

Test Report

1/16

Report No.
FCC IDC3115979
IOWRMO221UPSpecifications
Test Method
ApplicationFCC Part 15, Class B
ANSI C63.4 1992
☒Original ☐Class II ChangesApplicant
Applicant
addressChic Technology Corp.
16F, No. 150, Chien-I Road, 235 Chung Ho City,
Taipei Hsien, Taiwan, R.O.C.Product name
Items tested
Model No.
Sample No.
EUT Condition
Frequency RangeMini Wireless Optical Mouse(Chargeable)
Wireless Optical Mouse
RMO221UP
C31978
☒Engineering sample ☐Pre-production ☐Final production
26.96MHz to 27.28MHzResults
Date**Compliance** (As detailed within this report)
08/19/2003 (month / day / year)(Sample received)
10/01/2003 (month / day / year)(Tested)

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Issue date

December 8, 2003

(month / day / year)

Modifications

None

Tested by

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- *The test data in this test report are following the procedures in accordance with the terms of accreditation.*
- *This test report and measurements made by TRC are traceable to the NIST only Conducted and Radiated Method (TRC is accredited by NVLAP, code No.: 200174-0).*
- *The device has been tested is fully complied with the requirements the Directive FCC Part 15.*

Report No.: C3115979

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Chapter 1 Introduction

Description of EUT:

EUT : Wireless Optical Mouse and Receiver
Model No. : RMO221UP
Product name : Mini Wireless Optical Mouse(Changeable)
Frequency Range : 26.96 – 27.28 MHz
Power Type : Transmitter: Powered by two 1.5VDC AA batteries

*This EUT has two channels (each with 256 IDs):

1. 27.0450 MHz
2. 27.0950 MHz

Test method:

Pretest was found that the emission of operating mode is worse than standby mode. So, The final test is made at the operating mode.

During the measurement, the following mode were tested:

- Tx radiated on channel 1
- Tx radiated on channel 2
- Charging

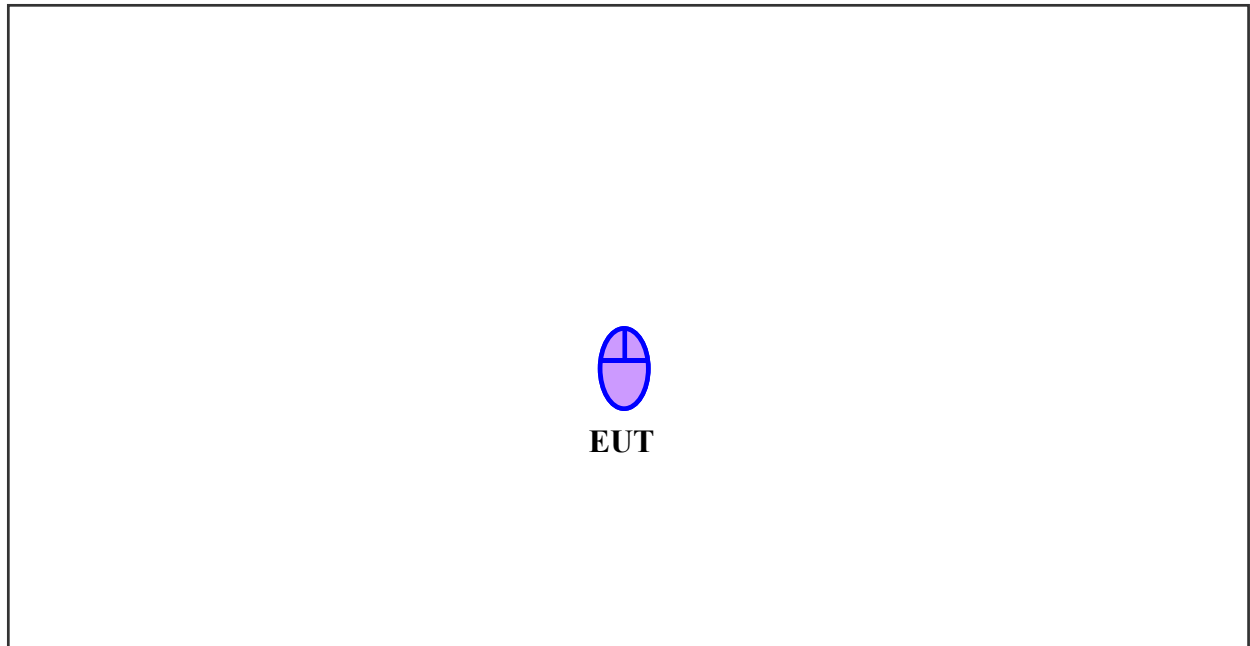
The radiation pretest was found out “Tx radiated on channel 1” was the worst case and we only recorded this data in this report.

