



# **FCC Radio Test Report**

FCC ID: RWO-RZ010399

This report concerns: Original Grant

Project No. : 2103C138

Equipment : Wireless Mouse

**Brand Name** : RAZER **Test Model** : RZ01-0399

Series Model : RZ01-0399XXXX-XXXX (X can be 0-9 or A-Z)

**Applicant**: Razer Inc.

Address : 9 Pasteur, Suite 100, Irvine, CA92618, USA

Manufacturer : Razer (Asia-Pacific) Pte.,Ltd.

**Address** : 514 Chai Chee Lane, #07-01-06, Singapore 469029

Factory : RAZER TECHNOLOGY AND DEVELOPMENT (SHENZHEN) CO.,

LTD

Address : East Wing, 3rd Floor, Block 2, Phase 1 of Vision Shenzhen Business

Park Keji South Road, Hi-Tech Industrial Park, Shenzhen 518057,

China

Date of Receipt : Mar. 16, 2021

**Date of Test** : Mar. 17, 2021 ~ Mar. 31, 2021

**Issued Date** : Apr. 30, 2021

Report Version : R00

Test Sample : Sample No.: DG20210316191 for conducted, DG2021031749 for

radiated

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

ANSI C63.10-2013

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

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

Prepared by: Vincent Tan

Approved by: Ethan Ma

IAC MRA
ACCREDIT

Certificate #5123.02

Add: No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

Tel: +86-769-8318-3000 Web: www.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, A2LA, 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** 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	5
1 . SUMMARY OF TEST RESULTS	6
1.1 TEST FACILITY	7
1.2 MEASUREMENT UNCERTAINTY	7
1.3 TEST ENVIRONMENT CONDITIONS	7
2 . GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF EUT	8
2.2 DESCRIPTION OF TEST MODES	9
2.3 PARAMETERS OF TEST SOFTWARE	9
2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.5 SUPPORT UNITS	10
3 . RADIATED EMISSIONS	11
3.1 LIMIT	11
3.2 TEST PROCEDURE	12
3.3 DEVIATION FROM TEST STANDARD	13
3.4 TEST SETUP	13
3.5 EUT OPERATING CONDITIONS	14
3.6 TEST RESULT - 9 KHZ TO 30 MHZ	14
3.7 TEST RESULT - 30 MHZ TO 1000 MHZ	14
3.8 TEST RESULT - ABOVE 1000 MHZ	14
4 . BANDWIDTH	15
4.1 LIMIT	15
4.2 TEST PROCEDURE	15
4.3 DEVIATION FROM STANDARD	15
4.4 TEST SETUP	15
4.5 EUT OPERATION CONDITIONS	15
4.6 TEST RESULTS	15
5 . MAXIMUM OUTPUT POWER	16
5.1 LIMIT	16
5.2 TEST PROCEDURE	16
5.3 DEVIATION FROM STANDARD	16
5.4 TEST SETUP	16



Table of Contents	Page
5.5 EUT OPERATION CONDITIONS	16
5.6 TEST RESULTS	16
6 . CONDUCTED SPURIOUS EMISSION	17
6.1 LIMIT	17
6.2 TEST PROCEDURE	17
6.3 DEVIATION FROM STANDARD	17
6.4 TEST SETUP	17
6.5 EUT OPERATION CONDITIONS	17
6.6 TEST RESULTS	17
7 . POWER SPECTRAL DENSITY	18
7.1 LIMIT	18
7.2 TEST PROCEDURE	18
7.3 DEVIATION FROM STANDARD	18
7.4 TEST SETUP	18
7.5 EUT OPERATION CONDITIONS	18
7.6 TEST RESULTS	18
8 . MEASUREMENT INSTRUMENTS LIST	19
APPENDIX A - RADIATED EMISSION - 9 KHZ TO 30 MHZ	20
APPENDIX B - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	25
APPENDIX C - RADIATED EMISSION - ABOVE 1000 MHZ	28
APPENDIX D - BANDWIDTH	53
APPENDIX E - MAXIMUM OUTPUT POWER	56
APPENDIX F - CONDUCTED SPURIOUS EMISSION	58
APPENDIX G - POWER SPECTRAL DENSITY	61



# **REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Apr. 30, 2021



# 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	Remark
15.207	AC Power Line Conducted Emissions		N/A	
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	APPENDIX A APPENDIX B APPENDIX C	PASS	
15.247(a)(2)	Bandwidth	APPENDIX D	PASS	
15.247(b)(3)	Maximum Output Power APPENDIX E		PASS	
15.247(d)	Conducted Spurious Emission	APPENDIX F	PASS	
15.247(e)	Power Spectral Density	APPENDIX G	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 Road, Shixia, Dalang Town, Dongguan, Guangdong, China

BTL's Test Firm 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. Radiated emissions Measurement:

Test Site	Method	Measurement Frequency Range	Ant. H / V	U, (dB)
		9kHz ~ 30MHz	ı	3.02
		30MHz ~ 200MHz	V	4.26
	DG-CB03 CISPR	30MHz ~ 200MHz	Η	3.38
		200MHz ~ 1,000MHz	V	3.98
DG-CB03		200MHz ~ 1,000MHz	Τ	3.94
		1GHz ~ 6GHz	ı	3.96
		6GHz ~ 18GHz	ı	5.24
		18GHz ~ 26.5GHz	ı	3.62
		26.5GHz ~ 40GHz	-	4.00

#### B. 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
Radiated Emissions-9 kHz to 30 MHz	25°C	60%	DC 1.5V	Hayden Chen
Radiated Emissions-30 MHz to 1000 MHz	26°C	52%	DC 1.5V	Hayden Chen
Radiated Emissions-Above 1000 MHz	26°C	52%	DC 1.5V	Hayden Chen
Bandwidth	24°C	52%	DC 1.5V	Jesse Wang
Maximum Output Power	24°C	52%	DC 1.5V	Hand Huang
Conducted Spurious Emission	24°C	52%	DC 1.5V	Jesse Wang
Power Spectral Density	24°C	52%	DC 1.5V	Jesse Wang



## 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Mouse
Brand Name	RAZER
Test Model	RZ01-0399
Series Model	RZ01-0399XXXX-XXXX (X can be 0-9 or A-Z)
Model Difference(s)	The system's model name is RZ01-0399XXXX-XXXX (X: Can be 0-9, A-Z), and the system contains a Wireless Mouse (Model name: RZ01-0399) and USB Dongle (Model name: DGRFG7).
Power Source	Supplied from battery.
Power Rating	1.5V === 25mA
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	1Mbps, 2Mbps
Max. Output Power	1Mbps: 4.89 dBm (0.0031 W) 2Mbps: 4.90 dBm (0.0031 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	P/N	Antenna Type	Connector	Gain (dBi)
1	YAGEO	ANT5320LL24R2400A	Chip	N/A	2.78

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		
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.

## 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		N/A	
Frequency (MHz)	2402	2440	2480
1Mbps	N/A	N/A	N/A
2Mbps	N/A	N/A	N/A





## 3. RADIATED EMISSIONS

#### **3.1 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)

Fraguency (MHz)	(dBuV/n	n 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).



