MEASUREMENT REPORT

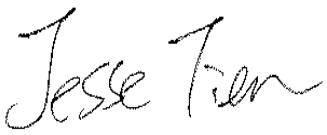
(FCC : Part 15 Subpart C (15.249) / ANSI C63.4-2014/C63.10-2013)

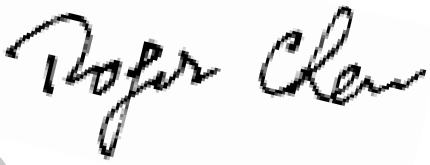
Testing Laboratory
1288

Product	:	Wireless Mouse
Trade Name	:	VAXEE
Model No.	:	AX Wireless, AX W Wireless, AX P Wireless, AX Y Wireless, AX B Wireless, AX O Wireless
Applicant	:	VAXEE Corporation
Applicant Address	:	No. 61-3, Sec. 2, Jiayuan Rd., Shulin Dist., New Taipei City 23804 , Taiwan

MLT2308P15001

Report Number	MLT2308P15001
Applicant	VAXEE Corporation
Product	Wireless Mouse
Sample Received Date	2023/08/24
Sample Tested Date	2023/08/24- 2023/09/26

Report Prepared By	Jesse Tien
Signature	
Date Prepared	2023/09/27

Report Authorized By	Roger Chen
Signature	
Date Authorized	2023/09/27

Test By

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This test report not include the evaluation of MU.
The test results only relate to the submitted test sample.

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History of Test Report

Original Report Issue Date: 2023/09/27

■ No additional attachment

☐ Additional attachments were issued as in the following record:

Attachment No.	Issue Date	Description
MLT2308P15001	2023/09/27	Original Report

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1. General Information

1.1 Introduction

The following measurement report is submitted on behalf of VAXEE Corporation In support of a Class B Digital Device certification in accordance with Part2 Subpart J and Part 15 Subpart C of the Commission's and Regulations.

1.2 Customer Details

Applicant Name	VAXEE Corporation
Applicant Address	No. 61-3, Sec. 2, Jiayuan Rd., Shulin Dist., New Taipei City 23804 , Taiwan
Manufacturer Name	VAXEE Corporation
Manufacturer Address	No. 61-3, Sec. 2, Jiayuan Rd., Shulin Dist., New Taipei City 23804 , Taiwan

1.3 Technical data of EUT

Equipment	Wireless Mouse
Model No	AX Wireless, AX W Wireless, AX P Wireless, AX Y Wireless, AX B Wireless, AX O Wireless
Model Difference	The difference among of models AX W Wireless, AX P Wireless, AX Y Wireless, AX B Wireless, AX O Wireless is different appearance colour. All covered models have electrically identical on the circuitry to each other, within the model designations for sales purposes only.
FCC ID	2A9L8-AXWL
Power Type	1) DC 5V ---- Form PC 2) DC 3.7V ---- From Battery
Type of Modulation	2402~2480 MHz
Transfer rate	GFSK
Type of Antenna	PCB Antenna
Frequency of Channel	40

During testing the EUT was operated at Tx or Rx mode for each emission measured. This was done in order to ensure that maximum emission levels were attained.

2. Report of Measurements and Examinations

2.1 List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.249(a)	. Field Strength of Fundamental Emissions	Pass
15.249(d)	. Band Edge Emissions	Pass
15.249(a)(d)	. Radiated Emissions	Pass
15.207	. Conducted Emissions	Pass
15.215(c)	. 20dB Bandwidth	Pass
15.203	. Antenna Requirements	Pass

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3. Test Configuration of Equipment under Test

3.1 Carrier Frequency of Channels

Channel	Freq.(MHz)	Channel	Freq.(MHz)	Channel	Freq.(MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476
10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454		
13	2428	27	2456		

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3.2 Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10.

b. The complete test system included PC and EUT for RF test.

c. An executive “Engineering mode” was executed to keep transmitting and receiving data via Wireless.

d. After the Wireless Mouse is connected to the USB cable, it will automatically switch to wired
mode and charging function, and there is no radio feature, so only use the battery test.

e. New battery was used for all testing and the worst radiated emission.

f. The following test modes were performed for test:

- GFSK: CH 00: 2402MHz, CH 19: 2440MHz, CH 39: 2480MHz.

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3.3 TEST Methodology & General Test Procedures

All testing as described bellowed were performed in accordance ANSI C63.4:2014, C63.10:2013 and FCC CFR 47 Part 15 Subpart C.

Conducted Emissions

The EUT is placed on a wood table, which is at 0.8 m above ground plane acceding to clause 15.207 and requirements of ANSI C63.4 and C63.10. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz are using CISPR Quasi-Peak / Average detectors. The resolution bandwidth of test receiver/spectrum analyzer is 9 KHz and video bandwidth is 120 KHz.