While testing, the EUT was made to transmit continuously and adjusted at a position, which transmitted the maximum emission.

The test placement as the photographs showed is the worst case emission placed. (If the emission is close to the ambient, the resolution BW and view resolution will be reduced and the data will be recorded by detection of maximum hold peak mode.)

The testing configuration of test setup is showing in the next page.
There is no deviation from standard test method.

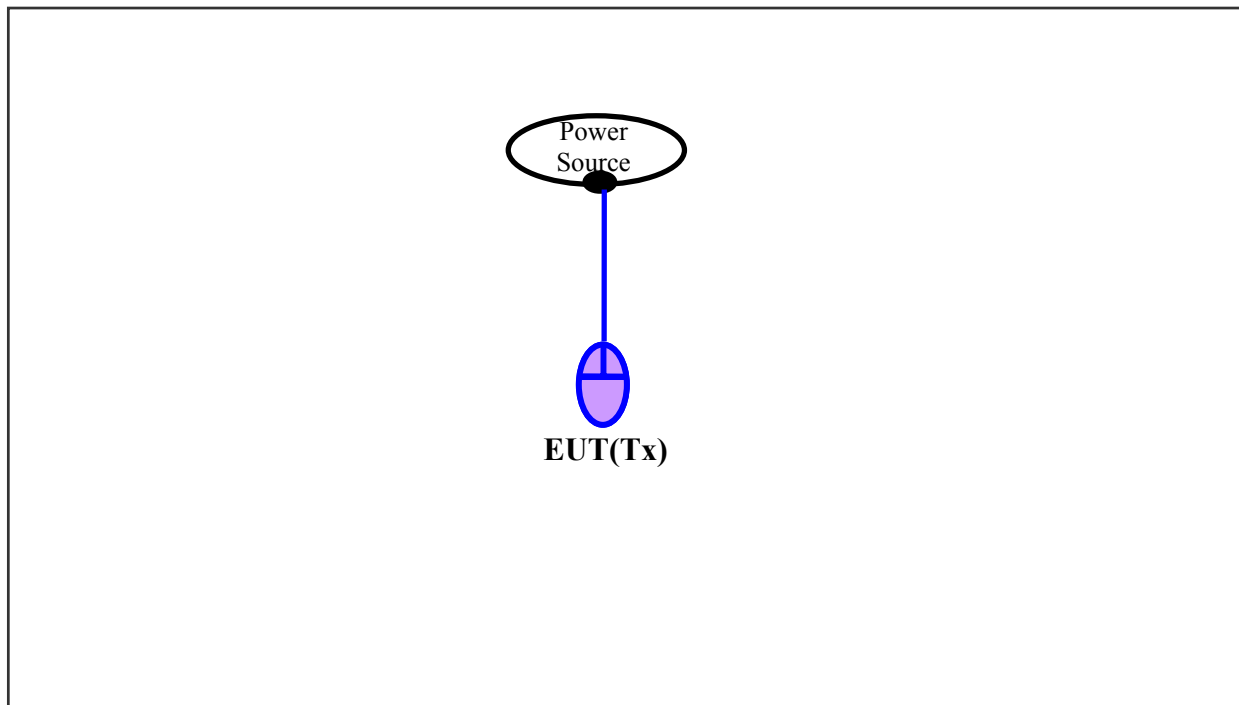
Configuration of Test Setup



EUT:

Put two AA size, 1.5V battery into the battery cell of EUT, powers the subject device.
The EUT does not be connected with any product.

