



# **FCC Radio Test Report**

**FCC ID: RWO-RZ040378** 

This report concerns: Original Grant

**Project No.** : 2110C120

**Equipment**: Wireless Headset

**Brand Name** : RAZER **Test Model** : RZ04-0378

Series Model : RZ04-0378XXXX-XXXX (X can be 0-9 or A-Z)

**Applicant**: Razer Inc.

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Date of Receipt : Oct. 26, 2021

**Date of Test** : Oct. 10, 2021 ~ Nov. 29, 2021

**Issued Date** : Dec. 10, 2021

Report Version : R00

Test Sample : Sample No.: DG2021102731 for conducted, DG2021102733 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.

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ACCREDITED
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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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# **REPORT ISSUED HISTORY**

Report Version	Description	Issued Date
R00	Original Issue.	Dec. 10, 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 Item Test Result July 1985			
15.207	AC Power Line Conducted Emissions	APPENDIX A	PASS		
15.247(d) 15.205(a) 15.209(a)	Radiated Emissions	Radiated Emissions APPENDIX B APPENDIX C APPENDIX D			
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, 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 test:

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150kHz ~ 30MHz	2.60

#### B. Radiated emissions test:

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)
		30MHz ~ 200MHz	>	4.36
DG-CB03	DG-CB03 (3m) CISPR	30MHz ~ 200MHz	Н	3.32
(3m)		200MHz ~ 1,000MHz	V	4.08
		200MHz ~ 1,000MHz	Н	3.96

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

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03	CISPR	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	65%	AC 120V/60Hz	Aries Tang
Radiated Emissions-9 kHz to 30 MHz	25°C	60%	DC 5V	Sparrow Liu
Radiated Emissions-30 MHz to 1000 MHz	26°C	52%	DC 5V	Chen Mo
Radiated Emissions-Above 1000 MHz	26°C	52%	DC 5V	Laughing Zhang
Bandwidth	23.1°C	47%	DC 5V	Longdage Feng
Maximum Output Power	23.1°C	47%	DC 5V	Longdage Feng
Conducted Spurious Emission	23.1°C	47%	DC 5V	Longdage Feng
Power Spectral Density	23.1°C	47%	DC 5V	Longdage Feng



### 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	Wireless Headset
Brand Name	RAZER
Test Model	RZ04-0378
Series Model	RZ04-0378XXXX-XXXX (X can be 0-9 or A-Z)
Model Difference(s)	The system model number is RZ04-0378XXXX-XXXX, this system consists of Wireless Headset (Model: RZ04-0378) and USB Wireless Transceiver (Model: RC30-0378), X can be 0-9 or A-Z.
Power Source	1# Supplied from USB port. 2# Supplied from battery. Model: 553450
Power Rating	1# 5V === 500mA 2# 3.7V, 1000mAh, 3.7Wh
Operation Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK
Bit Rate of Transmitter	1Mbps, 2Mbps
Max. Peak Output Power	2Mbps: 5.59 dBm (0.0036 W)
Max. Average Output Power	2Mbps: 5.51 dBm (0.0036 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	Unnovation WE DESIRE. WE EXPLORE	BTH-1393	PCBA	N/A	2.22

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.



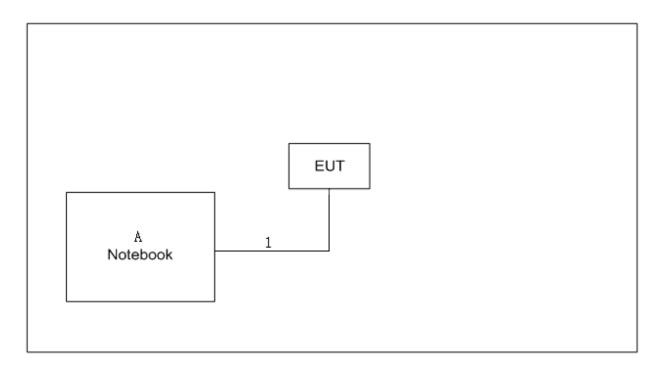
### 2.3 PARAMETERS OF TEST SOFTWARE

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	AWRDLABV2_V1.0.9.19		
Frequency (MHz)	2402	2440	2480
1Mbps	0X04	0X04	0X04
2Mbps	0X04	0X04	0X04



### 2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



### 2.5 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.
Α	Notebook	Honor	14SER5 3500	N/A

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



#### 3. AC POWER LINE CONDUCTED EMISSIONS

#### **3.1 LIMIT**

Frequency of Emission (MHz)	Limit (dBµV)		
Frequency of Emission (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.

#### 3.2 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:

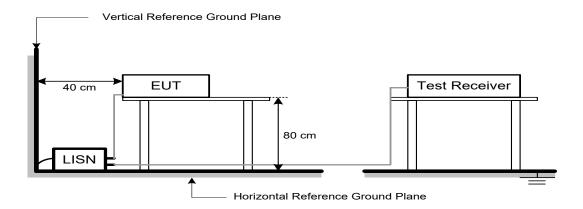
Receiver Parameters	Setting
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

#### 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 <code>『Note』</code>. 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)

Fraguency (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.

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

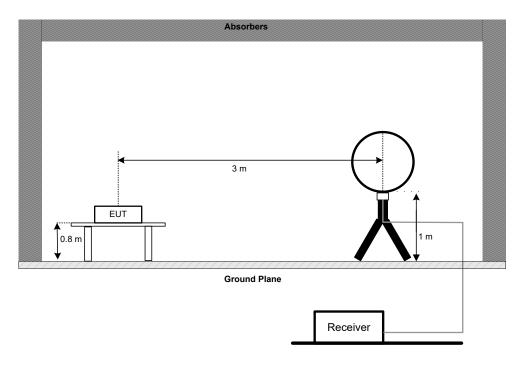


### 4.3 DEVIATION FROM TEST STANDARD

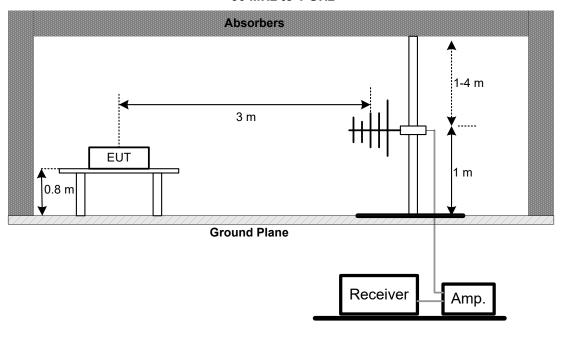
No deviation.