Radiated Emissions

The EUT is a placed on a turn table, which is 0.8 m (1.5 m for above 1 GHz) above ground plane. The turntable was rotated through 360 degrees to determine the position of maximum emission level. The EUT is placed at 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

1) Putting the EUT on the platform and turning on the EUT (on/off button on the bottom of the EUT).
2) Setting test channel described as “Channel setting and operating condition”, and testing channel by channel.
3) For the spurious emission test based on ANSI C63.4 and C63.10, the resolution bandwidth of test receiver/spectrum analyzer is 120 KHz and video bandwidth is 300 KHz for Quasi-peak detection at frequency 30 MHz~1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz RMS detector for Average Value at frequency above 1GHz.

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3.4 Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameter	MU
Radio Frequency	±22.4 Hz
Total RF power (conducted)	±3.63 dB
RF power density (conducted)	±3.62 dB
Spurious emissions (conducted)	±3.62 dB
All emissions (radiated)	±3.95 dB

3.5 Description of the Support Equipments

Setup Diagram

See test photographs attached in appendix 1 for the actual connections between EUT and support equipment.

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4. Test and measurement equipment

4.1 Calibration

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2 Equipment

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and. Other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

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3.3 Test Equipment List:

Item	Instrument	Mfr/Brand	Model No.	Serial No	Calibrated Date	Next Cal. Date
1.	Pre Amplifier	MLT	PREAMP6G-01	20110209	2023/03/08	2024/03/08
2.	Pre Amplifier	MLT	PREAMP6G-02	20110301	2023/03/08	2024/03/08
3.	Biconilog Antenna	EMCO	3142C	00044568	2022/10/11	2023/10/11
4.	Spectrum Analyzer	Agilent	E7403A	US40240137	2023/01/12	2024/01/12
5.	LISN	EMCO	3825/2	2658	2022/12/20	2023/12/20
6.	Spectrum Analyzer	Agilent	E4446A	US44300422	2023/03/08	2024/03/08
7.	Home Antenna	SCHWARZBECK	BBHA 9120D	304	2023/02/03	2024/02/03
8.	Spectrum Analyzer	Agilent	E4407B	US44300422	2023/03/08	2024/03/08
9.	Pre Amplifier	TA	0.10~19.1GHz 60dBm	RF01	2022/10/03	2023/10/03
10.	Spectrum Analyzer	Agilent	N9010A	MY50060164	2022/11/29	2023/11/29
11.	Spectrum Analyzer	Agilent	N9020A	MY46471764	2022/12/21	2023/12/21
12.	Loop Antenna	EMCO	1493	6570	2023/02/03	2024/02/03
13.	Schwarzbeck	Horn Antenna	BBHA 9170	9170181	2022/11/29	2023/11/29
14.	Herotek	Pre Amplifier	A402-417	306090	2022/12/21	2023/12/21

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5. Antenna Requirements

5.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The device meets the requirements because it uses a fixed antenna and is not user replaceable.

5.2 Antenna Construction and Directional Gain

Antenna Type: PCB Antenna
Antenna Gain: 1.3 dBi (Manufacturer Provide)

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6. Test of Conducted Emission

6.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2014. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

6.2 Test Procedures

a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched.
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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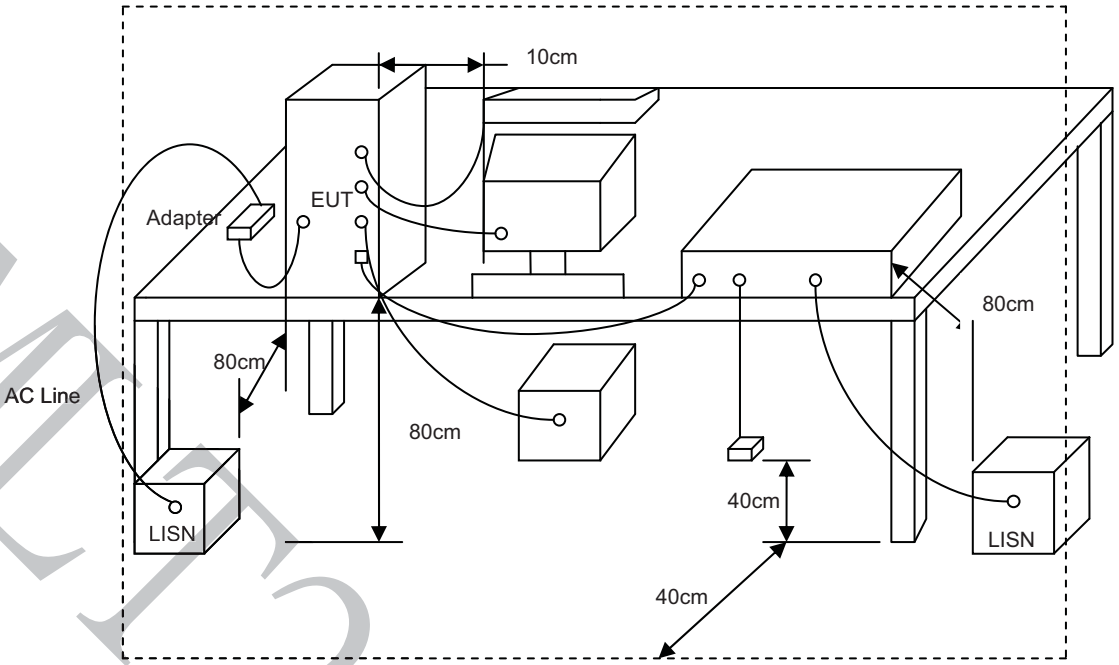
6.3 Typical Test Setup