Configuration of Test Setup (Test mode: “Charging”)



Connections:

EUT(Tx):

*Put two AA size, 1.5V battery into the battery cell of EUT, powers the subject device.

The EUT does not be connected with any product.

*Power jack --- via a power adaptor that with a 1.85m length power cable to the power source.

List of Support Equipment

Conducted (Radiated) test:

None

Chapter 2 Conducted Emission Test

Test Condition and Setup:

All the equipment is placed and setup according to the ANSI C63.4 – 1992. The EUT is assembled on a wooden table that is 80 cm high, is placed 40 cm from the back-wall that is a vertical conducting plane. One LISN is for EUT, the other LISN is for support equipment. They are all placed on the conductive ground. The EUT's LISN connect a line switch box for selecting L1 or L2, then connect to a preamplifier and Spectrum.

The spectrum measured from 150KHz to 30MHz. Conducted emission levels are detected at max. peak mode. But if the max. peak mode failed or over average limit, it will be measured by QP and average detection mode using the Receiver.

Final AC Power line Conducted Emission Measurement set the measurement equipment in Average Detector mode, Re-test all the frequencies that conducted emission level over the limit, if the Quasi-Peak Detector measurement result higher than the Average Detector measurement result 6 dB above at same frequency, than that frequency emission type category as Broad Band Noise. The Quasi-Peak Detector measure result will minus 13dB. As measured result.

While testing, there is the worst-emission plot printed at peak detection mode, and there are more than 6 highest emissions relative to limit recorded. The plot is kept as the original data, not included in test report.

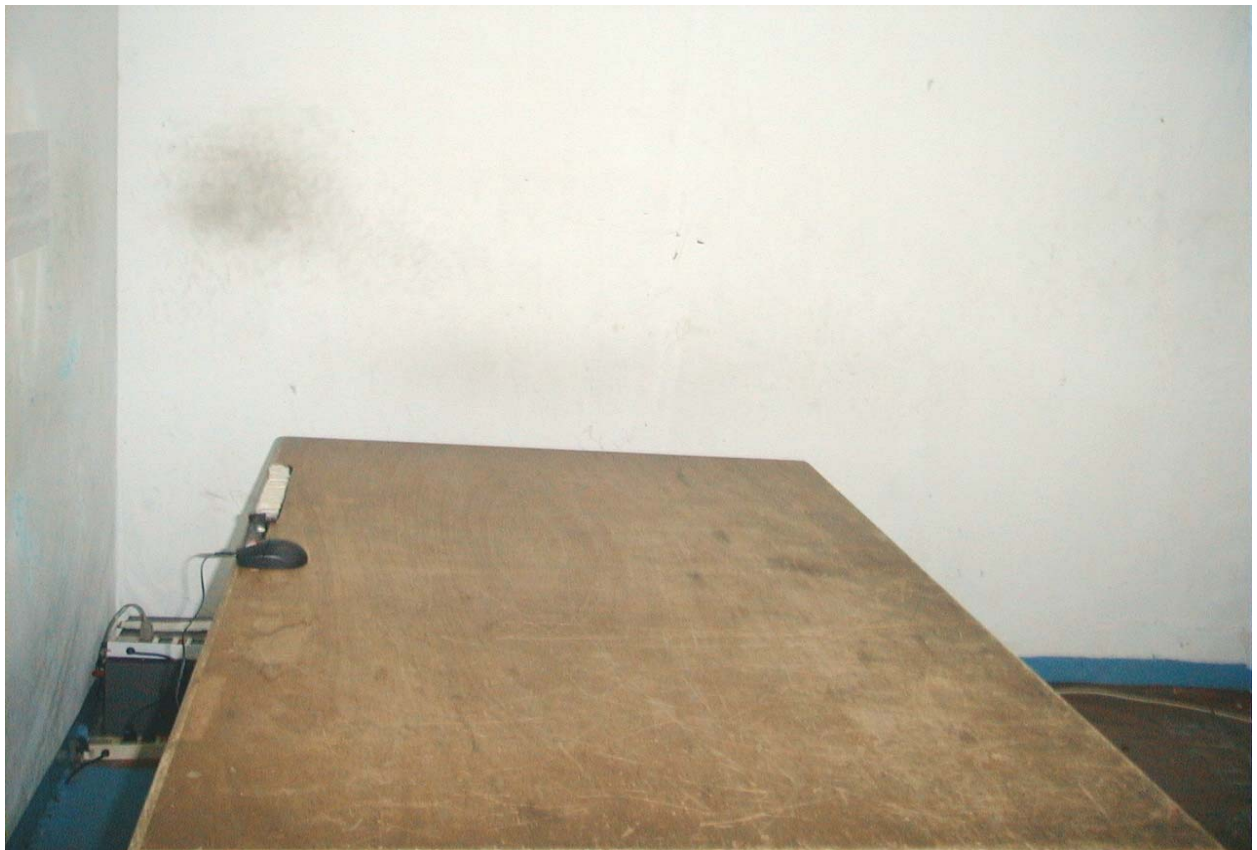
List of test Instrument :

