Report No.	C3115161
FCC ID	IOWRMO213UP
Specifications	FCC Part 15, Class B
Test Method	ANSI C63.4 1992
Application	■Original ☐Class II Changes
Applicant	Chic Technology Corp.
Applicant address	16F, No. 150, Chien-I Road, 235 Chung Ho City, Taipei Hsien, Taiwan, R.O.C.
Product name	Mini Wireless Optical Mouse
Items tested	Wireless Optical Mouse
Model No.	RMO213UP, DA 200040
Sample No.	C31161
EUT Condition	■Engineering sample ☐Pre-production ☐Final production
Frequency Range	26.96MHz to 27.28MHz
Results	**Compliance** (As detailed within this report)
Date	09/25/2003 (month / day / year)(Sample received) 10/08/2003 (month / day / year)(Tested)
Prepared by	Jason — Project Engineer
Authorized by	Jacob Lin — V. General Manager (Jacob Lin)
Issue date	November 24, 2003 (month / day / year)
Modifications	**None**
Tested by	Training Research Co., Ltd. **(Accredited by NVLAP)**
Office at	1F, No. 255, Nan Yang Street, Hsichih, Taipei Hsien 221, Taiwan
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Conditions of issue :

- ***This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.***
- ***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.***

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Chapter 1 Introduction

Description of EUT:

EUT	:	Wireless Optical Mouse
Model No.	:	RMO213UP, DA 200040
Product name	:	Wireless Optical Mouse
Frequency Range	:	26.96 – 27.28 MHz
Power Type	:	Transmitter: Powered by two 1.5VDC AA batteries Receiver: Powered by PC

*This EUT has two channels (with 256 IDs): CH 1: 27.0450MHz, CH 2: 27.0950MHz

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, Rx used USB Interface.
- Tx radiated on channel 2, Rx used PS/2 Interface.
- Tx radiated on channel 1, Rx used USB Interface.
- Tx radiated on channel 2, Rx used PS/2 Interface.
- Charging

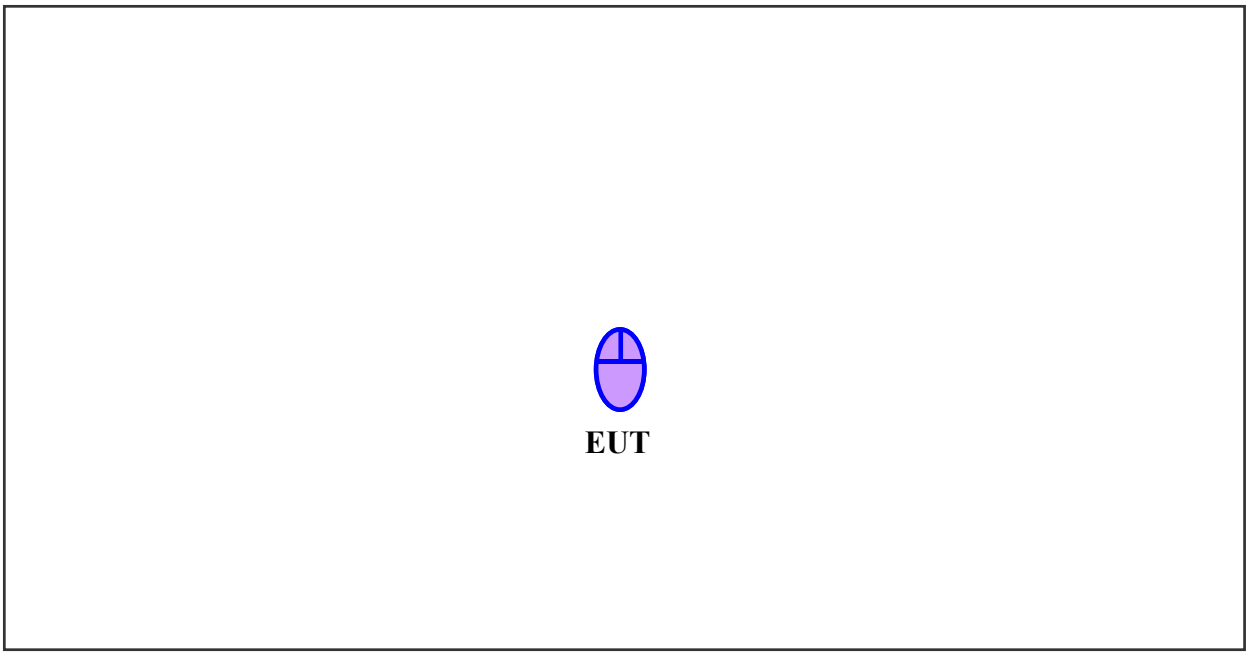
The radiation pretest was found out "Tx radiated on channel 1, Rx used USB Interface" was the worst case and we only recorded this data in this report.