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6.4 Test Result and Data

The following table shows a summary of the highest emissions of power line conducted emissions to the HOT and NEUTRAL conductor of the EUT power.

Test Mode : Charge

Conducted Emissions (Class B)										
Test Port	Freq (MHz)	Read(dBuV)		Factor	Limits (dBuV)		Amplitude (dBuV)		Margin (dBuV)	
		QP	AV		QP	AV	QP	AV	QP	AV
L1	0.180	56.39	49.89	64.49	54.49	56.30	49.80	0.09	-8.10	-4.60
	0.240	42.60	--	62.11	52.11	42.52	--	0.08	-19.51	--
	0.299	34.25	--	60.26	50.26	34.19	--	0.06	-26.01	--
	8.518	36.44	--	60	50	35.86	--	0.58	-23.56	--
	10.657	40.42	--	60	50	39.78	--	0.64	-19.58	--
	13.851	43.57	--	60	50	42.89	--	0.68	-16.43	--
	18.896	51.47	38.49	60	50	50.67	37.69	0.80	-8.53	-11.51
L2	0.180	56.02	49.76	64.49	54.49	55.92	49.66	0.10	-8.47	-4.73
	0.210	44.12	--	63.22	53.22	44.03	--	0.09	-19.10	--
	0.240	43.18	--	62.11	52.11	43.10	--	0.08	-18.93	--
	8.647	36.03	--	60	50	35.42	--	0.61	-23.97	--
	10.677	37.73	--	60	50	37.07	--	0.66	-22.27	--
	14.160	42.89	--	60	50	42.20	--	0.69	-17.11	--
	18.577	49.76	32.34	60	50	48.98	31.56	0.78	-10.24	-17.66

Notes : 1. L1: One end & Ground L2: The other end & Ground

2. Height of table on which the EUT was placed : 0.8 m.
3. The Quasi-Peak Value have already met the Average Value Limit showed on above limits.
4. The above test results are obtained under the normal condition.
5. Amplitude = Read + Factor

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7. Test of Radiated Emission

7.1 Test Limit

Radiated Emissions were measured from 9 KHz to 25 GHz and return leads of the EUT according to the methods defined in ANSI C63.4-2014 and C63.10-2013. In any 100kHz bandwidth. Field strength limits are specified at a distance of 3 meters. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emis-sion limits in §15.209, whichever is the lesser attenuation. for frequencies above 1000 MHz, the field strength limits in paragraphs of this section are based on average limits. the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under 24.05–24.25 GHz band subject to the following condition. The peak field strength shall not exceed 2500 millivolts/m at 3 meters .

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (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

Fundamental Frequency (MHz)	Field strength of fundamental (dBuV/m)		Field strength of harmonics (dBuV/m)	
Detector	Peak	Average	Peak	Average
902 - 928 2400 – 2483 5725 - 5875	114	94	74	54
24.0 - 24.25	128	108	88	68

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7.2 Test Procedures

a. The EUT was placed on a rotatable table top 0.8 meter above ground (30 MHz to 1 GHz).

b. The EUT was placed on a rotatable table top 1.5 meter above ground (above 1 GHz).

c. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.

d. The table was rotated 360 degrees to determine the position of the highest radiation.

e. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.

f. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.

g. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.

h. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

i. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

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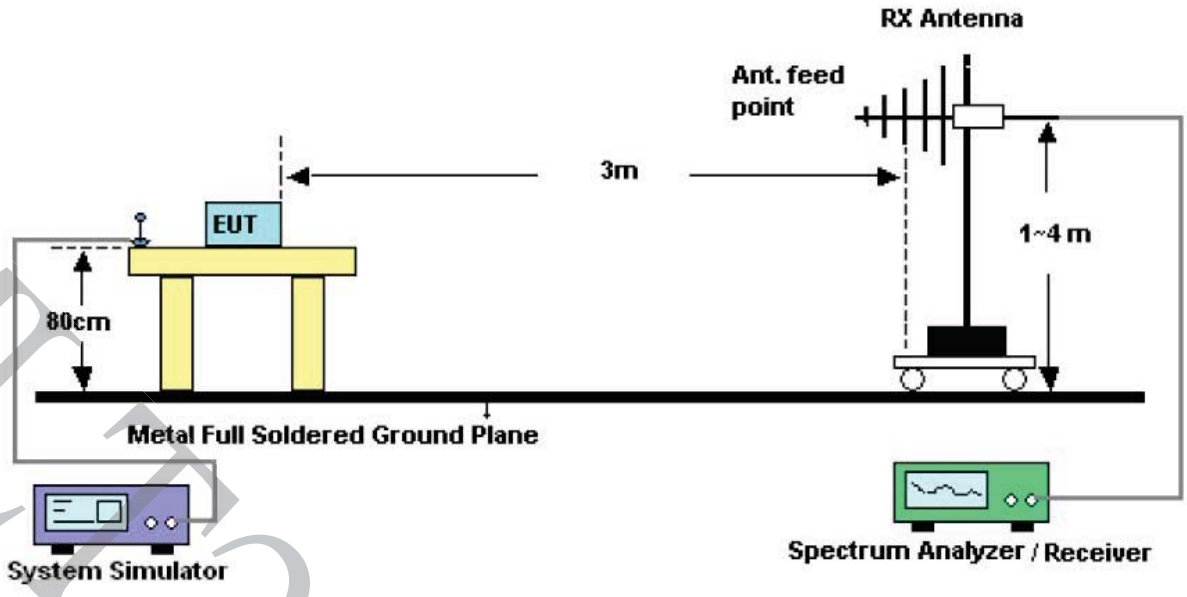
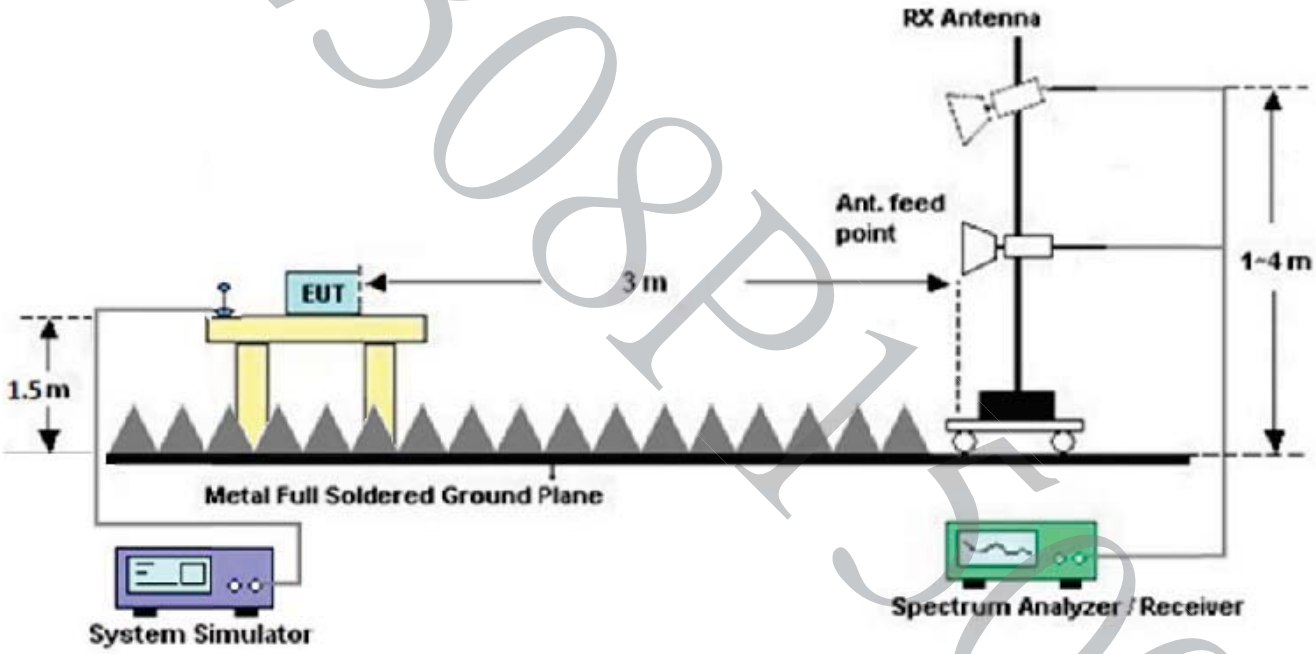
7.3 Typical Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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7.4 Test Result and Data (Fundamental)