### 4.4 TEST SETUP

### 9 kHz to 30 MHz

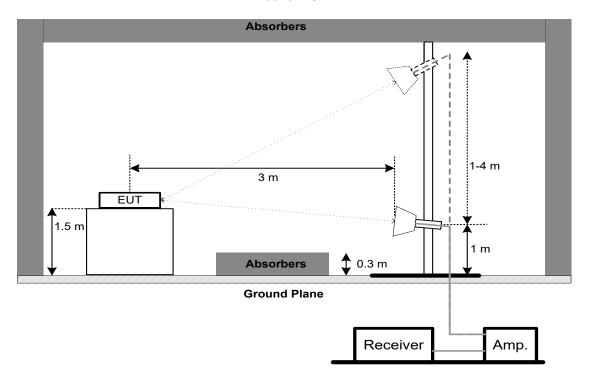


### 30 MHz to 1 GHz





#### **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
FCC 15.247(a)(2)	6 dB Bandwidth	>= 500 kHz
	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:

Of 3370 Effilasion Dandwidth		
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/RMS
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

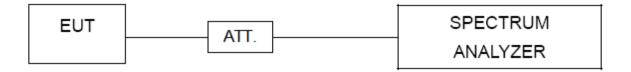
- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- b. The following table is the setting of the spectrum analyzer:

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	Feb. 28, 2022				
2	LISN	EMCO	3816/2	52765	Feb. 27, 2022				
3	TWO-LINE V-NETWORK	R&S	ENV216	101447	Feb. 27, 2022				
4	50Ω Terminator	50Ω Terminator SHX TF5-3 150413		15041305	Feb. 27, 2022				
5	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A				
6	Cable	N/A	RG223	12m	Mar. 09, 2022				
7	643 Shield Room	ETS	6*4*3m	N/A	N/A				

	Radiated Emissions - 9 kHz to 30 MHz							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until			
1	Loop Antenna	nna EM EM-6876-1		230	Apr. 28, 2022			
2	Cable	N/A	N/A RG 213/U		May 27, 2022			
3	MXE EMI Receiver	er Keysight N9038A		MY56400091	Feb. 27, 2022			
4	Measurement	Farad	EZ-EMC	N/A	N/A			
	Software		Ver.NB-03A1-01	·	-			
5	966 Chambe Room	RM	9*6*6m	N/A	Jul. 24, 2022			

	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. 15, 2022			
2	Amplifier	HP	8447D	2944A08742	Feb. 28, 2022			
3	Cable	emci	LMR-400	N/A	Nov. 30, 2022			
4	Controller	CT SC100		N/A	N/A			
5	Controller	MF MF-7802		MF780208416	N/A			
6	Receiver	er Agilent N9038A MY52130039		MY52130039	Mar. 19, 2022			
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, 2022			

	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. 21, 2022				
2	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 30, 2022				
3	Amplifier	Agilent	8449B	3008A02584	Jul. 10, 2022				
4	Controller	CT	SC100	N/A	N/A				
5	Controller	MF	MF-7802	MF780208416	N/A				
6	Receiver	Agilent	N9038A	MY52130039	Mar. 19, 2022				
7	EXA Spectrum Analyzer	· I KEVSIANT I NIGHTHA I MYSSAXIAXX		MY56480488	Feb. 28, 2022				
8	Low Noise Amplifier	Low Noise Amplifier CONNPHY		619413	Jul. 16, 2022				
9	Cable	N/A	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. 10, 2022				
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, 2022				



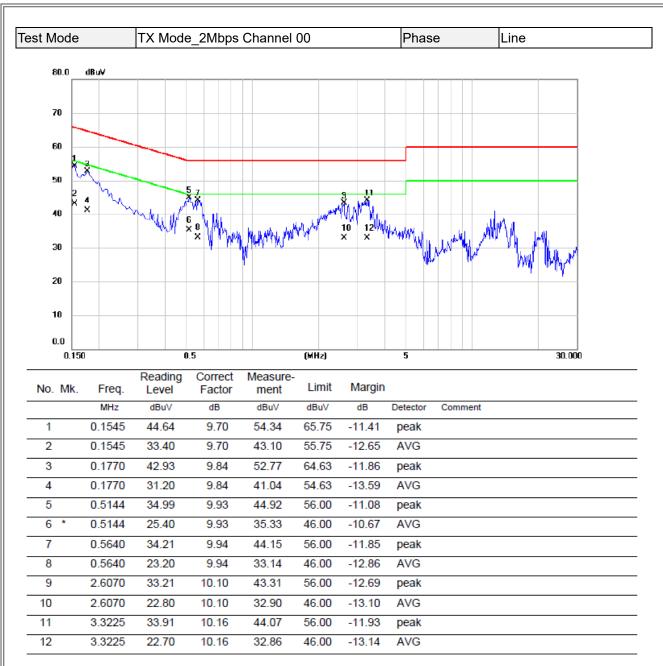
Bandwidth &  Maximum Output Power &  Power Spectral Density &  Conducted Spurious Emission							
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until		
1	Spectrum Analyzer	R&S	FSP40	100185	Jul. 10, 2022		
2 Attenuator WOKEN 6SM3502 VAS1214NL Feb. 07, 202							
3 RF Cable Tongkaichuan 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. All calibration period of equipment list is one year.



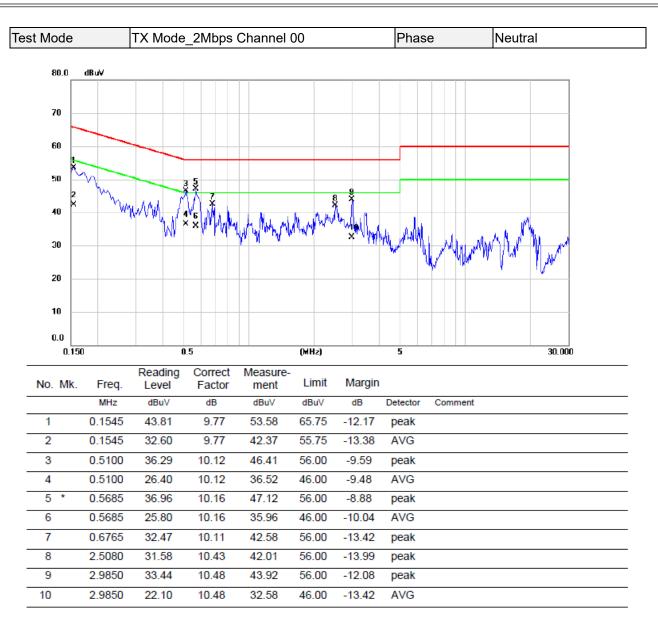
APPENDIX A - AC POWER LINE CONDUCTED EMISSIONS





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



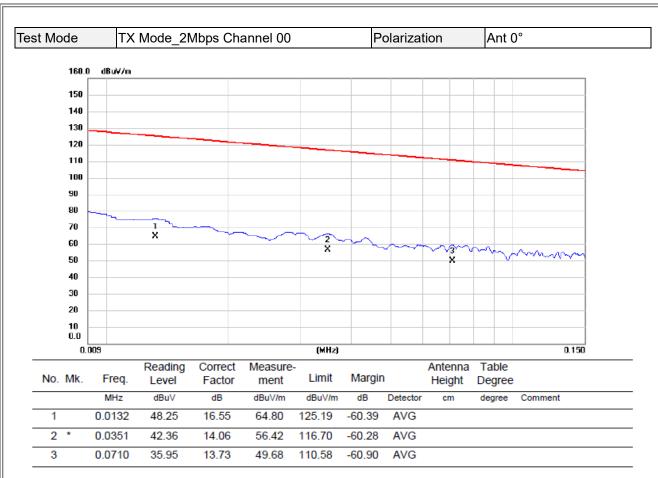


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



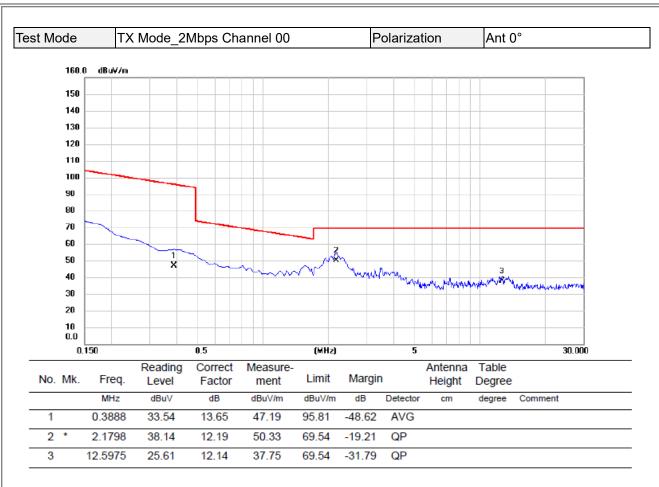
APPENDIX B - RADIATED EMISSION - 9 KHZ TO 30 MHZ