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.
<u>There is no deviation from standard test method.</u>

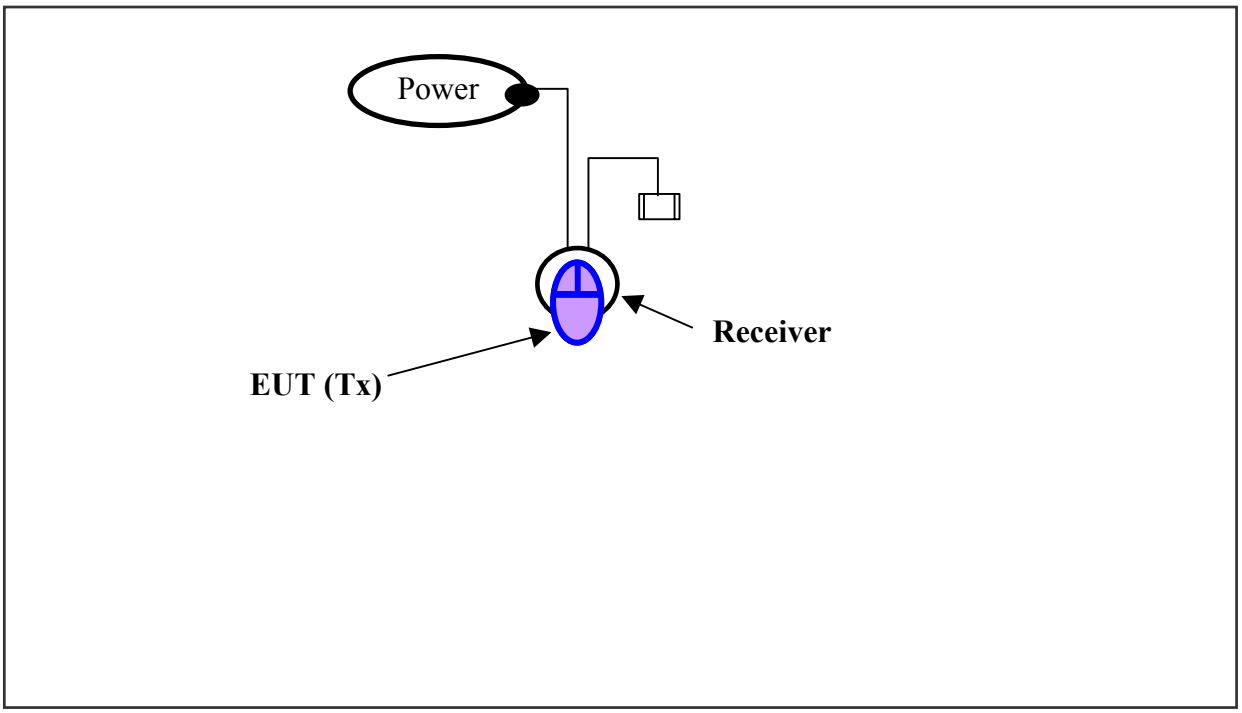
Configuration of Test Setup



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:

Suppot Equipment (Receiver):

*Mouse Jack --- with a 1.78 m length cable (with a ferrite bead core near USB jack) that terminated.

*Power Jack --- via a 1.86m long power cable with an adapter to the power source.