#### 3.2 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.

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
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

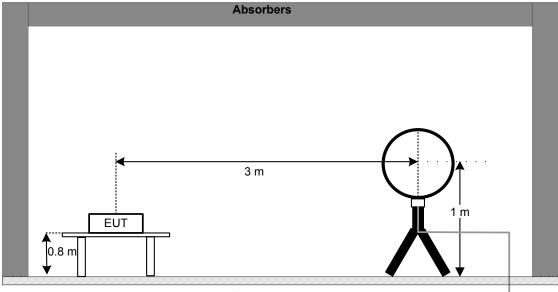


# 3.3 DEVIATION FROM TEST STANDARD

No deviation.

# 3.4 TEST SETUP

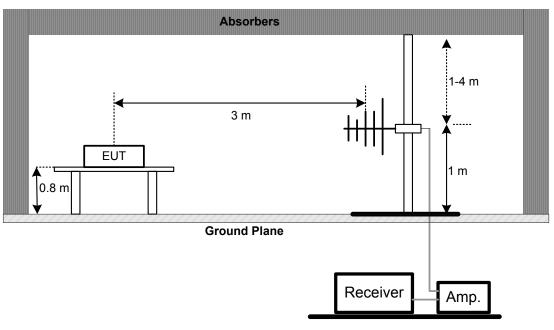
## 9 kHz to 30 MHz



**Ground Plane** 



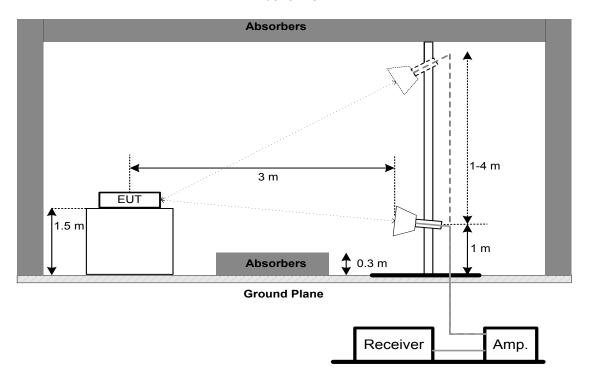
30 MHz to 1 GHz



Page 13 of 62



#### **Above 1 GHz**



# 3.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

## 3.6 TEST RESULT - 9 kHz TO 30 MHz

Please refer to the APPENDIX A.

#### Remark:

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

## 3.7 TEST RESULT - 30 MHz TO 1000 MHz

Please refer to the APPENDIX B.

## 3.8 TEST RESULT - ABOVE 1000 MHz

Please refer to the APPENDIX C.

# Remark:

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



## 4. BANDWIDTH

## **4.1 LIMIT**

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

## **4.2 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

## 4.3 DEVIATION FROM STANDARD

No deviation.

## 4.4 TEST SETUP



## **4.5 EUT OPERATION CONDITIONS**

The EUT was programmed to be in continuously transmitting mode.

## **4.6 TEST RESULTS**

Please refer to the APPENDIX D.



## **5. MAXIMUM OUTPUT POWER**

# 5.1 LIMIT

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

#### **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 Peak Power:

Spectrum Parameters	Setting
Span Frequency	≥ 3×RBW
RBW	3 MHz
VBW	3 MHz
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. CONDUCTED SPURIOUS EMISSION

#### 6.1 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.

#### **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
Start Frequency	30 MHz
Stop Frequency	26.5 GHz
RBW	100 kHz
VBW	100 kHz
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. POWER SPECTRAL DENSITY

#### **7.1 LIMIT**

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

# 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
Span Frequency	2 MHz (1 Mbps) / 4 MHz (2 Mbps)
RBW	3 kHz
VBW	10 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. MEASUREMENT INSTRUMENTS LIST**

	Radiated Emissions - 9 kHz to 30 MHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Antenna	Antenna EM EM-6876-1		230	Apr. 16, 2021			
2	Cable	N/A	RG 213/U	N/A	May 29, 2021			
3	EMI Test Receiver	R&S	ESCI	100895	Feb. 27, 2022			
4	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A			
5	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021			

	Radiated Emissions - 30 MHz to 1 GHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Antenna	Schwarzbeck	VULB9160	9160-3231	Apr. 17, 2021			
2	Amplifier	HP	8447D	8447D 2944A09673				
3	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021			
4	Cable emci		LMR-400(30MHz-1 GHz)(8m+5m)	N/A	May 22, 2021			
5	Controller	CT	SC100	N/A	N/A			
6	Controller	MF	MF-7802	MF780208416	N/A			
7	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A			
8	966 Chambe Room	RM	9*6*6m	N/A	Jul. 25, 2021			

	Radiated Emissions - Above 1 GHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Double Ridged Guide Antenna	ETS	3115	75789	May 12, 2021			
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jul. 07, 2021			
3	Amplifier	Agilent	8449B	3008A02333	Feb. 28, 2022			
4	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Feb. 28, 2022			
5	Receiver	Agilent	N9038A	MY52130039	Jul. 25, 2021			
6	Controller	CT	SC100	N/A	N/A			
7	Controller	MF	MF-7802	MF780208416	N/A			
8	Cable	N/A	EMC104-SM-SM-6 000	N/A	May 09, 2021			
9	9 Measurement Farad		EZ-EMC Ver.NB-03A1-01	N/A	N/A			
10	Filter	STI	STI15-9912	N/A	Jul. 25, 2021			
11 966 Chambe Room RM		9*6*6m	N/A	Jul. 25, 2021				

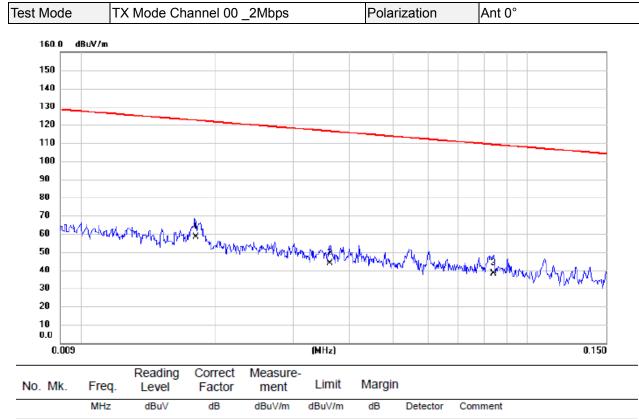
Bandwidth &  Maximum Output Power &  Power Spectral Density &  Conducted Spurious Emission							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 25, 2021		
2	Attenuator	WOKEN	6SM3502	VAS1214NL	Feb. 10, 2022		
3	DC Block	Mini	N/A	N/A	N/A		
4	RF Cable	Tongkaichuan	N/A	N/A	N/A		