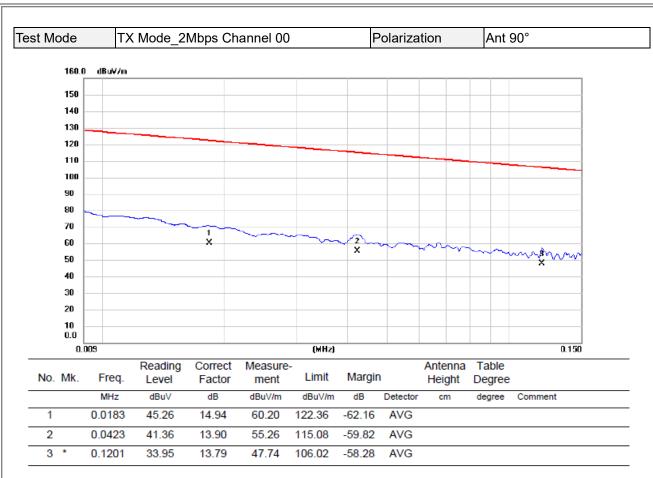
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





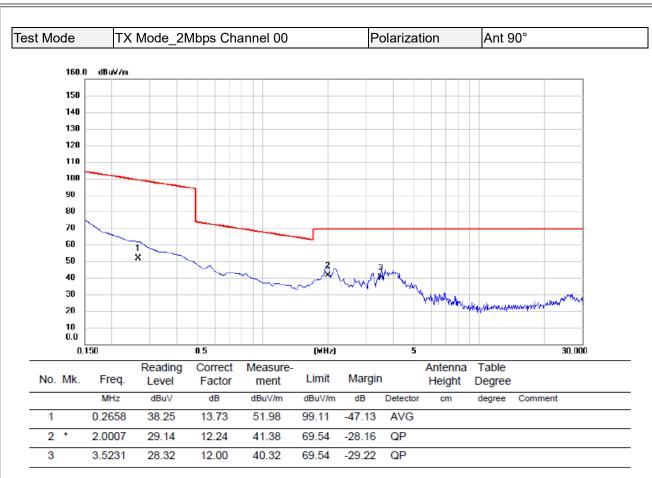
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.





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



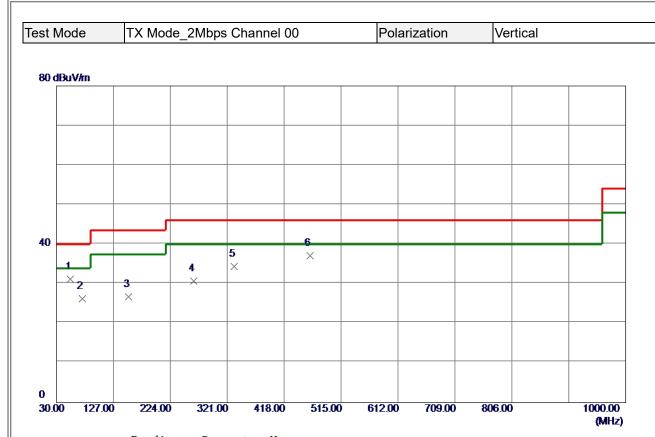


- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



APPENDIX C - RADIATED EMISSION - 30 MHZ TO 1000 MHZ	



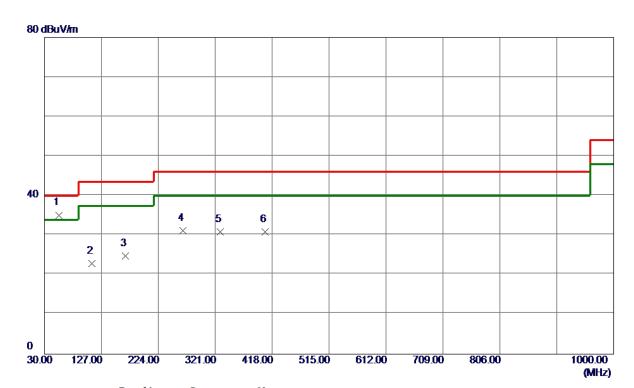


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	53. 7650	45. 20	-14. 06	31. 14	40.00	-8. 86	Peak	
2	73.6500	43. 27	-17. 02	26. 25	40.00	-13. 75	Peak	
3	153. 1900	39. 32	-12. 54	26. 78	43. 50	-16. 72	Peak	
4	264. 2550	43. 13	<b>-12.40</b>	30. 73	46.00	-15. 27	Peak	
5	333. 1250	44. 69	-10. 28	34. 41	46.00	-11. 59	Peak	
6	461. 6500	44. 27	-7. 20	37. 07	46. 00	-8. 93	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 *	54. 2500	49. 22	-14. 10	35. 12	40.00	-4. 88	Peak	
2	110. 5100	37. 87	-14. 99	22. 88	43. 50	-20.62	Peak	
3	168. 2250	37. 28	-12. 54	24. 74	43. 50	-18. 76	Peak	
4	266. 1950	43. 55	-12. 32	31. 23	46.00	-14. 77	Peak	
5	329. 7300	41. 29	-10. 34	30. 95	46.00	-15. 05	Peak	
6	405. 8750	39. 49	-8. 62	30. 87	46.00	-15. 13	Peak	

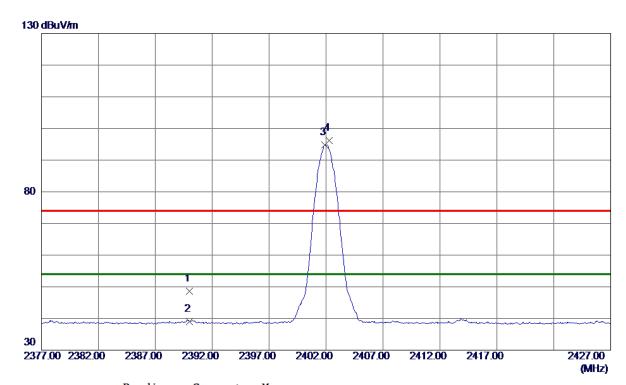
- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value Limit Value.