Power	:	DC 3.7V			
Test Mode	:	CH0	Temperature	:	27 °C
Test Date	:	SEP. 13, 2023	Humidity	:	61%
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2401.88	112.03	--	-22.08	89.95	--	114	94	-24.05	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2402.00	110.98	--	-22.07	88.91	--	114	94	-25.09	--

Notes : 1. Amplitude = Reading Amplitude + Factor

2. Factor = Antenna Factor + Cable Loss – Amplifier Gain
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz RMS detector for Average Value at frequency above 1GHz
5. The Peak Value have already met the Average Value Limit showed on above limits.
6. Margin<0 is Pass , Margin≧0 is Fail.

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Power	:	DC 3.7V			
Test Mode	:	CH19	Temperature	:	27 °C
Test Date	:	SEP. 13 2023	Humidity	:	61%
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2439.89	112.25	--	-22.07	90.18	--	114	94	-23.82	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2439.79	110.35	--	-22.07	88.28	--	114	94	-25.72	--

Notes : 1. Amplitude = Reading Amplitude + Factor

2. Factor = Antenna Factor + Cable Loss – Amplifier Gain
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz RMS detector for Average Value at frequency above 1GHz
5. The Peak Value have already met the Average Value Limit showed on above limits.
6. Margin<0 is Pass , Margin≧0 is Fail.

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Power	:	DC 3.7V			
Test Mode	:	CH39	Temperature	:	27 °C
Test Date	:	SEP. 13, 2023	Humidity	:	61%
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2479.91	111.44	--	-22.55	88.89	--	114	94	-25.11	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2479.72	110.47	--	-22.55	87.92	--	114	94	-26.08	--

Notes : 1. Amplitude = Reading Amplitude + Factor

2. Factor = Antenna Factor + Cable Loss – Amplifier Gain
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz RMS detector for Average Value at frequency above 1GHz
5. The Peak Value have already met the Average Value Limit showed on above limits.
6. Margin<0 is Pass , Margin≧0 is Fail.

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7.5 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

7.6 Test Result and Data (30MHz ~ 1GHz, worst emissions found)

Power	:	DC 3.7V			
Test Mode	:	CH19	Temperature	:	27 °C
Test Date	:	SEP. 08, 2023	Humidity	:	65 %
Memo	:				

Radiated Emissions (VERTICAL)					
Frequency (MHz)	Read (dBuV)	Factor	Amplitude (dBuV/m)	Limits (dBuV/m)	Margin (dB)
31.97	42.31	-13.67	28.64	40	-11.36
119.93	44.41	-24.31	20.10	43.5	-23.40
189.67	44.93	-20.20	24.73	43.5	-18.77
572.84	36.35	-6.20	30.15	46	-15.85
607.86	35.92	-4.21	31.71	46	-14.29
951.15	35.07	3.10	38.17	46	-7.83

Radiated Emissions (HORIZONTAL)					
Frequency (MHz)	Read (dBuV/m)	Factor	Amplitude (dBuV/m)	Limits (dBuV/m)	Margin (dB)
31.33	34.94	-12.86	22.08	40	-17.92
412.65	36.06	-11.72	24.34	46	-21.66
657.25	37.13	-4.05	33.08	46	-12.92
759.54	36.42	-1.10	35.32	46	-10.68
952.37	35.13	3.06	38.19	46	-7.81
995.01	34.65	2.96	37.61	54	-16.39

Notes :

1. Amplitude = Reading Amplitude + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier Gain
3. The resolution bandwidth of test receiver/spectrum analyzer is 120 KHz and video bandwidth is 300 KHz for Quasi-peak detection at frequency 30 MHz~1GHz.
4. Margin<0 is Pass , Margin≧0 is Fail.

