

Prüfbericht-Nr.: <i>Test report no.:</i>	CN210K6S (FCC-Colocated) 001	Auftrags-Nr.: <i>Order no.:</i>	238514203	Seite 1 von 15 Page 1 of 15
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-04-27	
Auftraggeber: <i>Client:</i>	Voyetra Turtle Beach, Inc. 44 South Broadway, 4th Floor, White Plains, New York 10601, U.S.A.			
Prüfgegenstand: <i>Test item:</i>	Wireless gaming headset			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	SYN Max Air			
Auftrags-Inhalt: <i>Order content:</i>	Spot Checking Emissions (FCC)			
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.247			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021-07-01			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003083728-001			
Prüfzeitraum: <i>Testing period:</i>	2021-10-08			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>compiled by:</i>		genehmigt von: <i>authorized by:</i>		
Datum: <i>Date:</i>	2021-11-04	Ausstellungsdatum: <i>Issue date:</i>	2021-11-04	
Stellung / Position:	Assistant Project Engineer	Stellung / Position:	Senior Project Manager	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

TEST SUMMARY

Report Section	FCC Clause	Test Item	Result
5.1.1	15.247(d) & 15.205 & 15.209	Radiated Spurious Emissions and Band Edges	Pass

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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APPENDIX A - TEST RESULT OF RADIATED EMISSIONS

APPENDIX SP - PHOTOGRAPHS TEST SETUP

APPENDIX EP - PHOTOGRAPHS OF EUT

HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN210K6S (FCC-Colocated) 001	Original Release	2021-11-04

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A - Test Result of Radiated Emissions

Appendix SP - Photographs Test Setup

Appendix EP - Photographs of EUT

Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart C Section 15.247
FCC 47CFR Part 2: Subpart J Section 2.1049
ANSI C63.10:2013
KDB 558074 D01 15.247 Meas Guidance v05r02

1.2 Decision Rule of Conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

No.458-18, Sec. 2, Fenliao Rd., Linkou Dist.,
New Taipei City 244
Taiwan (R.O.C.)
FCC Registration No.: 226631
ISED Registration No.: 25563

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95% level of confidence.

Emission Measurement Uncertainty

Parameter	Uncertainty
Radiated Emission (9 kHz ~ 30 MHz)	± 1.15 dB
Radiated Emission (30 MHz ~ 200 MHz)	± 1.32 dB
Radiated Emission (200 MHz ~ 1 GHz)	± 1.31 dB
Radiated Emission (1 GHz ~ 18 GHz)	± 1.53 dB
Radiated Emission (18 GHz ~ 40 GHz)	± 2.50 dB
Mains Conducted Emission	± 1.65 dB

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Wireless gaming headset. It contains a Bluetooth and 2.4GHz compatible module enabling the user to communicate data through a Wireless interface.

For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Basic Information of EUT

Item	EUT Information
Kind of Equipment/Test Item	Wireless gaming headset
Type Identification	SYN Max Air
FCC ID	XGB-14155

Technical Specification of EUT

Item	EUT Information
Operating Frequency	2402 MHz ~ 2480 MHz
Channel Number	Bluetooth: 79 2.4GHz: 40
Operation Voltage	3.7 Vdc (Battery) 5 Vdc (USB)
Modulation	Bluetooth: GFSK, $\pi/4$ -DQPSK, 8DPSK 2.4GHz: GFSK
Accessory Device	Refer to 4.3

3.3 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.4 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use. During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output expected by the customer and is going to be fixed on the firmware of the final end product.

4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with an USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed as below.

Test Software	TestCommonUT
---------------	--------------

The samples were used as follows:
A003083728-001

Full test was applied on all test modes, but only worst case was shown.

EUT Configure Mode	Applicable To	Description
	Radiated Spurious Emissions above 1 GHz	
-	√	-

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when position on **Y-plane**.
2. "-" means no effect.

Radiated Spurious Emissions (Above 1 GHz)

- Pre-Scan full test was applied on all test modes, but only worst case was shown.
- Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode
2.4GHz_1Mbps_2402 MHz + BT_GFSK_2441 MHz

Test Condition

Test Item	Ambient Temperature	Relative Humidity	Tested by
Radiated Spurious Emissions above 1 GHz	23.1-25.1 °C	50-60 %	Hunter Wang