APPENDIX D - RADIATED EMISSION	I - ABOVE 1000 MHZ



Test Mode	TX 2402 MHz _CH00_1Mbps	Polarization	Vertical

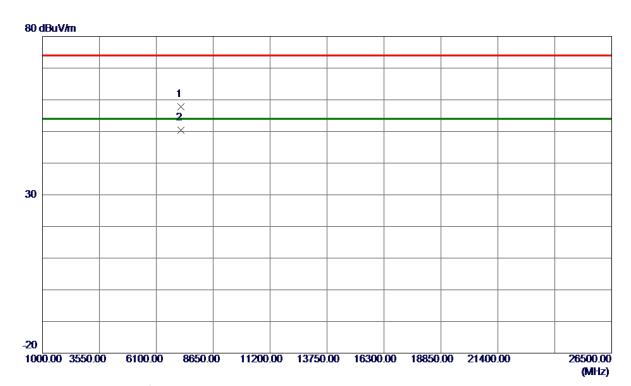


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	40. 37	8. 31	48. 68	74.00	-25. 32	Peak	
2	2390. 0000	30. 77	8. 31	39. 08	54.00	-14. 92	AVG	
3 *	2401. 9000	86. 53	8. 32	94. 85	54.00	40.85	AVG	No Limit
4	2402. 3000	87. 86	8. 32	96. 18	74.00	22. 18	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

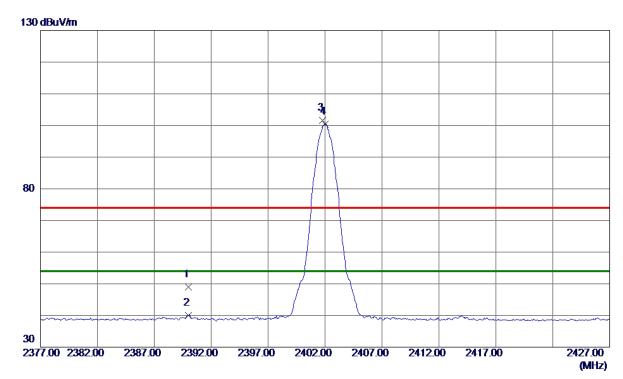


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7205. 2460	47. 33	10. 56	57. 89	74.00	-16. 11	Peak	
2 *	7205. 3640	39. 75	10. 56	50. 31	54.00	-3. 69	AVG	

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



Test Mode	TX 2402 MHz CH00 1Mbps	Polarization	Horizontal

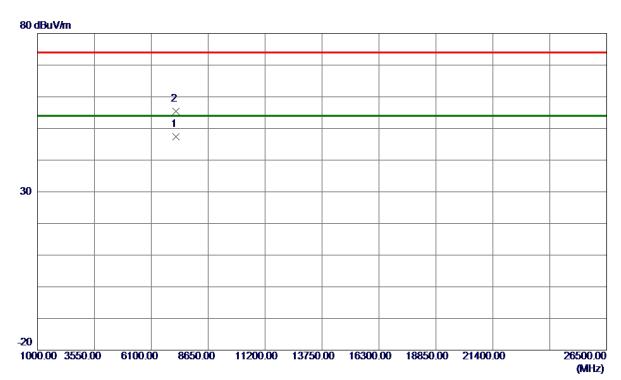


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	40. 72	8. 31	49. 03	74.00	-24. 97	Peak	
2	2390. 0000	31. 74	8. 31	40.05	54.00	-13. 95	AVG	
3	2401. 8000	93. 34	8. 32	101.66	74.00	27. 66	Peak	No Limit
4 *	2402. 0000	92. 11	8. 32	100. 43	54. 00	46. 43	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

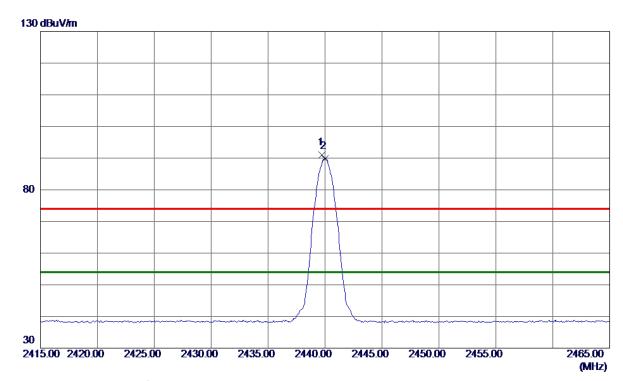


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7205. 3500	36. 91	10. 56	47. 47	<b>54.00</b>	-6. 53	AVG	
2	7205, 4540	44. 77	10. 56	55, 33	74. 00	-18. 67	Peak	

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



Test Mode	TX 2440 MHz CH19 1Mbps	Polarization	Vertical

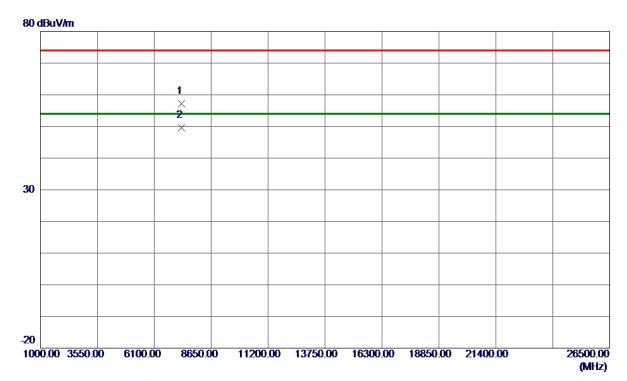


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2439. 7500	82. 68	8. 37	91. 05	74.00	17. 05	Peak	No Limit
2 *	2440. 0000	81. 47	8. 37	89. 84	54.00	35. 84	AVG	No Limit

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



Test Mode	TX 2440 MHz CH19 1Mbps	Polarization	Vertical

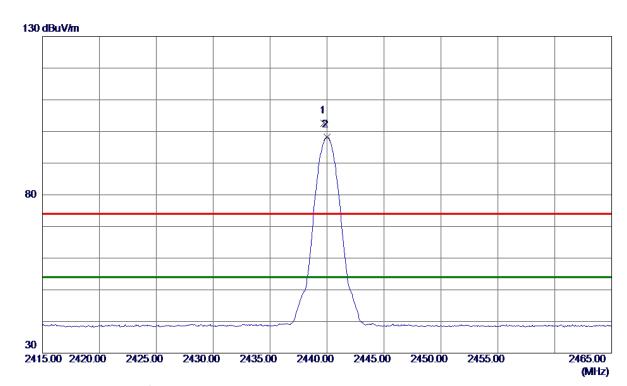


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7319. 3280	46. 49	10. 71	57. 20	74.00	-16. 80	Peak	
2 *	7319. 3560	38. 86	10.71	49. 57	54.00	<b>-4.43</b>	AVG	

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



Test Mode	TX 2440 MHz CH19 1Mbps	Polarization	Horizontal

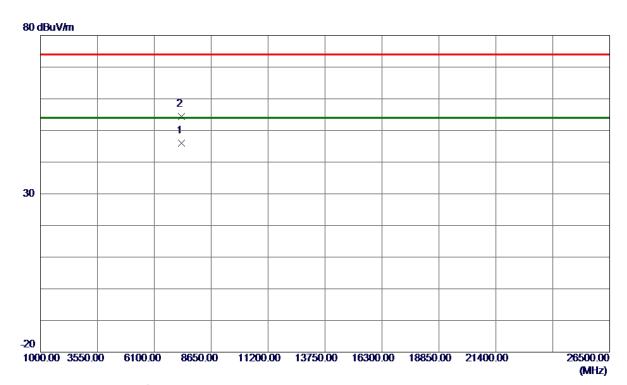


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2439. 7500	94. 25	8. 37	102.62	74.00	28. 62	Peak	No Limit
2 *	2440. 0000	89. 85	8. 37	98. 22	54.00	44. 22	AVG	No Limit