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



APPENDIX A - RADIATED EMISSION - 9 KHZ TO 30 MHZ	





No.	Mk.	Freq.	Level	Factor	ment	Limit	Margin			
		MHz	dBu∀	dB	dBuV/m	dBuV/m	dB	Detector	Comment	
1	*	0.0181	44.45	13.81	58.26	122.45	-64.19	AVG		
2		0.0361	30.82	12.79	43.61	116.45	-72.84	AVG		
3		0.0840	25.57	12.62	38.19	109.12	-70.93	AVG		

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





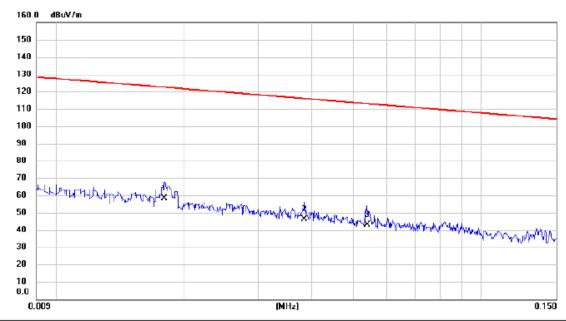


No. Mk.	Freq.	_	Correct Factor	Measure- ment	Limit	Margin		
	MHz	dBu∀	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.7670	29.95	11.89	41.84	69.91	-28.07	QP	
2 *	2.2486	38.17	11.18	49.35	69.54	-20.19	QP	
3	6.3520	30.03	11.20	41.23	69.54	-28.31	QP	

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





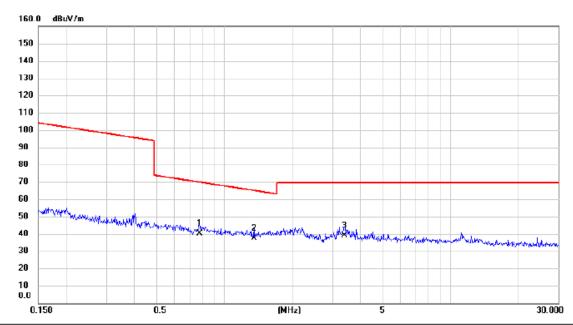


No. MI	k. F		Reading Level	Correct Factor	Measure- ment	Limit	Margin		
	N	ИHz	dBu∨	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	0.0	180	44.18	13.84	58.02	122.50	-64.48	AVG	
2	0.0	384	33.39	12.73	46.12	115.92	-69.80	AVG	
3	0.0	540	30.72	12.44	43.16	112.96	-69.80	AVG	

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







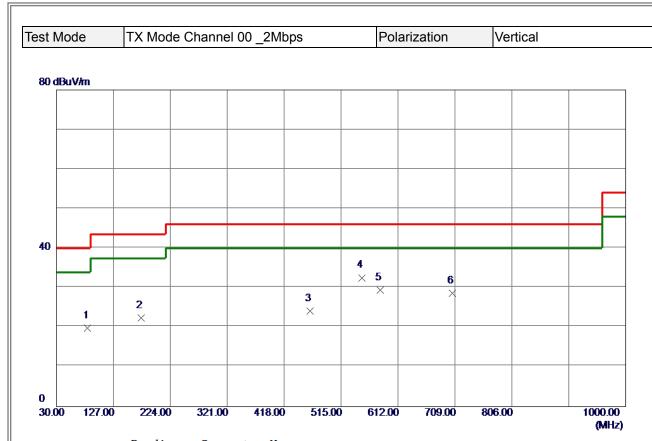
No. Mk.	Freq.	Reading Level		Measure- ment	Limit	Margin		
	MHz	dBu∀	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	0.7752	28.23	11.89	40.12	69.82	-29.70	QP	
2 *	1.3521	25.92	11.63	37.55	64.98	-27.43	QP	
3	3.3994	28.13	10.87	39.00	69.54	-30.54	QP	

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



APPENDIX B - RADIATED EMISSION - 30 MHZ TO 1000 MHZ



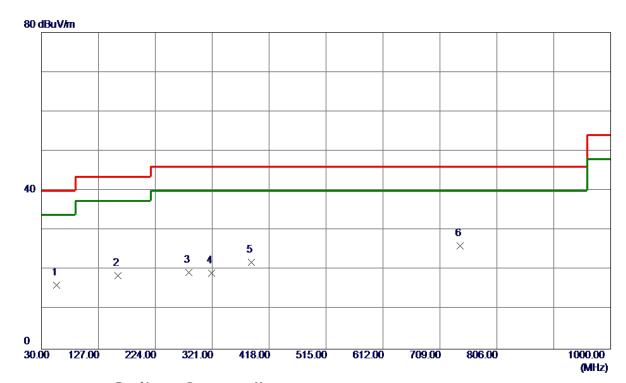


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	83. 3500	36. 85	-17. 07	19. 78	40.00	<b>-20.</b> 22	Peak	
2	174. 5300	34. 80	-12. 40	22. 40	43. 50	-21. 10	Peak	
3	462. 6200	31. 74	-7. 54	24. 20	46.00	-21.80	Peak	
4 *	550. 8900	39. 34	-6. 78	32. 56	46.00	-13. 44	Peak	
5	581. 9300	35. 36	-5. 88	29. 48	46.00	-16. 52	Peak	
6	705. 1200	32. 13	-3. 54	28. 59	46.00	-17. 41	Peak	

- (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/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	56. 1900	29. 95	-13. 81	16. 14	40.00	-23.86	Peak	
2	159. 9800	29. 24	-10. 67	18. 57	43. 50	-24. 93	Peak	
3	281. 2300	31. 44	-12. 08	19. 36	46.00	-26. 64	Peak	
4	320. 0300	29.82	-10. 68	19. 14	46.00	-26. 86	Peak	
5	387. 9300	31. 16	-9. 30	21. 86	46. 00	-24. 14	Peak	
6 *	743. 9200	29. 28	-3. 25	26. 03	46.00	-19. 97	Peak	

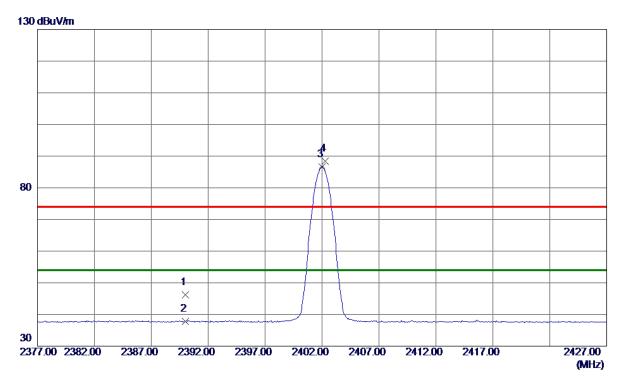
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