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Accessory of EUT

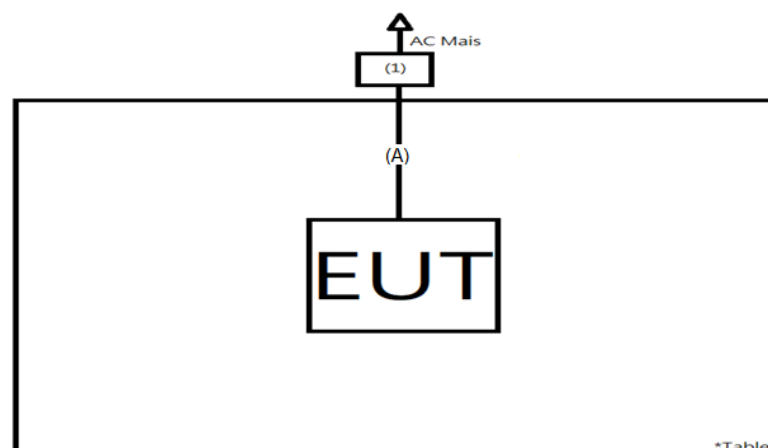
No.	Product	Brand	Model	Description
A	USB Cable 1 (A to C)	ROCCAT	SYN Max Air	150 cm shielded cable w/o core
-	USB Cable 2 (C to C)	ROCCAT	SYN Max Air	150 cm shielded cable w/o core
-	USB C to USB A Adapter	ROCCAT	SYN Max Air	--
-	Battery	Hang Zhou Future Power Technology Co., Ltd.	FT593545P	3.7 Vdc

Support Unit

Support Unit								
No	Description	Brand	Model	S/N	Shielded	Ferrite Core (Qty)	Length (cm)	Remark
1	Notebook	HP	15s-du0007TX	CND93662VF	-	-	-	--
-	Wireless Tester	R&S	CBT	100866	-	-	-	--

4.4 Test Setup Diagram

<Radiated Spurious Emissions mode>



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Radiated Spurious Emissions and Band Edges

Limit

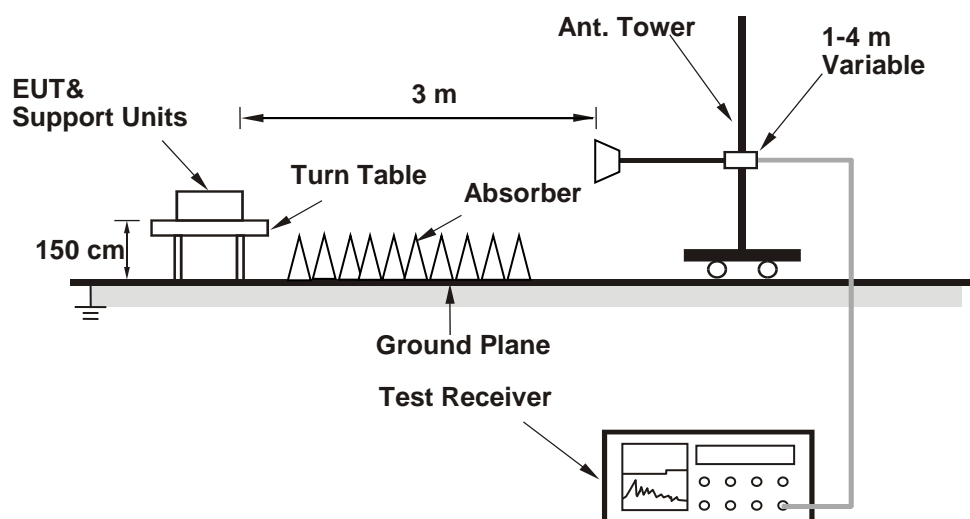
Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emission limits specified in §15.209(a).

Emissions radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in §15.247(d).

Kind of Test Site 3m Semi-Anechoic Chamber

Test Setup

<Radiated Emissions above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Test Instruments

Kind of Equipment	Manufacturer	Type	S/N	Calibration Date	Calibration Due Date
Signal Analyzer	R&S	FSV40	101508	2021/3/16	2022/3/15
Receiver	R&S	ESR7	102109	2021/3/16	2022/3/15
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2021/2/18	2022/2/17
Horn Antenna	ETS-Lindgren	3117	00218930	2020/12/1	2021/11/30
LF-AMP	Agilent	8447D	2944A10772	2021/2/18	2022/2/17
HF-AMP + AC source	EMCI	EMC051845SE	980633	2021/2/9	2022/2/8
HF-AMP + AC source	EMCI	EMC184045SE	980657	2021/2/1	2022/1/31
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2021/4/8	2022/4/7
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104EA	800056/4EA	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	804680/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 104	MY37202/4	2021/3/17	2022/3/16
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800898/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	800901/2EA	2021/4/16	2022/4/15
Microwave Cable	HUBER+SUHNER	SUCOFLEX 102EA	801027/2EA	2021/4/16	2022/4/15
Loop Antenna	Chance Most	EMCILPA600 +calibration	287	2021/1/15	2022/1/14

Test Procedures**For Radiated Emissions below 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel (OPEN), perpendicular (CLOSE), and ground-parallel (GROUND) orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated Emissions above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. 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 from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The Radiated Emissions testing was performed in the X(E1), Y(H) and Z(E2) axis orientation. The worst-case Axis orientation is recorded in this test report.