Instrument Name	Model No.	Brand	Serial No.	<u>Calibration Date</u>	
				Last time	Next time
Spectrum analyzer	8591EM	H P	3710A01203	05/21/03	05/20/04
LISN (EUT)	3825/2	EMCO	9411-2284	07/21/03	07/20/04
LISN (Support E.)	3825/2	EMCO	9210-2007	09/03/03	09/02/04
Preamplifier	CB-001	TRC	98-02	05/29/03	05/28/04
Line switch box	CB-01	TRC	98-04	05/29/03	05/28/04
1dB Attenuator	CAT-1	mini-circuits	-----	05/29/03	05/28/04
FTB-1-6 Attenuator	15542	mini-circuits	9620 03	05/29/03	05/28/04
20dB Attenuator	CAT-20	mini-circuits	9620 13	05/29/03	05/28/04
3dB Attenuator	CAT-3	mini-circuits	9620 14	05/29/03	05/28/04
Coixal Cable	BNC3200B-0058	Jyebao	CL-05	05/29/03	05/28/04
Coixal Cable	BNC31VB-0316	Jyebao	IF-01ca0069-036	05/29/03	05/28/04
50ohm terminator	370BNM	NARDA	PWR5W	07/21/03	07/20/04
50ohm terminator	370BNM	NARDA	PWR5W	07/21/03	07/20/04
50ohm terminator	370BNM	NARDA	PWR5W	09/03/03	09/02/04
50ohm terminator	370BNM	NARDA	PWR5W	09/03/03	09/02/04

The level of confidence of 95% , the uncertainty of measurement of conducted emission is +3.1/-4.84 dB .

Test Result: Pass

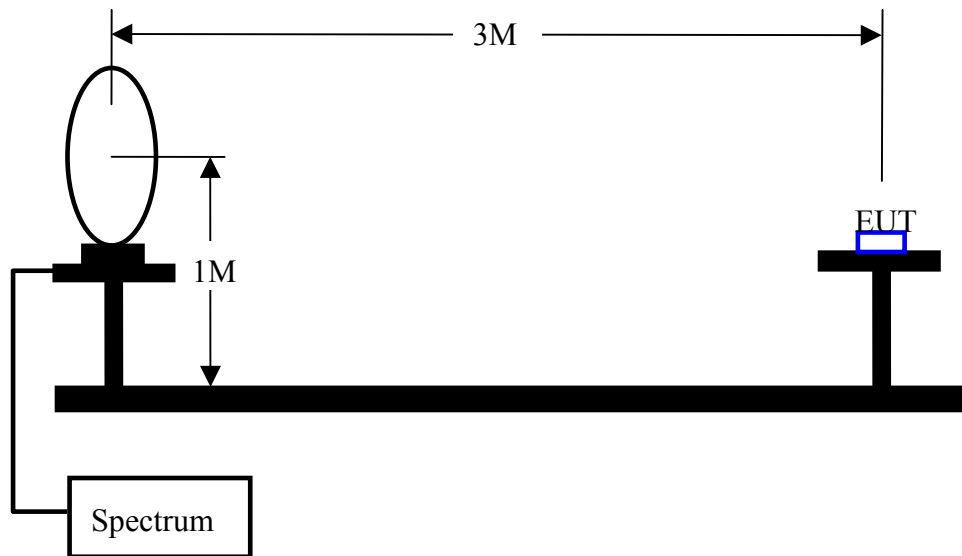
Conducted Test Placement: (Photographs) (Test Mode: Charging)