APPENDIX C - RADIATED EMISSION - ABOVE 1000 MHZ



Test Mode	TX 2402 MHz _CH00_1Mbps	Polarization	Vertical

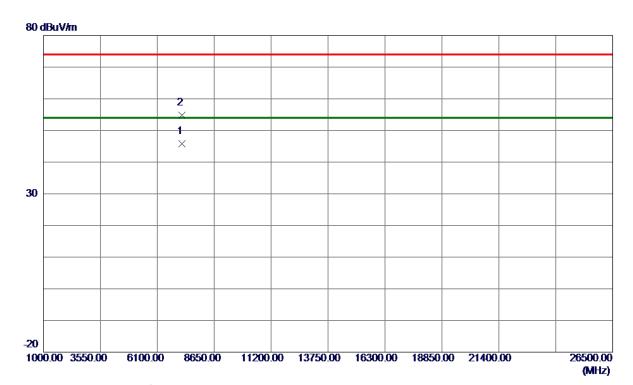


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	39. 01	7. 26	46. 27	74.00	-27. 73	Peak	
2	2390. 0000	30. 46	7. 26	37. 72	54.00	-16. 28	AVG	
3 *	2402. 0000	79. 43	7. 26	86. 69	54.00	32. 69	AVG	No Limit
4	2402. 3000	81. 19	7. 26	88. 45	74. 00	14. 45	Peak	No Limit

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



Test Mode	TX 2402 MHz _CH00_1Mbps	Polarization	Vertical

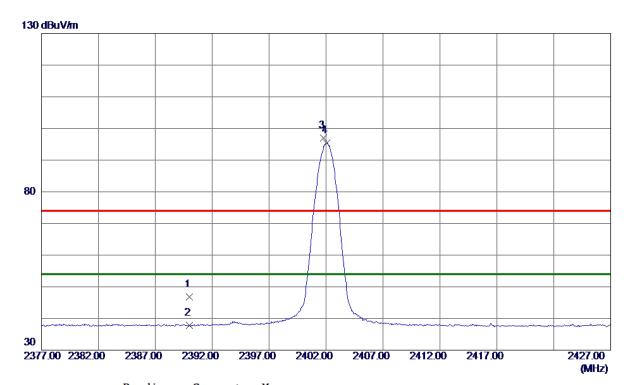


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7206. 6820	35. 69	10. 14	45. 83	54.00	-8. 17	AVG	
2	7206. 7650	44. 63	10. 14	54. 77	74.00	-19. 23	Peak	

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



Test Mode	TX 2402 MHz _CH00_1Mbps	Polarization	Horizontal

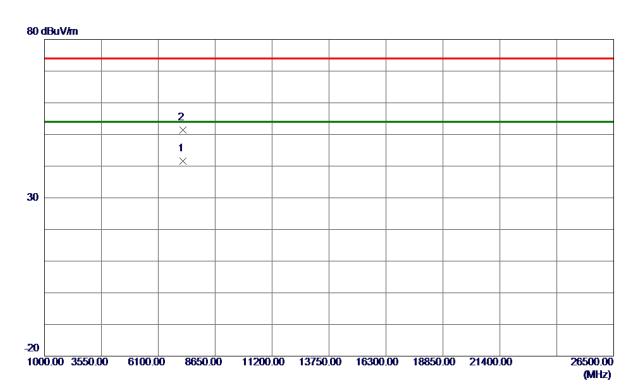


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	39. 55	7. 26	46. 81	74.00	-27. 19	Peak	
2	2390.0000	30. 54	7. 26	37. 80	54.00	-16. 20	AVG	
3	2401.8000	89. 73	7. 26	96. 99	74.00	22. 99	Peak	No Limit
4 *	2402. 0500	88. 14	7. 26	95. 40	54.00	41. 40	AVG	No Limit

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



Test Mode	TX 2402 MHz	_CH00_1Mbps	Polarization	Horizontal

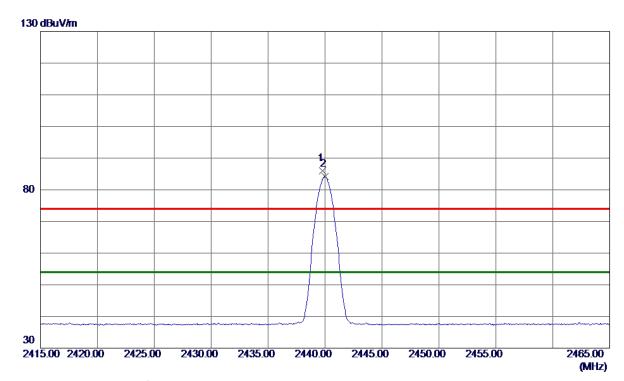


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7205. 4250	31. 38	10. 14	41. 52	54.00	-12. 48	AVG	
2	7205. 4400	41. 21	10. 14	51. 35	74.00	-22.65	Peak	

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





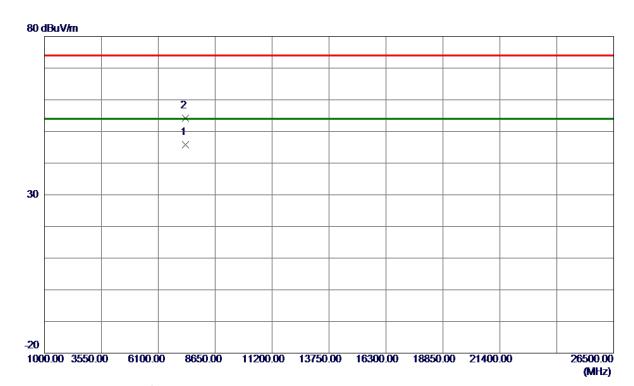


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2439. 8000	78. 69	7. 25	85. 94	74.00	11. 94	Peak	No Limit
2 *	2440. 0000	76. 87	7. 25	84. 12	54.00	30. 12	AVG	No Limit

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



Test Mode	TX 2440 MHz _	_CH19_1Mbps	Polarization	Vertical

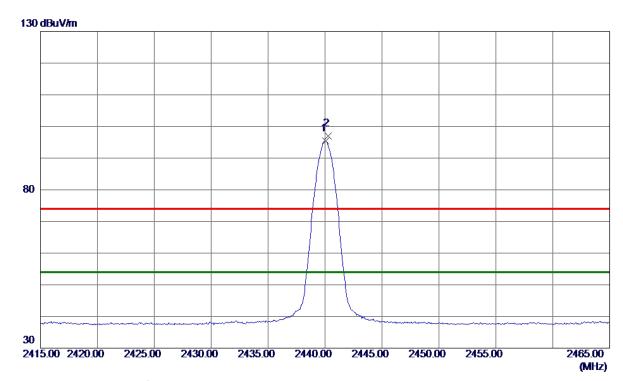


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7319. 3700	35. 52	10. 33	45. 85	54.00	-8. 15	AVG	
2	7320. 8050	43. 84	10. 34	54. 18	74. 00	-19.82	Peak	