EUT:

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

List of Support Equipment

Conducted (Radiated) test:

Receiver	**:**	**Chic**
Model No.	:	RMO213UP
Serial No.	:	N/A
FCC ID	:	Doc Approved
Power type	:	By PC
Data cable	:	1.42m length

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 :

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	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 .

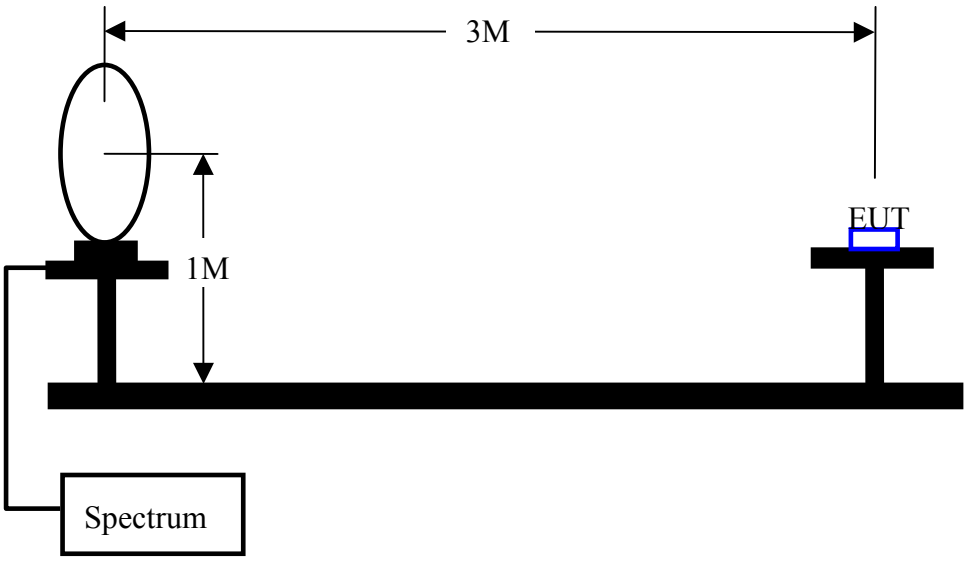
Test Result: Pass

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:

a. The EUT was setup in the anechoic chamber as shown above.
b. 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.
c. 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 :

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	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.

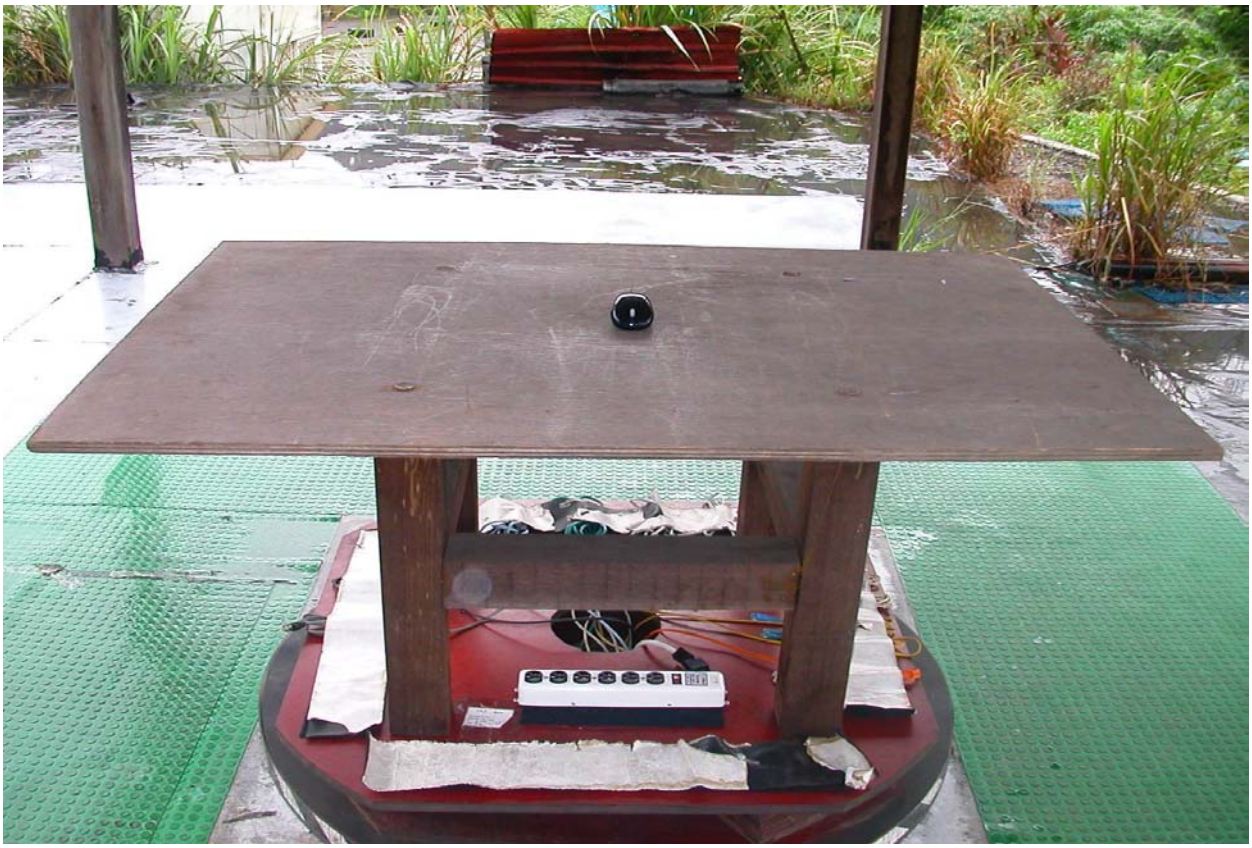
List of test Instrument :