Chapter 3 Peak Power Measurement (Frequency Band: 26.96 ~ 27.28)

Test Setup:

1. Test Setup:



2. Test Procedure:

- The EUT was setup in the anechoic chamber as shown above.
- The loop antenna was located upon its plane vertical, 3-meter distance from the EUT. The center of the loop is 1-meter above the ground plane.
- In order to find the maximum radiation, the EUT was rotated 360°. The measuring antenna was rotated about its axis at each azimuth about the EUT.

List of test Instrument :

Instrument Name	Model No.	Brand	Serial No.	Calibration Date	
				Last time	Next time
Receiver	SCR3102	SCHAFFNER	012	04/22/03	04/21/04
Control Box	TWR95-4	TRC	C9001-2	N/A	N/A
Antenna	6502	EMCO	9206-2777	06/10/03	06/09/04
Open test side (Antenna, Amplify, cable calibrated together)				05/29/03	05/28/04
Pre-amplifier	TRC-CB-2	TRC	CB-002	05/29/03	05/28/04
Coixal Cable(20meter)	RG-214/U	Jyebao	CL-002	05/29/03	05/28/04
Coixal Cable(50cm)	BNC31VB-0316	Jyebao	CL-002	05/29/03	05/28/04
Coixal Cable(20cm)	BNC31VB-0318	Jyebao	CL-007	05/29/03	05/28/04
Coixal Cable(55cm)	BNC31VB-0316	Jyebao	CL-006	05/29/03	05/28/04
Coixal Cable(55cm)	BNC31VB-0316	Jyebao	CL-005	05/29/03	05/28/04

The level of confidence of 95%, the uncertainty of measurement of radiated emission is +2.85/-2.77 dB.

Test Result : Appendix A

Chapter 4 Radiated Emission Test

Test Condition and Setup:

Pretest : Prior to the final test ,the EUT is placed in an anechoic chamber, and scan from 30MHz to 1GHz. The devices rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit. This is done to ensure the radiation exactly emits form the EUT.

Final test: Final radiation measurement was made on a **3 – meter** open-field test site. The EUT's maximum emission of radiation is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. All placement is according to ANSI C63.4 - 1992.

The emissions was examined from 30 MHz to 1000 MHz measured by receiver.

The whole range Antenna is used to measure frequency from 30 MHz to 1 GHz. The final test is used the receiver.

Measure more than six top marked frequencies generated form pretest by computer step by step at each frequency. The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier, which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading. The spectrum analyzer's 6dB bandwidth is set to 120 KHz, and the EUT is measured at quasi-peak mode.

If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from shield room will be taken as the final data.

List of test Instrument :

Instrument Name	Model No.	Brand	Serial No.	<u>Calibration Date</u>	
				Last time	Next time
Receiver	SCR3102	SCHAFFNER	012	04/22/03	04/21/04
Control Box	TWR95-4	TRC	C9001-2	N/A	N/A
Antenna	CBL6141A	SCHAFFNER	4206	05/27/03	05/26/04
Open test side (Antenna, Amplify, cable calibrated together)				05/29/03	05/28/04
Pre-amplifier	TRC-CB-2	TRC	CB-002	05/29/03	05/28/04
Coixal Cable(20meter)	RG-214/U	Jyebao	CL-002	05/29/03	05/28/04
Coixal Cable(50cm)	BNC31VB-0316	Jyebao	CL-002	05/29/03	05/28/04
Coixal Cable(20cm)	BNC31VB-0318	Jyebao	CL-007	05/29/03	05/28/04
Coixal Cable(55cm)	BNC31VB-0316	Jyebao	CL-006	05/29/03	05/28/04
Coixal Cable(55cm)	BNC31VB-0316	Jyebao	CL-005	05/29/03	05/28/04

The level of confidence of 95%, the uncertainty of measurement of radiated emission is +2.85/-2.77 dB.