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





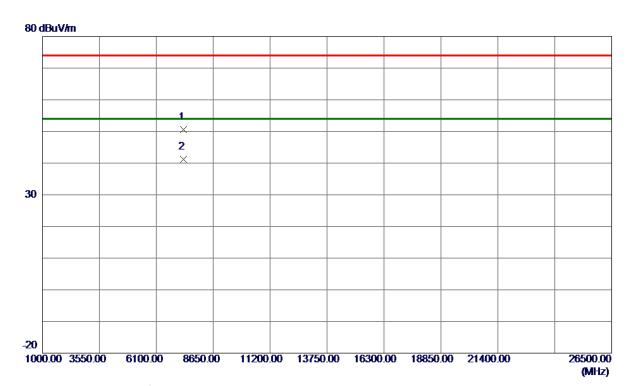


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2440. 0500	88. 14	7. 25	95. 39	54.00	41. 39	AVG	No Limit
2	2440. 3000	89. 84	7. 25	97. 09	74. 00	23. 09	Peak	No Limit

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



Test Mode	TX 2440 MHz _CH19_1Mbps	Polarization	Horizontal

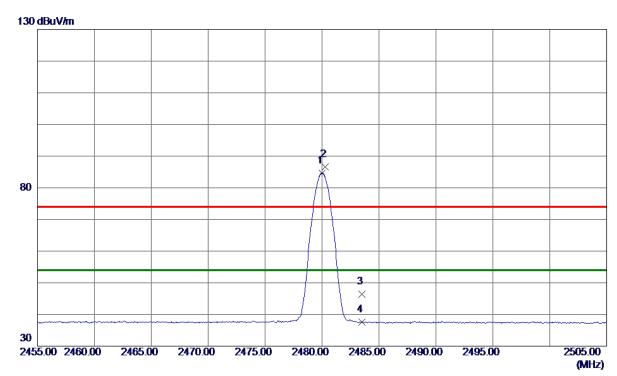


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7320. 0100	40. 19	10. 33	50. 52	74.00	-23. 48	Peak	
2 *	7320. 6150	30. 92	10. 34	41. 26	54.00	-12. 74	AVG	

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



Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Vertical

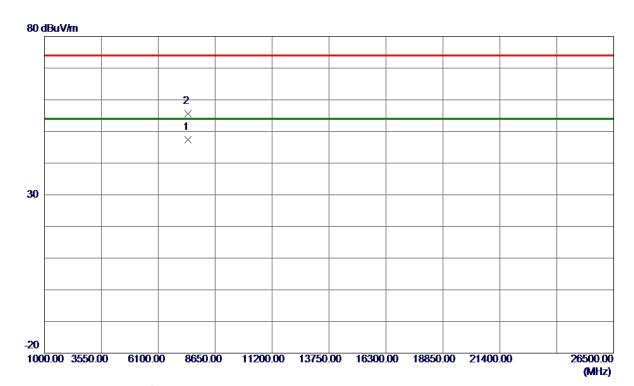


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480. 0000	77. 42	7. 25	84. 67	54.00	30. 67	AVG	No Limit
2	2480. 3000	79. 27	7. 25	86. 52	74.00	12. 52	Peak	No Limit
3	2483. 5000	39. 20	7. 25	46. 45	74.00	-27. 55	Peak	
4	2483. 5000	30. 32	7. 25	37. 57	54. 00	-16. 43	AVG	

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



Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Vertical

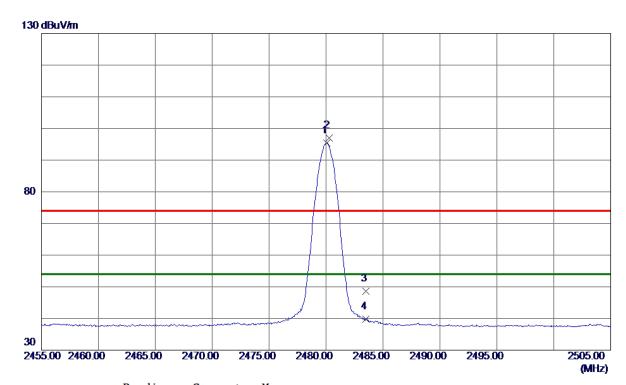


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7439. 4650	36. 81	10. 54	47. 35	<b>54.00</b>	-6. 65	AVG	
2	7440. 0780	45. 09	10. 54	55. 63	74.00	-18. 37	Peak	

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



Test Mode	TX 2480 MHz _	_CH39_1Mbps	Polarization	Horizontal

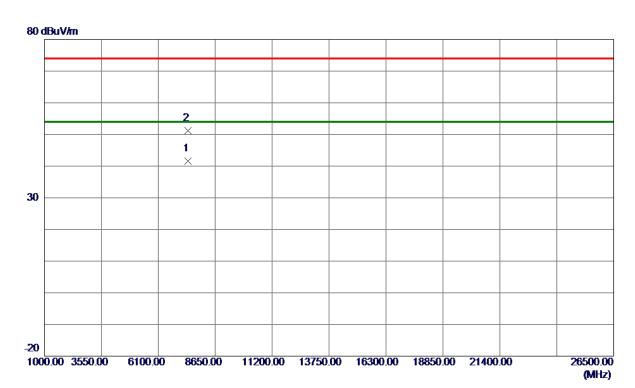


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2480. 0500	88. 18	7. 25	95. 43	54.00	41. 43	AVG	No Limit
2	2480. 2500	89. 80	7. 25	97. 05	74.00	23. 05	Peak	No Limit
3	2483. 5000	41. 35	7. 25	48. 60	74.00	-25. 40	Peak	
4	2483. 5000	32. 54	7. 25	39. 79	54.00	-14. 21	AVG	

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



Test Mode	TX 2480 MHz _	_CH39_1Mbps	Polarization	Horizontal

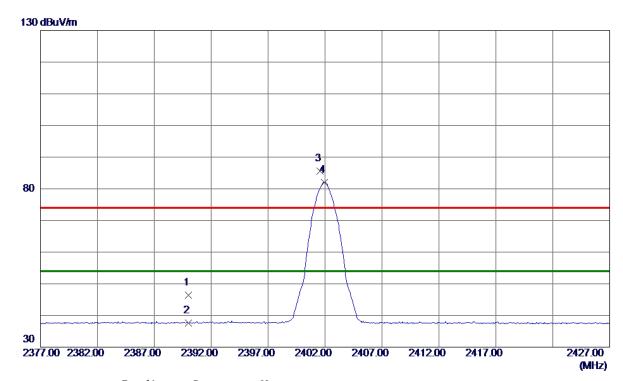


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7440. 7050	30. 97	10. 54	41. 51	<b>54.00</b>	-12. 49	AVG	
2	7440. 8230	40. 69	10. 54	51. 23	74.00	-22. 77	Peak	