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



Test Mode	TX 2440 MHz _CH19_1Mbps	Polarization	Horizontal

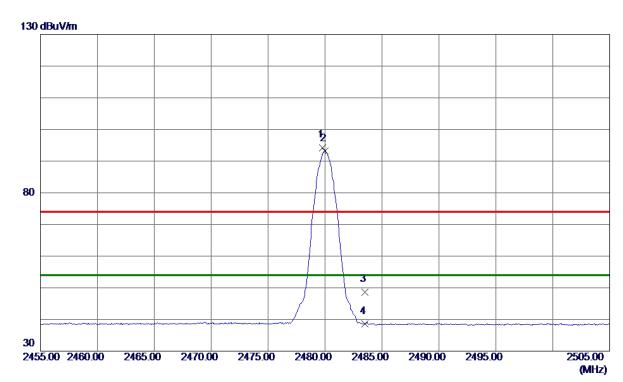


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7319. 3480	35. 25	10. 71	45. 96	54.00	-8. 04	AVG	
2	7320. 0720	43. 75	10. 71	<b>54. 46</b>	74.00	<b>-19.54</b>	Peak	

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



Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Vertical

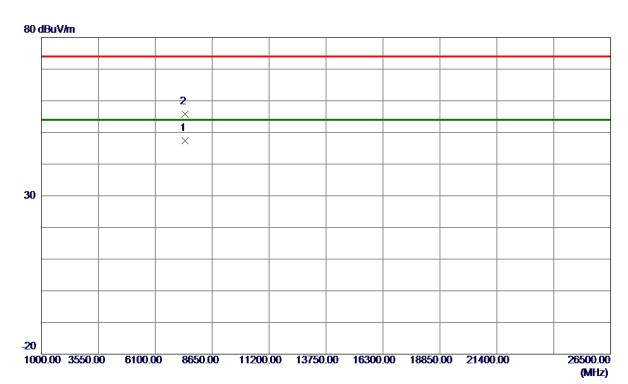


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2479. 8000	85. 88	8. 42	94. 30	74.00	20. 30	Peak	No Limit
2 *	2480. 0000	84. 70	8. 42	93. 12	54.00	39. 12	AVG	No Limit
3	2483. 5000	40. 28	8. 42	48. 70	74.00	-25. 30	Peak	
4	2483. 5000	30. 19	8. 42	38. 61	54. 00	-15. 39	AVG	

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



Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Vertical

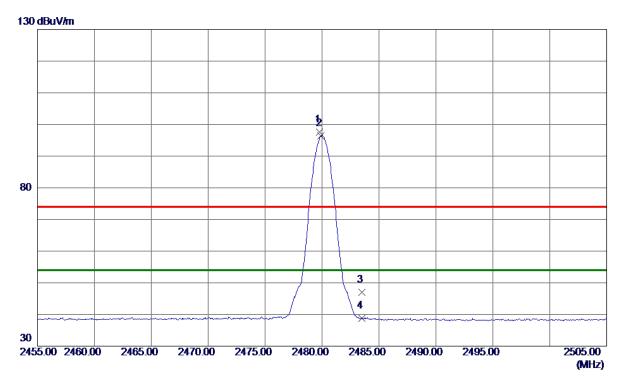


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7439. 3700	36. 48	10.86	47. 34	54.00	-6. 66	AVG	
2	7439, 4360	45. 02	10.86	55. 88	74. 00	-18. 12	Peak	

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



Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Horizontal

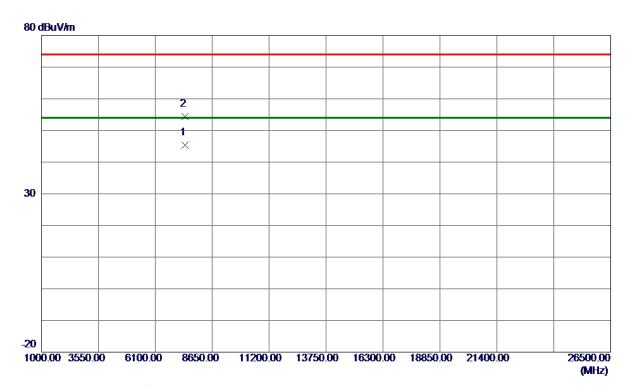


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2479. 8000	89. 19	8. 42	97. 61	74.00	23.61	Peak	No Limit
2 *	2479. 9000	87. 94	8. 42	96. 36	54.00	42. 36	AVG	No Limit
3	2483. 5000	38. 61	8. 42	47. 03	74.00	-26. 97	Peak	
4	2483. 5000	30. 47	8. 42	38. 89	54.00	-15. 11	AVG	

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



Test Mode	TX 2480 MHz _CH39_1Mbps	Polarization	Horizontal

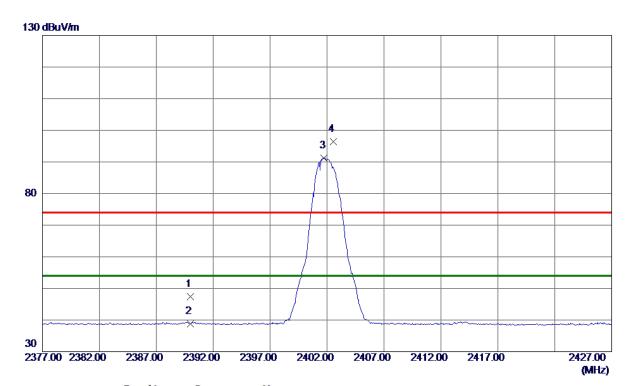


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7439. 3400	34. 58	10.86	45. 44	54.00	-8. 56	AVG	
2	7439. 3760	43. 56	10.86	<b>54. 4</b> 2	74.00	-19. 58	Peak	

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



Test Mode	TX 2402 MHz CH00 2Mbps	Polarization	Vertical

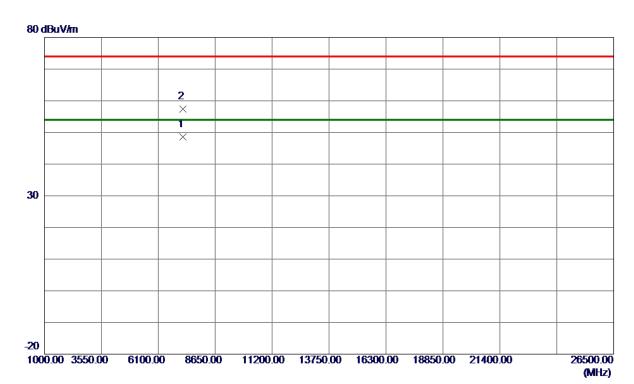


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	39. 18	8. 31	47. 49	74.00	-26. 51	Peak	
2	2390. 0000	30. 53	8. 31	38. 84	54.00	-15. 16	AVG	
3 *	2401. 7500	82. 87	8. 32	91. 19	54.00	37. 19	AVG	No Limit
4	2402. 5500	88. 15	8. 32	96. 47	74.00	22. 47	Peak	No Limit