Test Result : Pass (Appendix A)

Radiated Test Placement: (Photographs)



Appendix A

Conducted Emission Test Result:(Test Mode: Charging)

Testing room : Temperature : 23 ° C Humidity : 68 % RH

Line 1

Frequency (KHz)	READING AMPLITUDE			LIMIT		Margin (dB)
	Peak (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	
152.00	21.66	***.***	***.***	65.94	55.94	-34.28
156.00	21.17	***.***	***.***	65.83	55.83	-34.66
163.00	20.49	***.***	***.***	65.63	55.63	-35.14
173.00	21.61	***.***	***.***	65.34	55.34	-33.74
194.00	20.32	***.***	***.***	64.74	54.74	-34.42
209.00	21.79	***.***	***.***	64.31	54.31	-32.53
316.00	20.14	***.***	***.***	61.26	51.26	-31.12
349.00	25.51	***.***	***.***	60.31	50.31	-24.81

Line 2

Frequency (KHz)	READING AMPLITUDE			LIMIT		Margin (dB)
	Peak (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	
152.00	23.67	***.***	***.***	65.94	55.94	-32.27
159.00	22.42	***.***	***.***	65.74	55.74	-33.32
164.00	22.36	***.***	***.***	65.60	55.60	-33.24
185.00	22.31	***.***	***.***	65.00	55.00	-32.69
194.00	22.23	***.***	***.***	64.74	54.74	-32.51
203.00	20.92	***.***	***.***	64.49	54.49	-33.56
208.00	21.70	***.***	***.***	64.34	54.34	-32.64
216.00	21.96	***.***	***.***	64.11	54.11	-32.15
225.00	23.13	***.***	***.***	63.86	53.86	-30.72
352.00	21.94	***.***	***.***	60.23	50.23	-28.29

*The reading amplitudes are all under limit.

Appendix B

Peak Power Test Result: (Horizontal)(Test mode: Channel 1)

Frequency	Reading Amplitude	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dBμV/m	dB	dBμV/m	dBμV/m	dB
27.0915	51.26	-8.30	42.96	80.00	-37.04

Radiated Emission Test Result: (Horizontal) (Test mode: Channel 1)

Test Conditions:

Testing site : Temperature : 25 ° C Humidity : 73 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Class B Limit	Margin
MHz	dBμV/m	m	degree	dB	dBμV/m	dBμV/m	dB
270.9930	24.72	1.00	58	-1.11	23.61	46.02	-22.41
298.0870	32.95	1.00	71	-1.40	31.55	46.02	-14.47
325.1848	34.52	1.00	58	0.11	34.63	46.02	-11.39
352.2861	31.71	1.00	71	1.83	33.54	46.02	-12.48

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)
(For example : 30MHz correction factor = 15.5 + (–15.26) = 0.24 dB/m)

Peak Power Test Result: (Vertical) (Test mode: Channel 1)

Frequency	Reading Amplitude	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dBμV/m	dB/m	dBμV	dBμV/m	dB
27.0915	25.12	-8.30	16.82	80.00	-63.18

Radiated Emission Test Result: (Vertical) (Test mode: Channel 1)

Test Conditions:

Testing site : Temperature : 25 ° C Humidity : 73 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Class B Limit	Margin
MHz	dBμV/m	m	degree	dB	dBμV/m	dBμV/m	dB
67.7305	24.66	3.98	66	-9.95	14.71	40.00	-25.29
298.0078	25.12	2.50	62	-1.40	23.72	46.02	-22.30
325.0945	24.41	0.96	300	0.11	24.52	46.02	-21.50
352.1858	19.78	2.50	0	1.83	21.61	46.02	-24.41