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





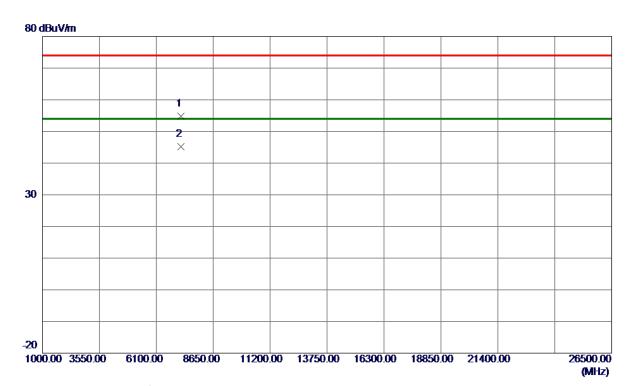


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	39. 08	7. 26	46. 34	74.00	-27. 66	Peak	
2	2390. 0000	30. 29	7. 26	37. 55	54.00	-16. 45	AVG	
3	2401. 5500	78. 39	7. 26	85. 65	74.00	11.65	Peak	No Limit
4 *	2401. 9500	74. 81	7. 26	82. 07	54.00	28. 07	AVG	No Limit

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





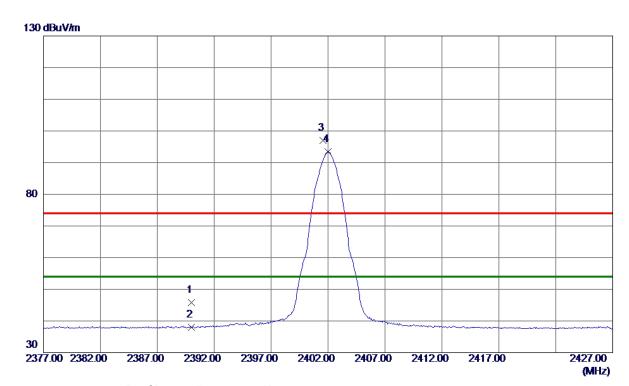


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7204. 4930	44.71	10. 14	54. 85	74.00	-19. 15	Peak	
2 *	7204. 7730	35. 06	10. 14	45. 20	54.00	-8. 80	AVG	

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





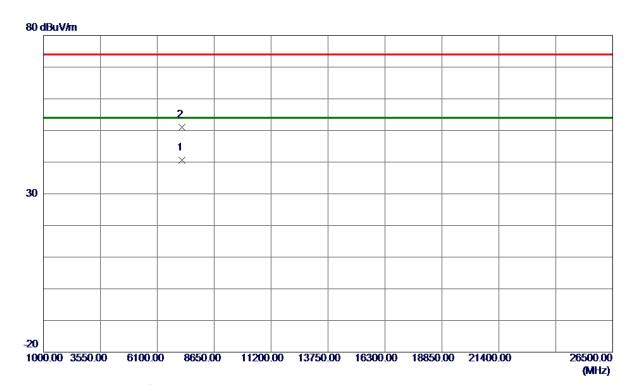


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	38. 62	7. 26	45. 88	74.00	-28. 12	Peak	
2	2390. 0000	30. 69	7. 26	37. 95	54.00	-16. 05	AVG	
3	2401. 5500	89. 75	7. 26	97. 01	74.00	23. 01	Peak	No Limit
4 *	2402. 0000	86. 15	7. 26	93. 41	54.00	39. 41	AVG	No Limit

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



Test Mode	TX 2402 MHz	_CH00_2Mbps	Polarization	Horizontal

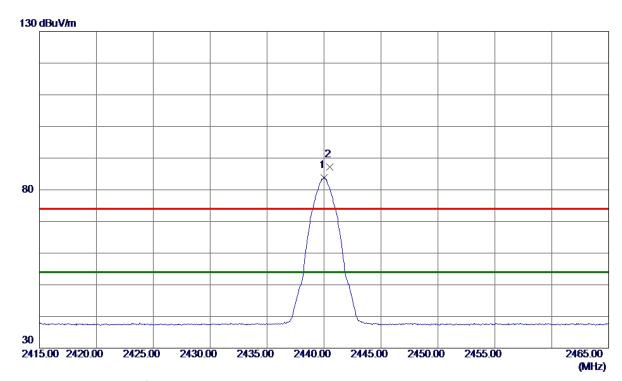


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7204. 8330	30. 52	10. 14	40. 66	54.00	-13. 34	AVG	
2	7207. 0230	40. 95	10. 14	51. 09	74.00	-22. 91	Peak	

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



Test Mode	TX 2440 MHz _CH19_2Mbps	Polarization	Vertical

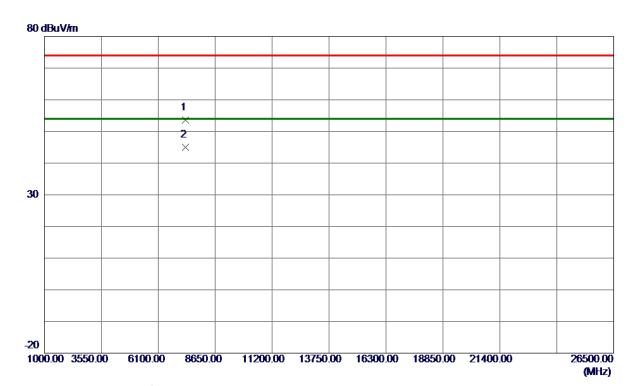


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2440. 0000	76. 51	7. 25	83. 76	54.00	29. 76	AVG	No Limit
2	2440. 5000	80. 00	7. 25	87. 25	74.00	13. 25	Peak	No Limit

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



Test Mode	TX 2440 MHz _CH19_2Mbps	Polarization	Vertical

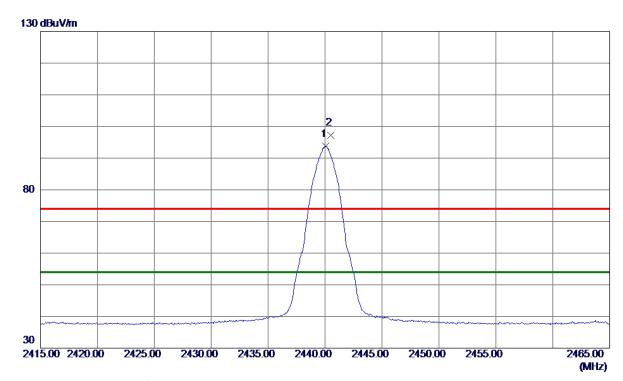


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7318. 6370	43. 23	10. 33	53. 56	74.00	<b>-20.44</b>	Peak	
2 *	7321. 3470	34. 66	10. 34	45. 00	54.00	-9. 00	AVG	

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





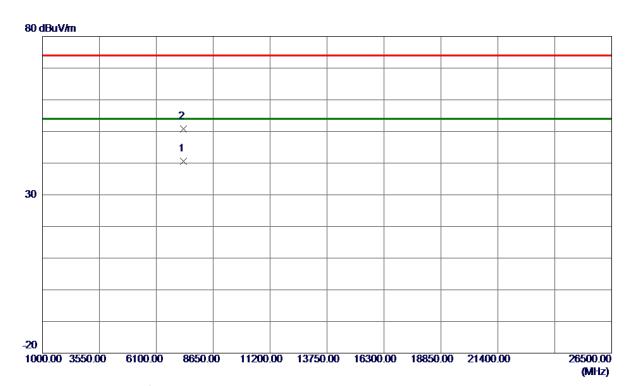


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2440. 0500	86. 45	7. 25	93. 70	54.00	39. 70	AVG	No Limit
2	2440. 5000	89. 93	7. 25	97. 18	74. 00	23. 18	Peak	No Limit