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7.7 Test Result and Data (Above 1GHz)

Power	:	DC 3.7V			
Test Mode	:	CH0	Temperature	:	27 °C
Test Date	:	SEP. 13, 2023	Humidity	:	61 %
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
1596.67	71.85	--	-25.15	46.70	--	74	54	-27.30	--
1880.00	66.54	--	-24.77	41.77	--	74	54	-32.23	--
2216.67	66.63	--	-21.93	44.70	--	74	54	-29.30	--
11425.00	46.54	--	-1.52	45.02	--	74	54	-28.98	--
14825.00	47.39	--	3.65	51.04	--	74	54	-22.96	--
17150.00	43.36	--	9.49	52.85	--	74	54	-21.15	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
1600.00	67.66	--	-25.16	42.50	--	74	54	-31.50	--
2176.67	60.70	--	-21.97	38.73	--	74	54	-35.27	--
2973.33	59.29	--	-21.26	38.03	--	74	54	-35.97	--
11575.00	48.63	--	-2.84	45.79	--	74	54	-28.21	--
14850.00	46.26	--	3.35	49.61	--	74	54	-24.39	--
17125.00	43.20	--	9.45	52.65	--	74	54	-21.35	--

Notes :

1. Amplitude = Reading Amplitude + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier Gain
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.

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4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz RMS detector for Average Value at frequency above 1GHz
5. Where limits are specified for both average and peak detector functions, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement at frequency above 1GHz.

6.The Peak Value have already met the Average Value Limit showed on above limits.

7. Margin<0 is Pass , Margin≧0 is Fail.

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Power	:	DC 3.7V			
Test Mode	:	CH19	Temperature	:	27°C
Test Date	:	SEP. 13, 2023	Humidity	:	61 %
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
1596.67	71.47	--	-25.15	46.32	--	74	54	-27.68	--
2123.33	66.24	--	-22.91	43.33	--	74	54	-30.67	--
2286.67	65.64	--	-21.90	43.74	--	74	54	-30.26	--
11125.00	46.22	--	-1.50	44.72	--	74	54	-29.28	--
14725.00	46.31	--	3.75	50.06	--	74	54	-23.94	--
17150.00	43.08	--	9.49	52.57	--	74	54	-21.43	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
1020.00	64.58	--	-25.96	38.62	--	74	54	-35.38	--
2333.33	60.18	--	-22.22	37.96	--	74	54	-36.04	--
2970.00	59.28	--	-21.25	38.03	--	74	54	-35.97	--
11475.00	46.64	--	-1.67	44.97	--	74	54	-29.03	--
14825.00	45.96	--	3.65	49.61	--	74	54	-24.39	--
17125.00	43.55	--	9.45	53.00	--	74	54	-21.00	--

Notes :

1.The Peak Value have already met the Average Value Limit showed on above limits.

2. Margin<0 is Pass , Margin≧0 is Fail.

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Power	:	DC 3.7V			
Test Mode	:	CH39	Temperature	:	27 °C
Test Date	:	SEP. 13, 2023	Humidity	:	61 %
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
1596.67	71.55	--	-25.15	46.40	--	74	54	-27.60	--
2093.33	65.69	--	-23.24	42.45	--	74	54	-31.55	--
2283.33	65.97	--	-21.93	44.04	--	74	54	-29.96	--
11475.00	46.36	--	-1.67	44.69	--	74	54	-29.31	--
14600.00	46.66	--	2.90	49.56	--	74	54	-24.44	--
17125.00	43.18	--	9.45	52.63	--	74	54	-21.37	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
1206.67	63.25	--	-25.24	38.01	--	74	54	-35.99	--
2313.33	60.67	--	-22.06	38.61	--	74	54	-35.39	--
2893.33	59.63	--	-21.34	38.29	--	74	54	-35.71	--
11150.00	45.97	--	-1.42	44.55	--	74	54	-29.45	--
14825.00	46.28	--	3.65	49.93	--	74	54	-24.07	--
17125.00	44.00	--	9.45	53.45	--	74	54	-20.55	--

Notes :

1.The Peak Value have already met the Average Value Limit showed on above limits.

2. Margin<0 is Pass , Margin≧0 is Fail.

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7.8 Test Result and Data (Band Edge)

Power	:	DC 3.7V			
Test Mode	:	CH0	Temperature	:	27 °C
Test Date	:	SEP. 13, 2023	Humidity	:	61%
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2391.22	71.10	--	-22.24	48.86	--	74	54	-25.14	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2335.42	69.64	--	-22.25	47.39	--	74	54	-26.61	--

Notes : 1. Amplitude = Reading Amplitude + Factor

2. Factor = Antenna Factor + Cable Loss – Amplifier Gain
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz RMS detector for Average Value at frequency above 1GHz
5. The Peak Value have already met the Average Value Limit showed on above limits.
6. Margin<0 is Pass , Margin≧0 is Fail.