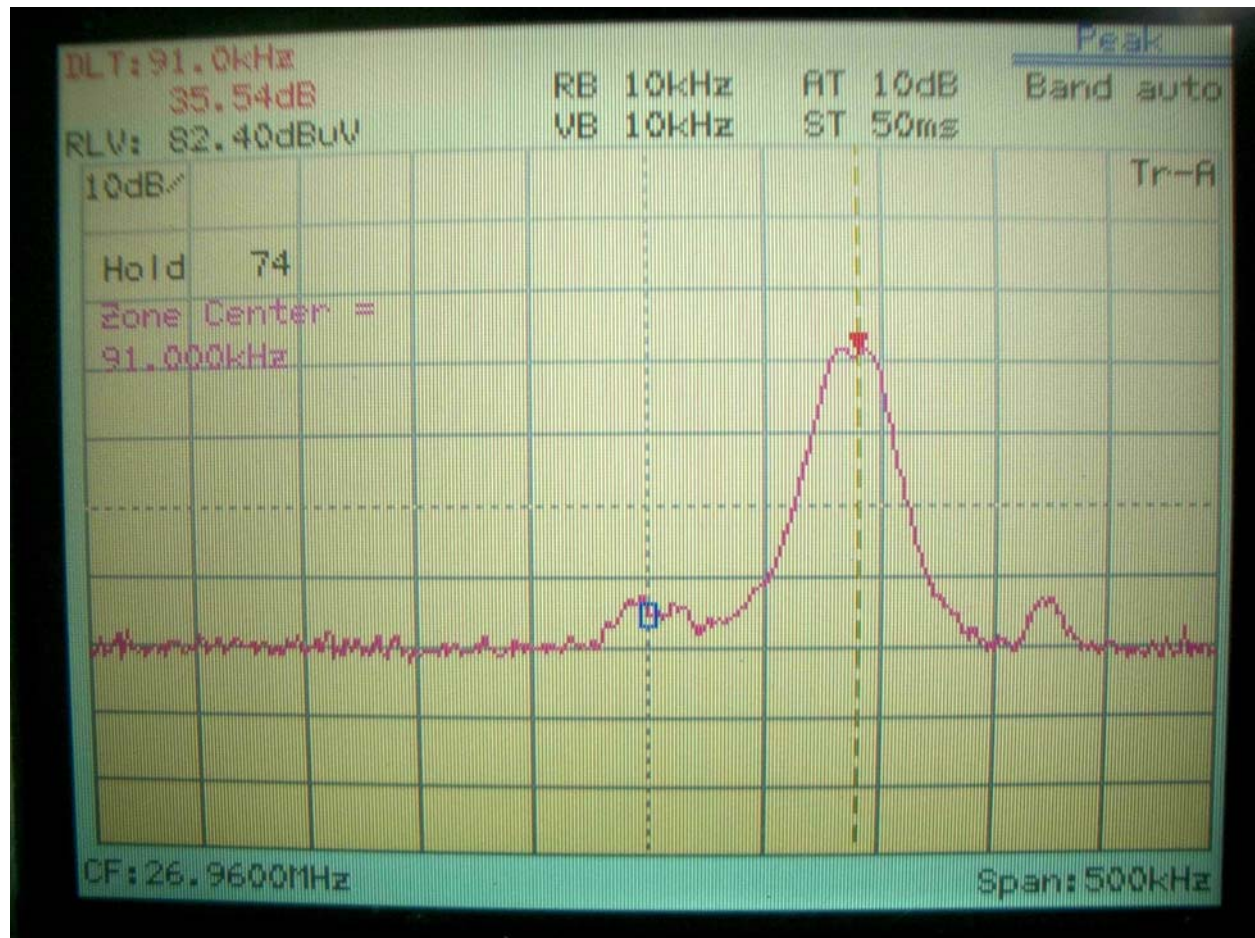
Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)
(For example : 30MHz correction factor = 15.5 + (–15.26) = 0.24 dB/m)