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	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 : 22 ° 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)	
521.00	31.12	***.**	***.**	56.00	46.00	-14.88
538.00	31.21	***.**	***.**	56.00	46.00	-14.79
568.00	31.55	***.**	***.**	56.00	46.00	-14.45
597.00	31.37	***.**	***.**	56.00	46.00	-14.63
637.00	30.36	***.**	***.**	56.00	46.00	-15.64
658.00	31.70	***.**	***.**	56.00	46.00	-14.30
680.00	30.41	***.**	***.**	56.00	46.00	-15.59
697.00	30.12	***.**	***.**	56.00	46.00	-15.88
749.00	30.02	***.**	***.**	56.00	46.00	-15.98
27090.00	45.87	***.**	***.**	60.00	50.00	-4.13

Line 2

Frequency (KHz)	READING AMPLITUDE			LIMIT		Margin (dB)
	Peak (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	
166.00	33.00	***.**	***.**	65.54	55.54	-22.55
174.00	33.50	***.**	***.**	65.31	55.31	-21.81
185.00	32.58	***.**	***.**	65.00	55.00	-22.42
206.00	32.18	***.**	***.**	64.40	54.40	-22.22
212.00	32.37	***.**	***.**	64.23	54.23	-21.86
218.00	31.84	***.**	***.**	64.06	54.06	-22.22
297.00	29.58	***.**	***.**	61.80	51.80	-22.22
527.00	24.96	***.**	***.**	56.00	46.00	-21.04
25700.00	28.20	***.**	***.**	60.00	50.00	-21.80
27090.00	46.65	***.**	***.**	60.00	50.00	-3.35

****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
27.0490	52.54	-8.30	44.24	80.00	-35.76

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
54.0845	30.42	2.51	95	-6.21	24.20	40.00	-15.79
81.1460	22.38	2.51	110	-9.90	12.48	40.00	-27.52
108.1670	19.23	1.00	95	-6.37	12.86	43.52	-30.66
135.2125	17.77	1.00	1	-4.40	13.37	43.52	-30.15
***							

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
27.1430	38.15	-8.30	29.85	80.00	-50.15

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
45.57.33	21.98	2.50	180	-2.75	19.23	40.00	-20.77
54.0853	20.63	1.01	288	-6.21	14.42	40.00	-25.58
73.7468	30.03	3.98	33	-10.25	19.78	40.00	-20.22
86.3015	27.73	1.01	311	-9.43	18.30	40.00	-21.70
***							

