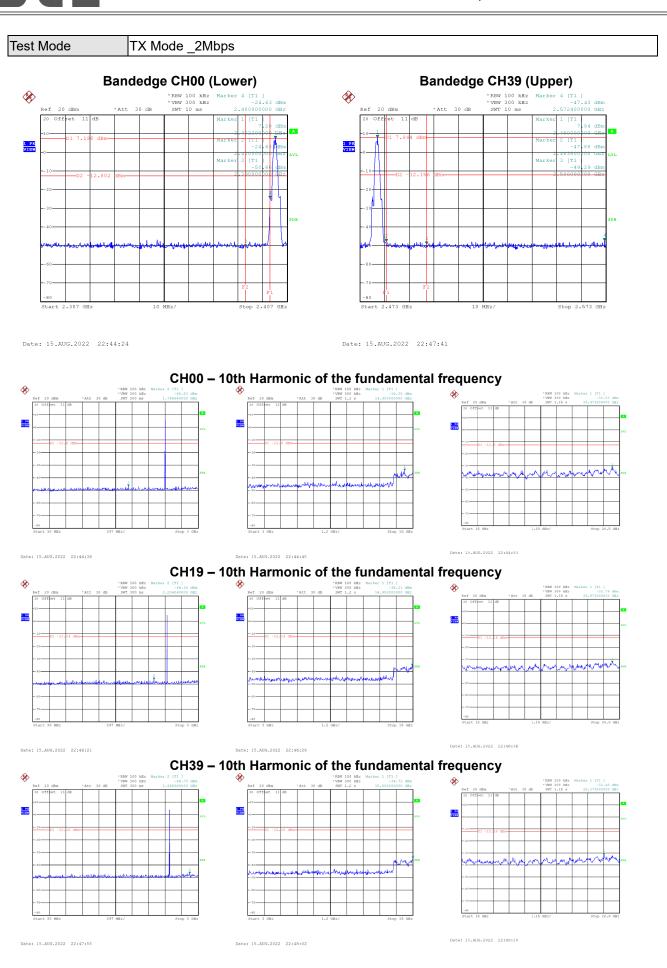
Date: 15.AUG.2022 22:46:49

Date: 15.AUG.2022 22:48:22



# **APPENDIX G - CONDUCTED SPURIOUS EMISSION**



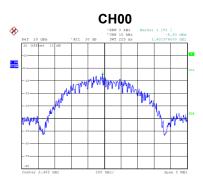




# **APPENDIX H - POWER SPECTRAL DENSITY**



#### Test Mode TX Mode \_1Mbps Frequency Power Spectral Density Max. Limit Channel Test Result (MHz) (dBm/3 kHz) (dBm/3 kHz) -5.93 00 2402 8.00 Pass 19 2440 -6.06 8.00 Pass 39 2480 -6.24 8.00 Pass





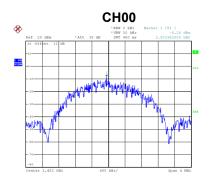


Date: 15.AUG.2022 22:37:22

Test Mode

TX Mode \_2Mbps

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-8.26	8.00	Pass
19	2440	-8.40	8.00	Pass
39	2480	-8.49	8.00	Pass







Date: 15.AUG.2022 22:44:59

Date: 15.AUG.2022 22:46:43

Date: 15.AUG.2022 22:48:16

### End of Test Report