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



Test Mode	TX 2402 MHz CH00 2Mbps	Polarization	Vertical

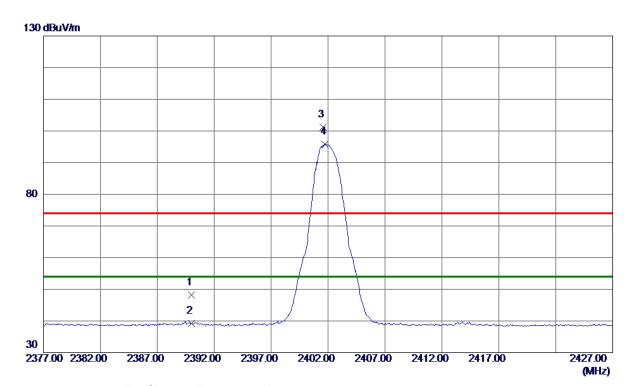


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7204. 6750	38. 08	10. 56	48. 64	54. 00	-5. 36	AVG	
2	7206. 0100	46. 92	10. 56	57. 48	74. 00	-16. 52	Peak	

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





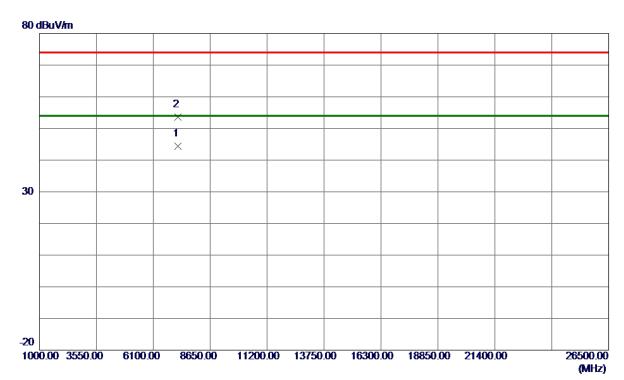


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2390. 0000	39. 96	8. 31	48. 27	74.00	-25. 73	Peak	
2	2390. 0000	30. 91	8. 31	39. 22	54.00	-14. 78	AVG	
3	2401. 5500	92. 82	8. 32	101. 14	74.00	27. 14	Peak	No Limit
4 *	2401. 7500	87. 52	8. 32	95. 84	54. 00	41.84	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

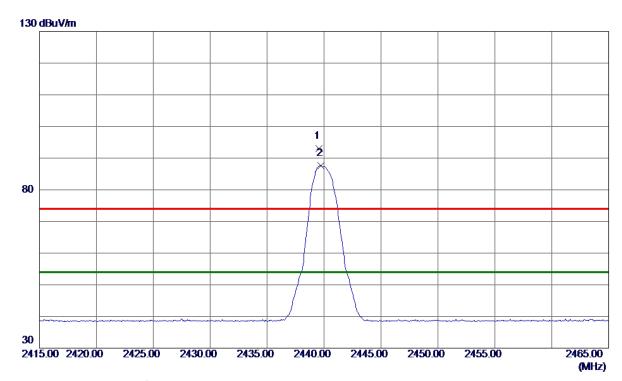


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7204. 4600	33. 77	10. 56	44. 33	54.00	-9. 67	AVG	
2	7207. 5650	43.00	10. 56	53. 56	74. 00	-20. 44	Peak	

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



Test Mode	TX 2440 MHz _CH19_2Mbps	Polarization	Vertical

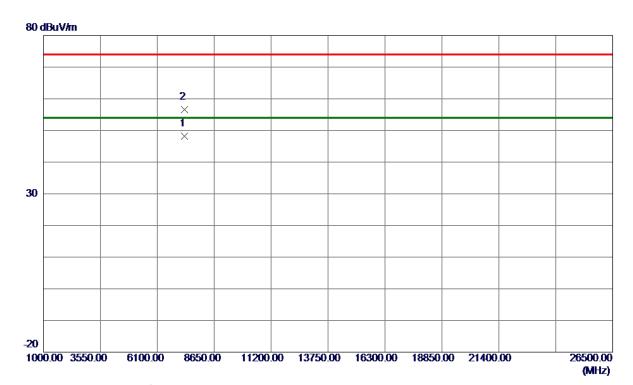


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2439. 5500	84. 69	8. 37	93. 06	74.00	19. 06	Peak	No Limit
2 *	2439. 7500	79. 25	8. 37	87. 62	54. 00	33. 62	AVG	No Limit

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



Test Mode	TX 2440 MHz CH19 2Mbps	Polarization	Vertical

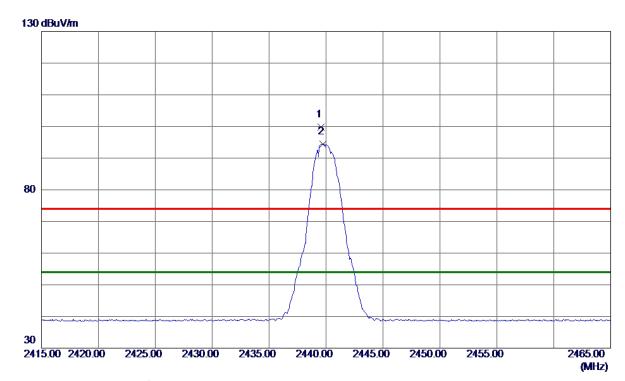


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7318. 5350	37. 44	10. 70	48. 14	54.00	-5. 86	AVG	
2	7318. 5550	45. 99	10. 70	56. 69	74.00	-17. 31	Peak	

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



Test Mode	TX 2440 MHz _CH19_2Mbps	Polarization	Horizontal

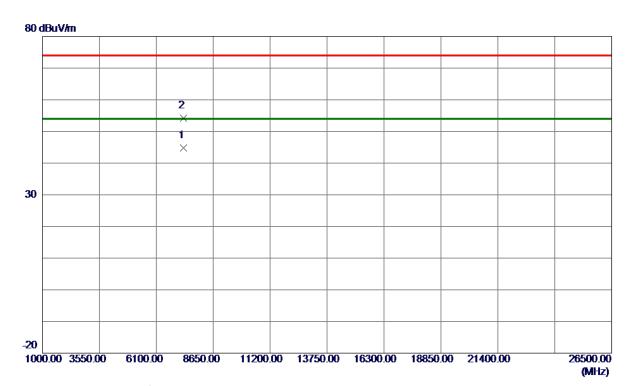


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2439. 5500	91. 45	8. 37	99. 82	74.00	25.82	Peak	No Limit
2 *	2439. 7000	86. 12	8. 37	94. 49	54.00	40. 49	AVG	No Limit

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



Test Mode	TX 2440 MHz _CH19_2Mbps	Polarization	Horizontal

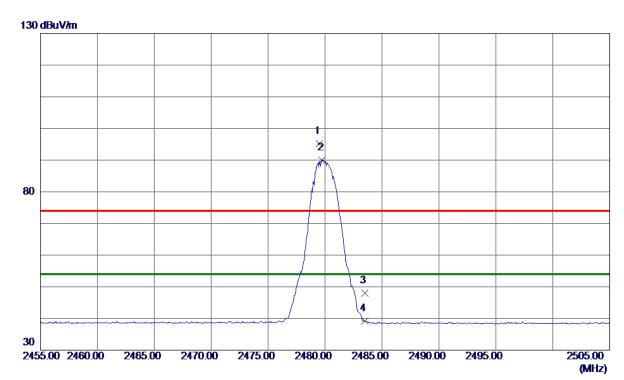


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1 *	7318. 6050	34. 15	10. 70	44. 85	<b>54.00</b>	-9. 15	AVG	
2	7321. 5400	43. 52	10.71	54. 23	74.00	-19. 77	Peak	