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Test Results

Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
Level (dBuV/m) = Reading (dBuV) + Factor (dB/m)

Please refer to Appendix A.

Appendix A: Test Results of Radiated Emissions

Band Edges, 2.31GHz ~ 2.9GHz

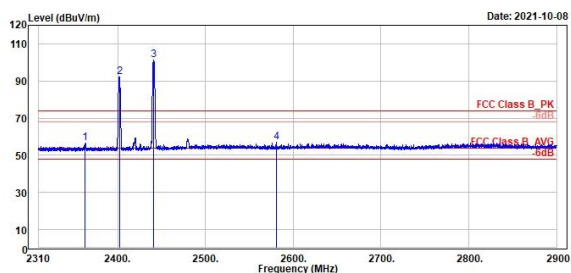
2.4GHz_1Mbps_2402 MHz + BT_GFSK_2441 MHz

(Horizontal) Peak

(Vertical) Peak



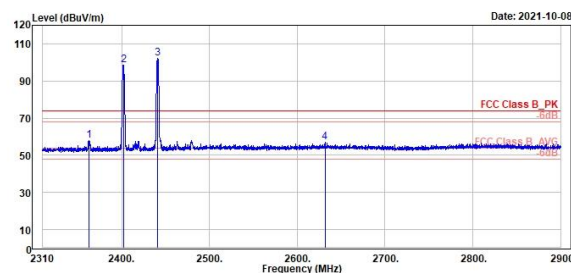
TUV Rheinland Taiwan Ltd.
No. 458-18, Sec 2, Fenliao, Linkou Dist., New Taipei City 244, Taiwan(R.O.C.)
Tel: +886-2172-1000 Fax: +886-2172-1322



1	2	3	4								
Freq	Level	Read	Limit								
MHz	dBuV/m	Level	Line								
		Factor	Limit								
		dB/m	dBuV/m								
			dB								
			Over								
			Limit								
			dB								
			APos								
			TPos								
			cm								
			deg								
			Remark								
			Pol/Phase								
			Note								
1	2362.98	56.42	19.15	37.27	74.00	-17.58	180	184	Peak	Horizontal	
2 *	2402.00	92.01	54.69	37.32	74.00	18.01	180	184	Peak	Horizontal	
3 *	2441.00	101.22	63.78	37.44	74.00	27.22	400	285	Peak	Horizontal	
4	2581.05	56.89	18.97	37.92	74.00	-17.11	400	285	Peak	Horizontal	



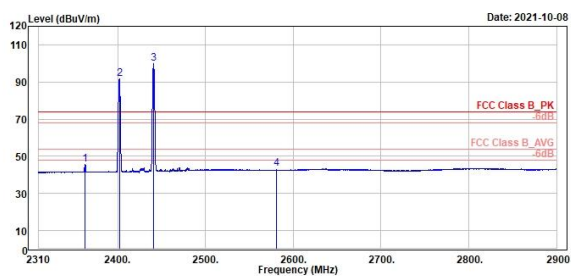
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1	2	3	4								
Freq	Level	Read	Limit								
MHz	dBuV/m	Level	Line								
		Factor	Limit								
		dB/m	dBuV/m								
			dB								
			Over								
			Limit								
			dB								
			APos								
			TPos								
			cm								
			deg								
			Remark								
			Pol/Phase								
			Note								
1	2362.98	57.81	20.54	37.27	74.00	-16.19	189	163	Peak	Vertical	
2 *	2402.00	98.39	61.07	37.32	74.00	24.39	189	163	Peak	Vertical	
3 *	2441.00	102.36	64.92	37.44	74.00	28.36	313	16	Peak	Vertical	
4	2631.55	57.00	19.08	37.92	74.00	-17.00	313	16	Peak	Vertical	