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



Test Mode	TX 2440 MHz _CH19_2Mbps	Polarization	Horizontal

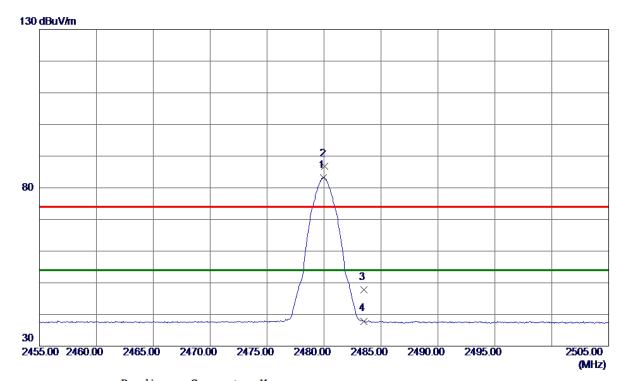


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7318. 8330	30. 18	10. 33	40. 51	54.00	-13. 49	AVG	
2	7319. 6420	40. 47	10. 33	50. 80	74.00	-23. 20	Peak	

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



Test Mode	TX 2480 MHz _CH39_2Mbps	Polarization	Vertical

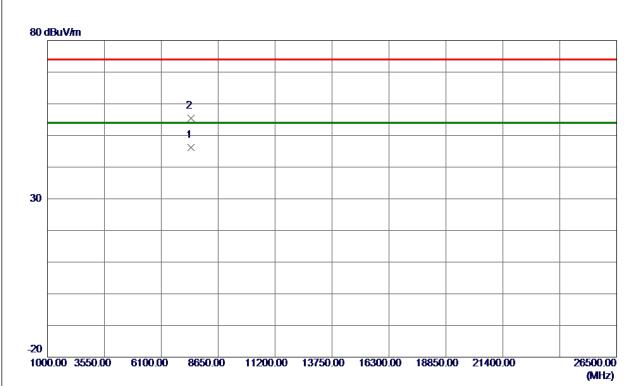


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2479. 9500	76. 00	7. 25	83. 25	54.00	29. 25	AVG	No Limit
2	2480.0500	79. 48	7. 25	86. 73	74.00	12. 73	Peak	No Limit
3	2483. 5000	40. 48	7. 25	47. 73	74.00	-26. 27	Peak	
4	2483. 5000	30. 65	7. 25	37. 90	54. 00	-16. 10	AVG	

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



Test Mode	TX 2480 MHz _	_CH39_2Mbps	Polarization	Vertical

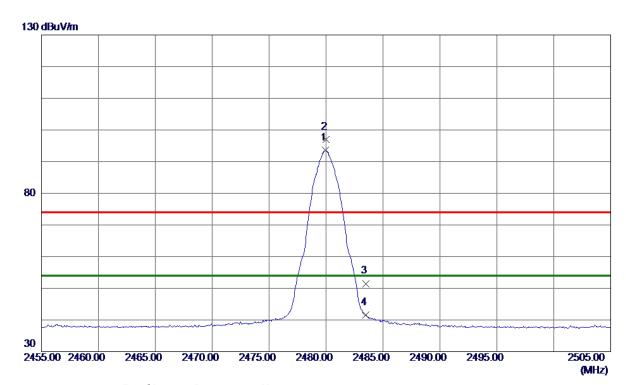


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7441. 3400	35. 67	10. 54	46. 21	54.00	-7. 79	AVG	
2	7441. 5950	44. 79	10. 54	55. 33	74.00	-18. 67	Peak	

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





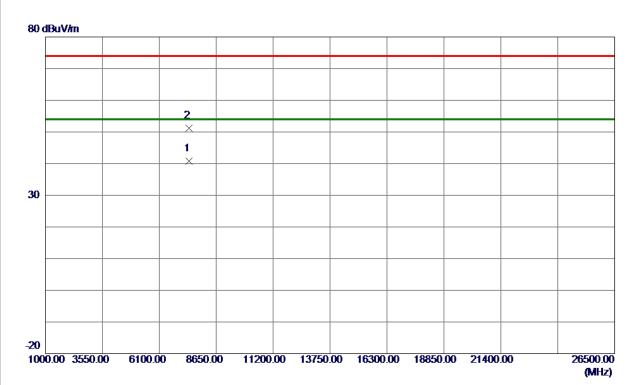


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	2479. 9500	86. 28	7. 25	93. 53	54.00	39. 53	AVG	No Limit
2	2480. 0000	89. 73	7. 25	96. 98	74.00	22. 98	Peak	No Limit
3	2483. 5000	44. 25	7. 25	51. 50	74.00	-22. 50	Peak	
4	2483. 5000	34. 36	7. 25	41. 61	54.00	-12. 39	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/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7438. 9200	30. 26	10. 54	40. 80	54.00	-13. 20	AVG	
2	7439. 9030	40. 60	10. 54	51. 14	74. 00	-22. 86	Peak	

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

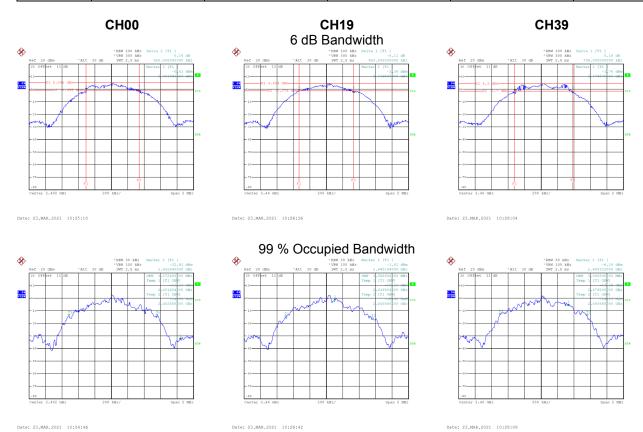


APPENDIX D - BANDWIDTH



Test Mode	TX Mode	1Mbps
100t Mode	177 171000	_ 1141550

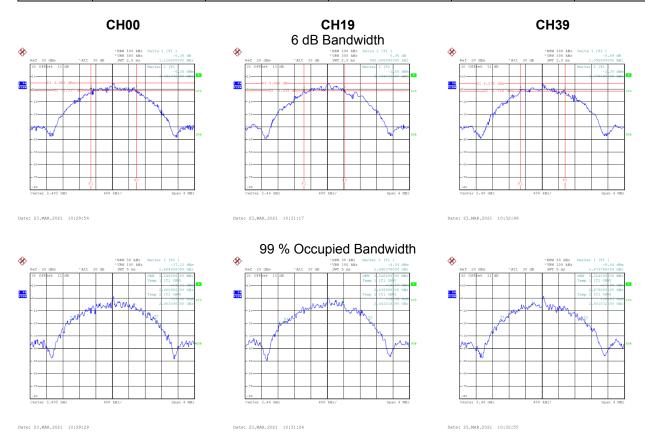
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	2402	0.650	1.072	0.5	Pass
19	2440	0.664	1.056	0.5	Pass
39	2480	0.706	1.060	0.5	Pass