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



Test Mode	TX 2480 MHz _CH39_2Mbps	Polarization	Vertical

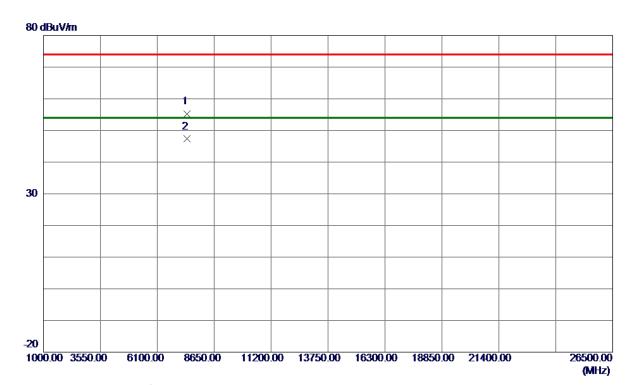


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2479. 5000	86. 82	8. 42	95. 24	74.00	21. 24	Peak	No Limit
2 *	2479. 7500	81. 50	8. 42	89. 92	54.00	35. 92	AVG	No Limit
3	2483. 5000	39. 61	8. 42	48. 03	74.00	-25. 97	Peak	
4	2483. 5000	30. 79	8. 42	39. 21	54. 00	-14. 79	AVG	

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



Test Mode	TX 2480 MHz CH39 2Mbps	Polarization	Vertical

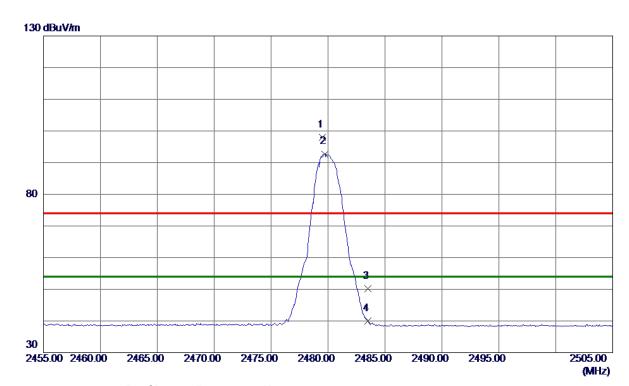


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	7438. 5700	44. 28	10.86	55. 14	74.00	-18.86	Peak	
2 *	7438. 6150	36. 44	10.86	47. 30	54.00	-6. 70	AVG	

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





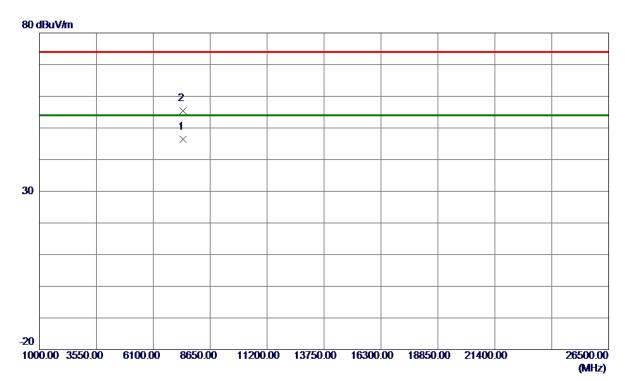


No.	Freq.	Reading Level	Correct Factor	Measure ment	Limit	Margin		
	MHz	dBuV/m	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	2479. 5000	89. 63	8. 42	98. 05	74.00	24. 05	Peak	No Limit
2 *	2479. 7000	84. 28	8. 42	92. 70	54.00	38. 70	AVG	No Limit
3	2483. 5000	41. 83	8. 42	50. 25	74.00	-23. 75	Peak	
4	2483. 5000	31. 55	8. 42	39. 97	54.00	-14. 03	AVG	

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



Test Mode	TX 2480 MHz CH39 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 *	7438. 5000	35. 50	10.86	46. 36	54. 00	-7. 64	AVG	
2	7440. 0450	44. 56	10. 86	55. 42	74. 00	-18. 58	Peak	

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

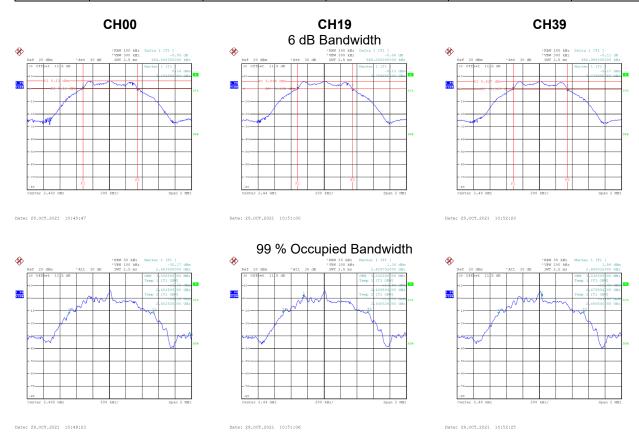


APPENDIX E - BANDWIDTH



Test Mode TX Mode \_1Mbps

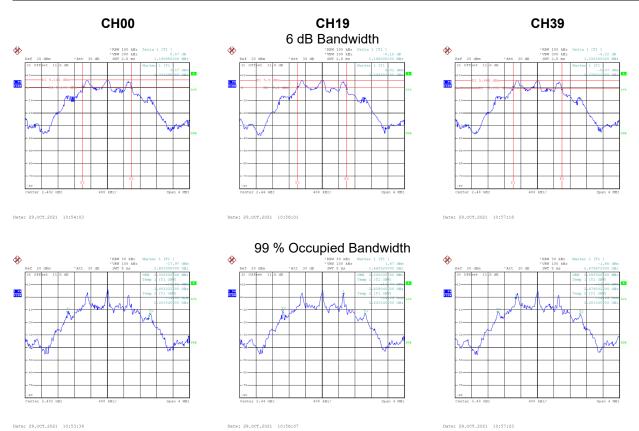
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	2402	0.664	1.028	0.5	Pass
19	2440	0.666	1.032	0.5	Pass
39	2480	0.657	1.036	0.5	Pass





Test Mode	TX Mode	2Mbps
rest ivioue	I V Mode	_ZIVIDPS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	99 % Occupied Bandwidth (MHz)	6 dB Bandwidth Min. Limit (MHz)	Test Result
00	2402	1.200	2.008	0.5	Pass
19	2440	1.196	2.000	0.5	Pass
39	2480	1.188	2.008	0.5	Pass





APPENDIX F - MAXIMUM OUTPUT POWER					

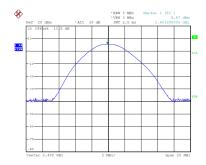


Test Mode TX Mode 1Mbps
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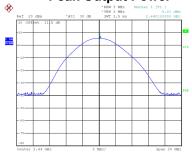
Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	5.57	0.0036	30.00	1.0000	Pass
2440	5.41	0.0035	30.00	1.0000	Pass
2480	5.22	0.0033	30.00	1.0000	Pass

Frequency (MHz)	Average Output Power (dBm)	Average Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	5.49	0.0035	30.00	1.0000	Pass
2440	5.27	0.0034	30.00	1.0000	Pass
2480	5.10	0.0032	30.00	1.0000	Pass