2.4GHz_1Mbps_2402 MHz + BT_GFSK_2441 MHz
(Horizontal) Average
(Vertical) Average

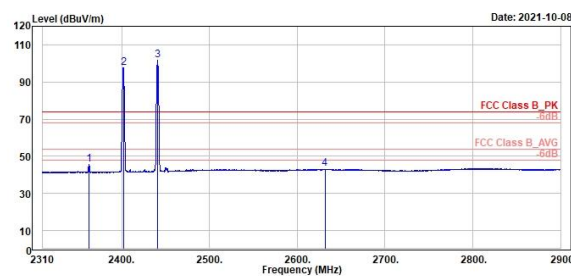

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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	2362.98	45.77	8.50	37.27	74.00	-28.23	180	184 Peak	Horizontal
2 *	2402.00	91.64	54.32	37.32	74.00	17.64	180	184 Peak	Horizontal
3 *	2441.00	99.85	62.41	37.44	74.00	25.85	400	285 Peak	Horizontal
4	2581.05	43.51	5.59	37.92	74.00	-30.49	400	285 Peak	Horizontal



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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	2362.98	45.66	8.39	37.27	74.00	-28.34	180	163 Peak	Vertical
2 *	2402.00	97.63	60.31	37.32	74.00	23.63	180	163 Peak	Vertical
3 *	2441.00	101.86	64.42	37.44	74.00	27.86	313	16 Peak	Vertical
4	2631.55	43.45	5.53	37.92	74.00	-30.55	313	16 Peak	Vertical

Spurious Emissions, Tx Mode, 1GHz ~ 26.5GHz

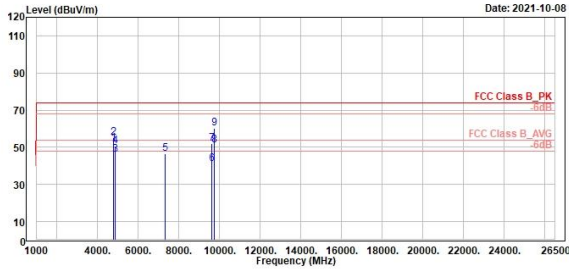
2.4GHz_1Mbps_2402 MHz + BT_GFSK_2441 MHz

Horizontal

Vertical



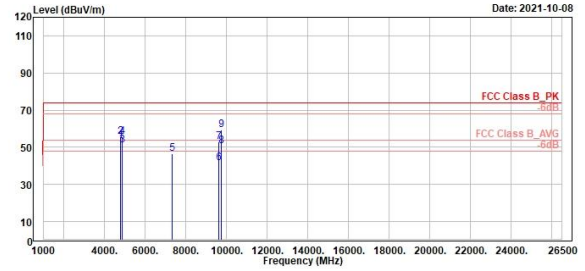
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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4894.00	52.02	61.43	-9.41	54.00	-1.98	321	59 Average	Horizontal
2	4894.00	55.31	64.72	-9.41	74.00	-18.69	321	59 Peak	Horizontal
3	4882.00	45.86	55.21	-9.35	54.00	-8.14	297	301 Average	Horizontal
4	4882.00	50.62	59.97	-9.35	74.00	-23.38	297	301 Peak	Horizontal
5	7323.00	46.68	53.22	-6.62	74.00	-27.40	400	2 Peak	Horizontal
6	9688.00	41.18	45.13	-3.95	54.00	-12.82	185	219 Average	Horizontal
7	9688.00	52.04	55.99	-3.95	74.00	-21.96	185	219 Peak	Horizontal
8	9764.00	50.94	54.49	-3.55	54.00	-3.06	100	360 Average	Horizontal
9	9764.00	60.13	63.68	-3.55	74.00	-13.87	100	360 Peak	Horizontal



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Freq	Level	Read	Limit	Over	APos	TPos	Remark	Pol/Phase	Note
MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	4894.00	53.23	62.64	-9.41	54.00	-0.77	281	290 Average	Vertical
2	4894.00	55.76	65.17	-9.41	74.00	-18.24	281	290 Peak	Vertical
3	4882.00	50.97	60.32	-9.35	54.00	-3.03	279	165 Average	Vertical
4	4882.00	55.75	65.10	-9.35	74.00	-18.25	279	165 Peak	Vertical
5	7323.00	46.68	53.30	-6.62	74.00	-27.32	204	120 Peak	Vertical
6	9688.00	41.40	45.35	-3.95	54.00	-12.60	206	79 Average	Vertical
7	9688.00	53.15	57.10	-3.95	74.00	-20.85	286	79 Peak	Vertical
8	9764.00	50.84	54.39	-3.55	54.00	-3.16	385	274 Average	Vertical
9	9764.00	59.35	62.90	-3.55	74.00	-14.65	385	274 Peak	Vertical