Appendix C

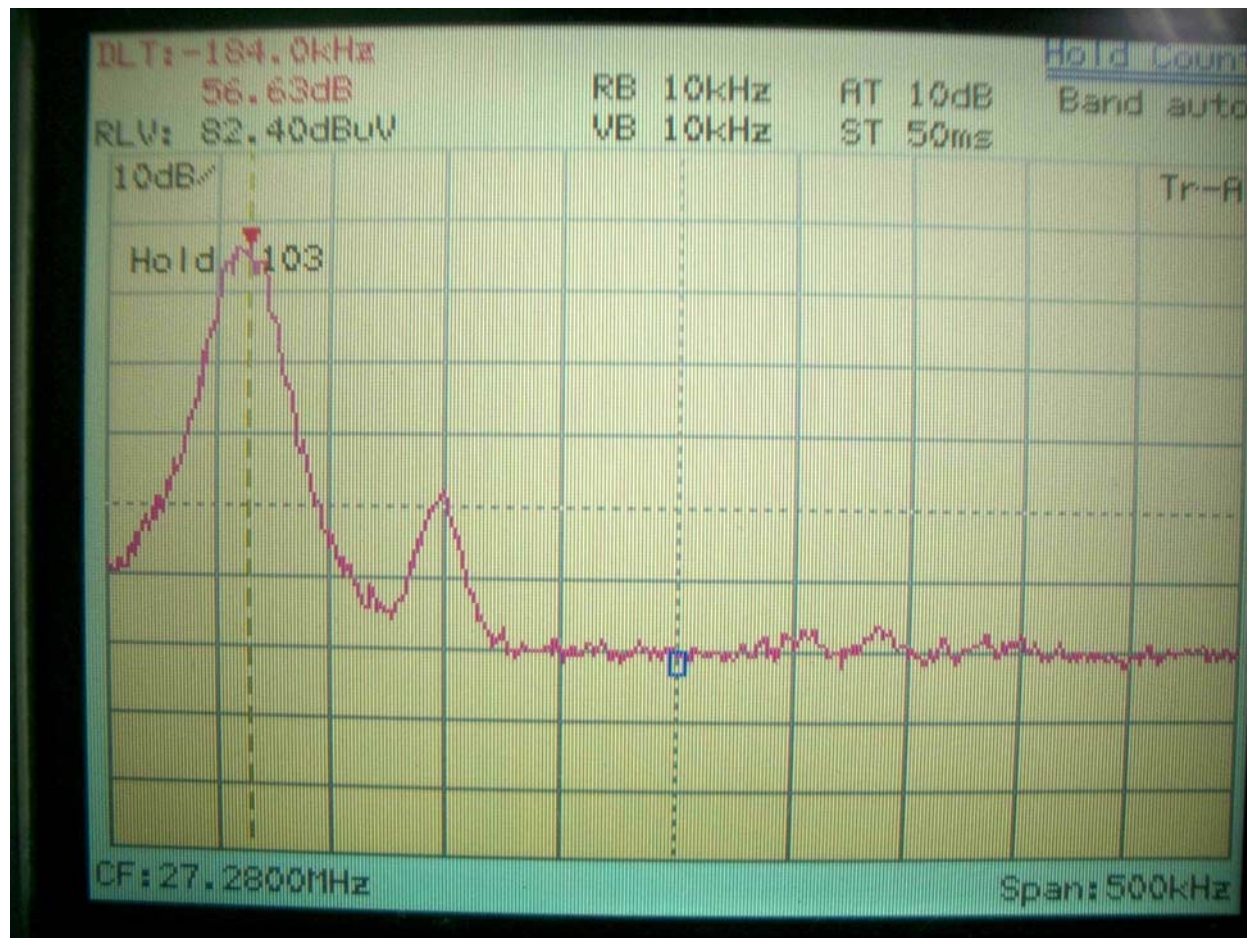
Band Edge of Measurement: (Frequency Band: 26.96 ~ 27.28)

Lower channel



26.96MHz << Class B Limit.

Upper channel:



27.28 MHz << Class B Limit.