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Power	:	DC 3.7V			
Test Mode	:	CH39	Temperature	:	27 °C
Test Date	:	SEP. 13, 2023	Humidity	:	61%
Memo	:				

Radiated Emissions (VERTICAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2483.55	69.64	--	-22.54	47.10	--	74	54	-26.90	--

Radiated Emissions (HORIZONTAL)									
Frequency (MHz)	Read (dBuV)		Factor	Amplitude (dBuV/m)		Limits (dBuV/m)		Margin (dB)	
	PK	AV		PK	AV	PK	AV	PK	AV
2483.66	67.86	--	-22.54	45.32	--	74	54	-28.68	--

Notes : 1. Amplitude = Reading Amplitude + Factor

2. Factor = Antenna Factor + Cable Loss – Amplifier Gain
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3 MHz RMS detector for Average Value at frequency above 1GHz
5. The Peak Value have already met the Average Value Limit showed on above limits.
6. Margin<0 is Pass , Margin≧0 is Fail.

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8. 20dB Bandwidth Measurement

8.1 Test Setup

Please refer to section 7.3 (for radiated emissions above 1GHz).

8.2 Test Limit

N/A

8.3 Test Procedures

a. Set RBW=30KHz and VBW=100 KHz.
b. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.
c. The 20dB Bandwidth was measured and recorded.

8.4 Test Data

Test Date: SEP. 26, 2023 Temperature: 27 ℃
Atmospheric pressure: 1007 hPa Humidity: 60 %

Modulation Type	Channel	Frequency (MHz)	20dB Bandwidth (MHz)
GFSK	0	2402	1.23
	19	2440	1.19
	39	2480	1.23