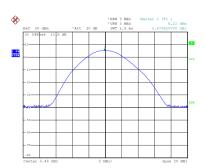






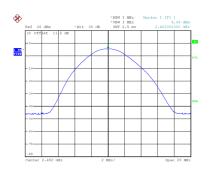


**CH39** 

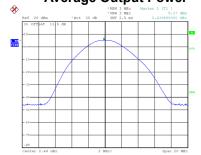


Date: 9.NOV.2021 19:18:28

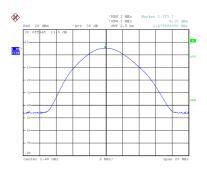
Date: 9.NOV.2021 19:19:40



# **Average Output Power**



Date: 9.NOV.2021 19:24:38



Date: 9.NOV.2021 19:20:02

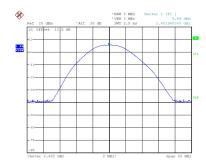
Date: 9.NOV.2021 19:20:36



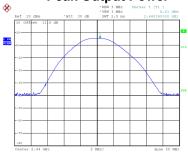
Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	5.59	0.0036	30.00	1.0000	Pass
2440	5.41	0.0035	30.00	1.0000	Pass
2480	5.23	0.0033	30.00	1.0000	Pass

Frequency (MHz)	Average Output Power (dBm)	Average Peak Output Power (W)	Max. Limit (dBm)	Max. Limit (W)	Test Result
2402	5.51	0.0036	30.00	1.0000	Pass
2440	5.32	0.0034	30.00	1.0000	Pass
2480	5.13	0.0033	30.00	1.0000	Pass

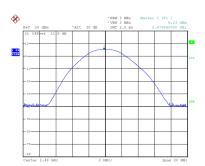




# CH19 Peak Output Power

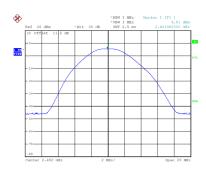


# **CH39**



Date: 9.NOV.2021 19:25:30

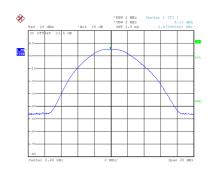
Date: 9.NOV.2021 19:21:01



# **Average Output Power**



Date: 9.NOV.2021 19:25:58



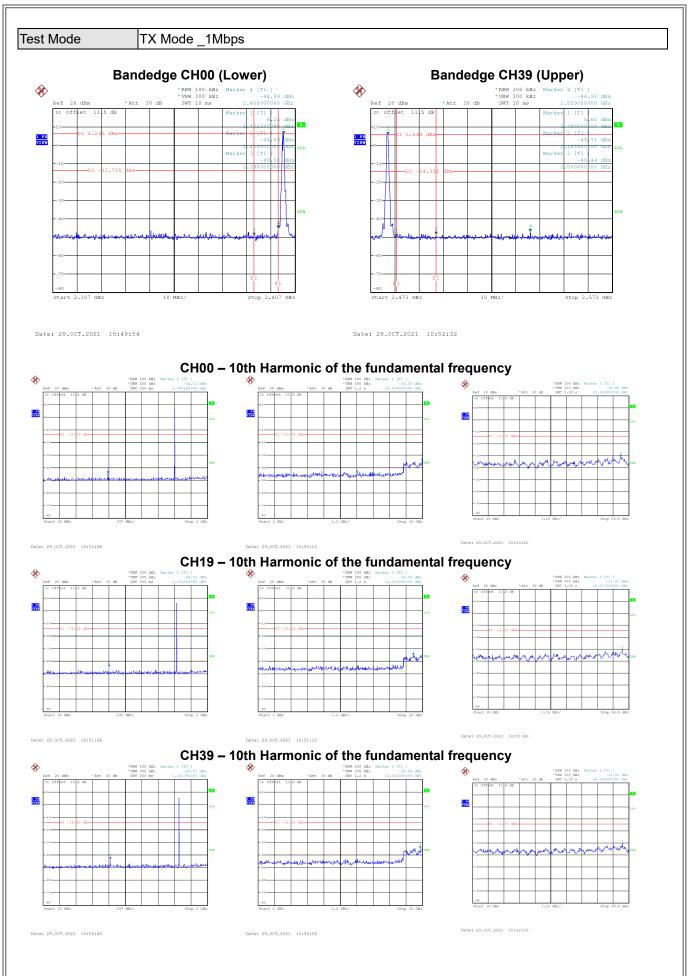
Date: 9.NOV.2021 19:21:25

Date: 9.NOV.2021 19:22:12

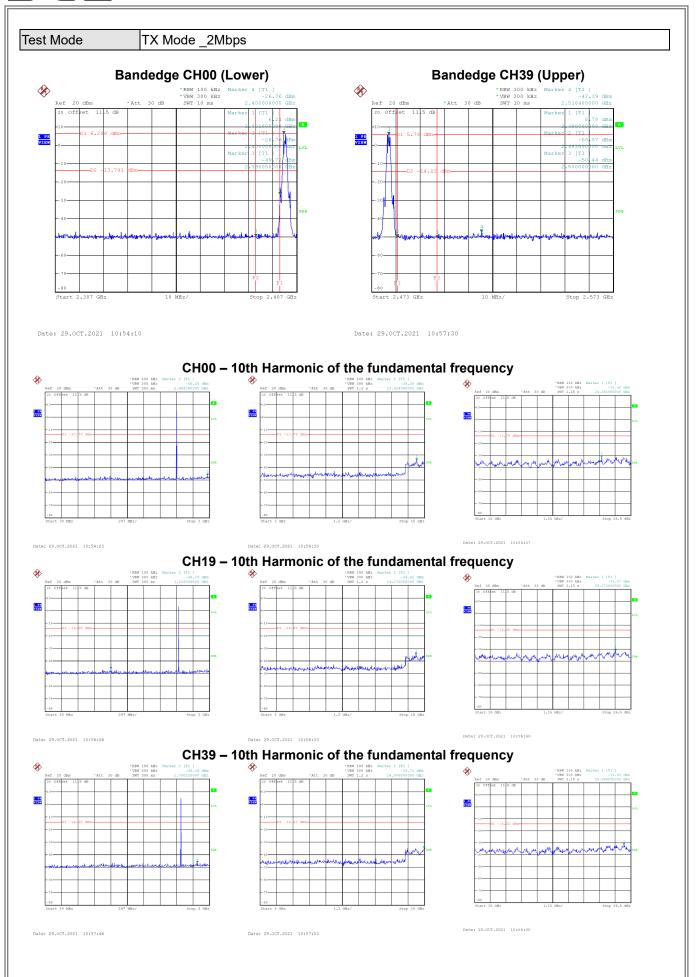


APPENDIX G - CONDUCTED SPURIOUS EMISSION					









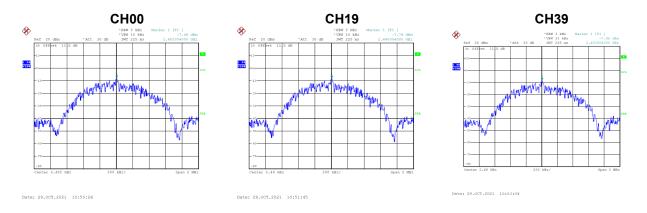


# **APPENDIX H - POWER SPECTRAL DENSITY**



Test Mode	TX Mode	1Mbps

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Max. Limit (dBm/3 kHz)	Test Result
00	2402	-7.46	8.00	Pass
19	2440	-7.76	8.00	Pass
39	2480	-7.94	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	-2.93	8.00	Pass
19	2440	-3.20	8.00	Pass
39	2480	-3.43	8.00	Pass



**End of Test Report**