Test Mode TX Mode \_2Mbps

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	2402	1.116	2.048	0.5	Pass
19	2440	0.990	2.048	0.5	Pass
39	2480	1.096	2.024	0.5	Pass





APPENDIX E - MAXIMUM OUTPUT POWER



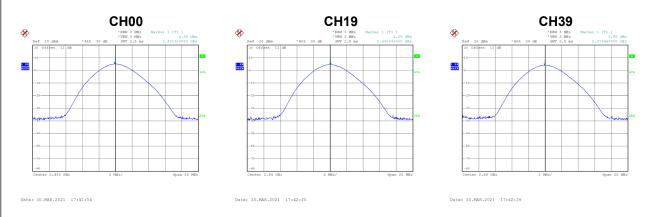
I	Test Mode	TX Mode _1N	/lbps

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	4.89	0.0031	30.00	1.0000	Pass
2440	4.38	0.0027	30.00	1.0000	Pass
2480	3.96	0.0025	30.00	1.0000	Pass



Test Mode	TX Mode _2Mbps

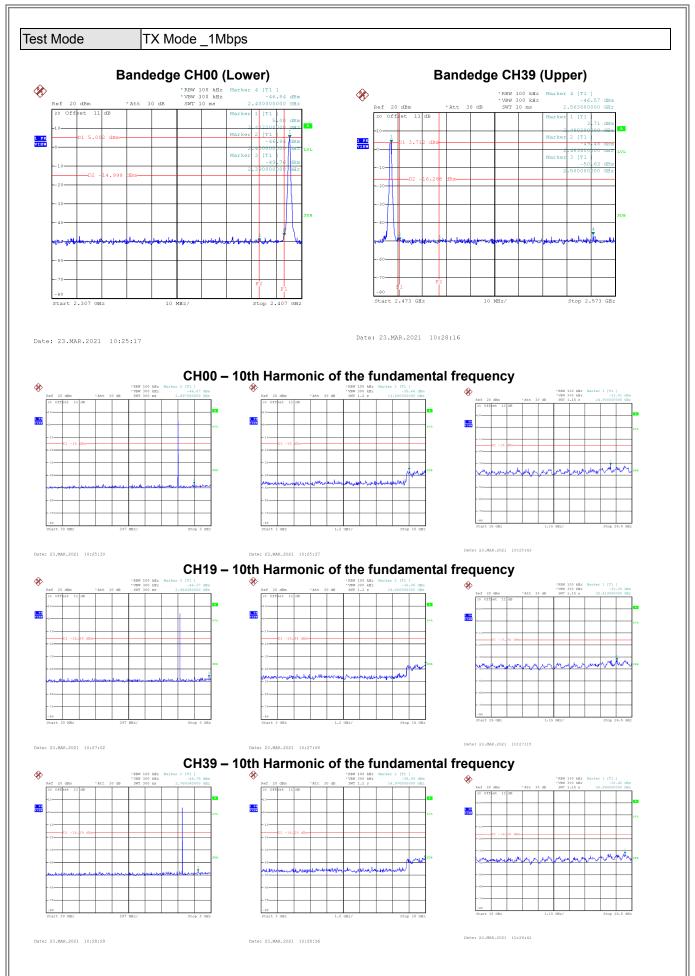
Frequency (MHz)	Output Power (dBm)	Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	4.90	0.0031	30.00	1.0000	Pass
2440	4.39	0.0027	30.00	1.0000	Pass
2480	3.98	0.0025	30.00	1.0000	Pass



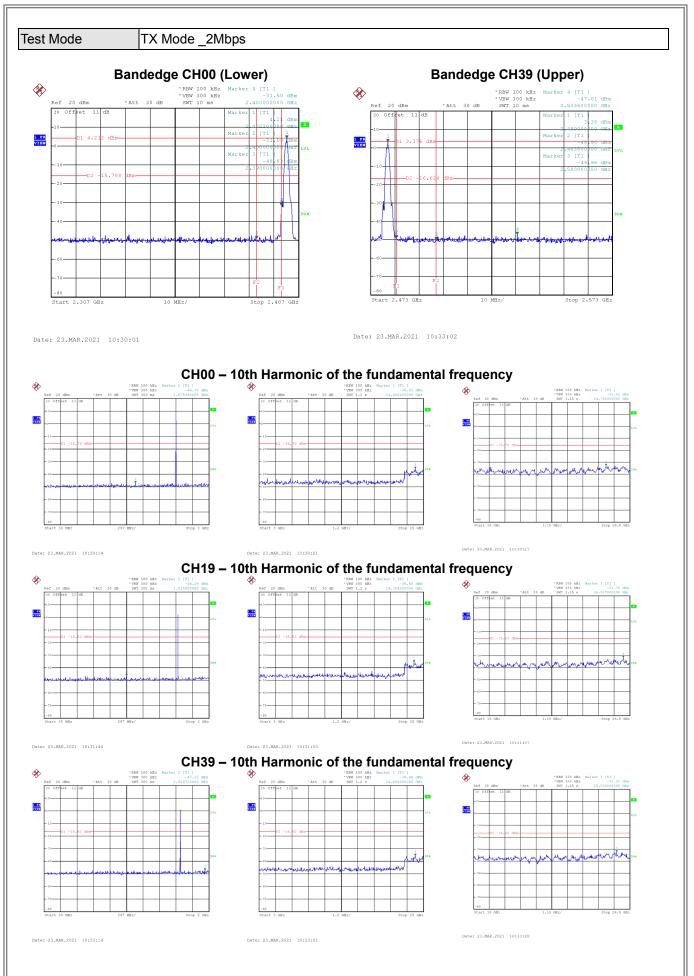


# **APPENDIX F - CONDUCTED SPURIOUS EMISSION**











APPENDIX G - POWER SPECTRAL DENSITY



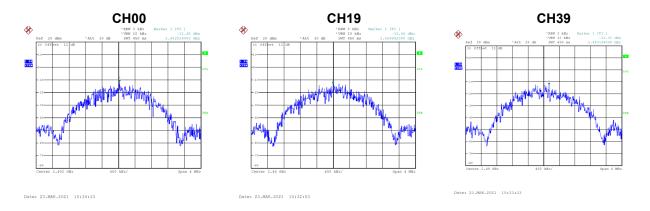
Test Mode	TX Mode	1Mbps

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-8.79	8.00	Pass
19	2440	-9.46	8.00	Pass
39	2480	-11.06	8.00	Pass



Test Mode	TX Mode 2Mbps
	· · · · · · · · · · ·   — · · · · · ·

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-11.45	8.00	Pass
19	2440	-12.86	8.00	Pass
39	2480	-12.33	8.00	Pass



**End of Test Report**