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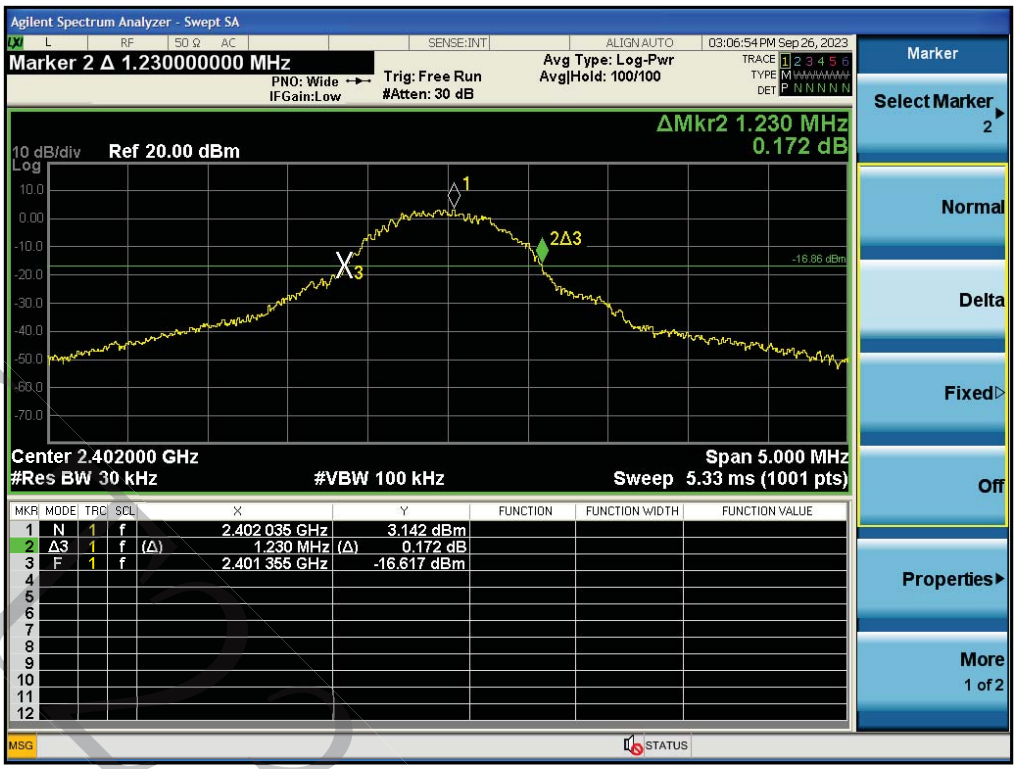
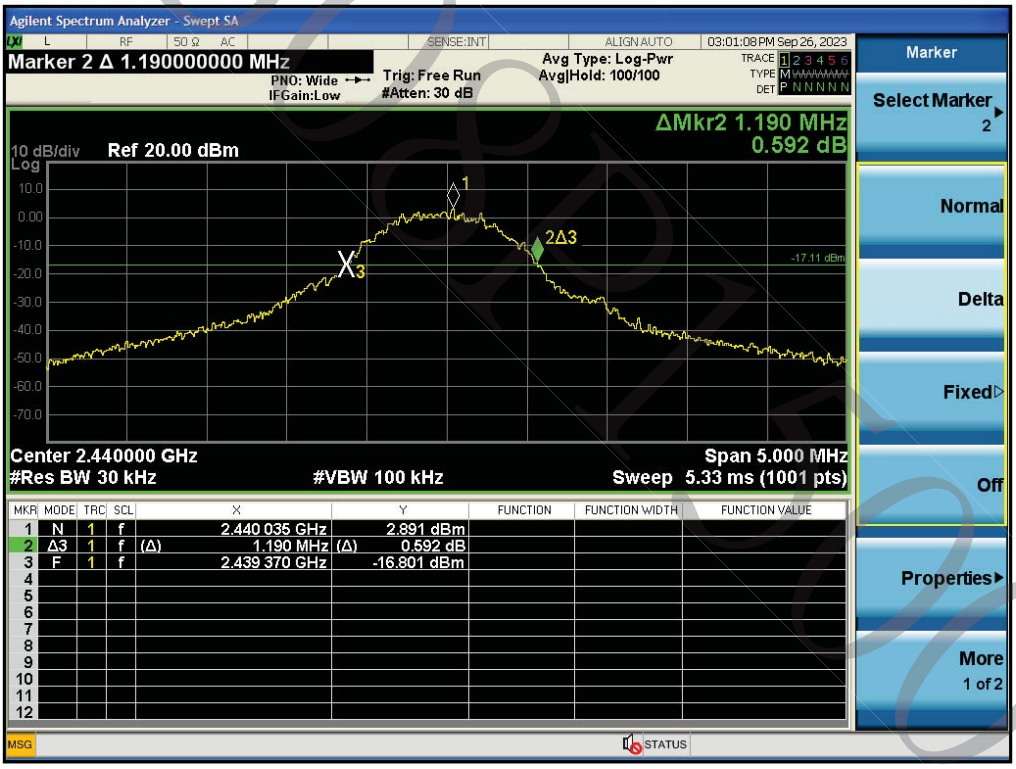
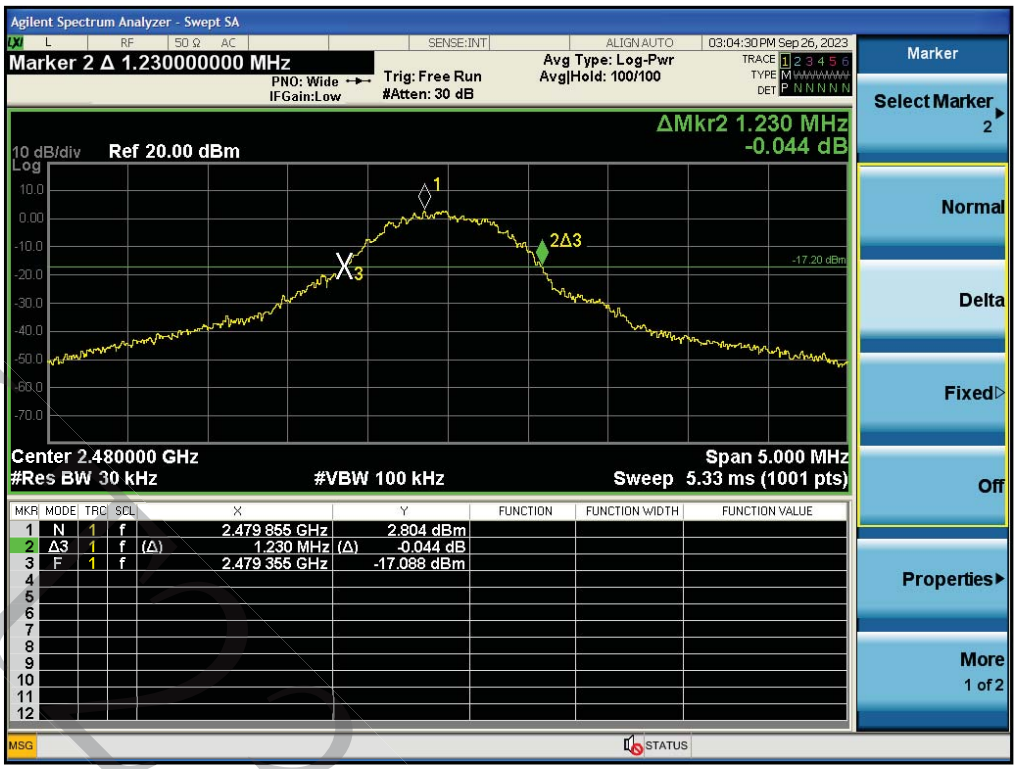
Modulation Standard: GFSK
Channel: 0



Modulation Standard: GFSK
Channel: 19



Modulation Standard: GFSK
Channel: 39



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9. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.150
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

**: Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

9.1 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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