Note:

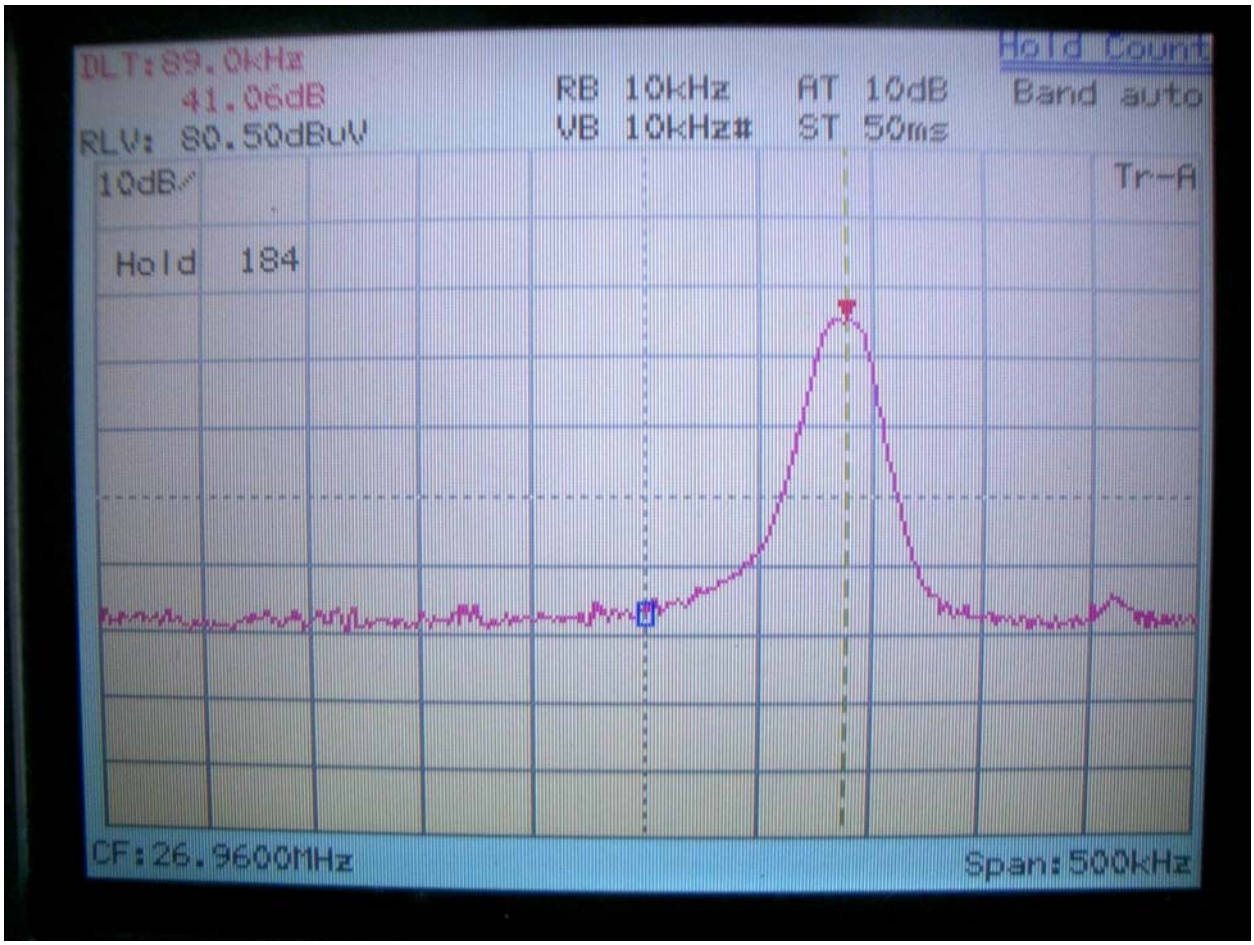
1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)

   (For example : 30MHz correction factor = 15.5 + (–15.26) = 0.24 dB/m)

Appendix C

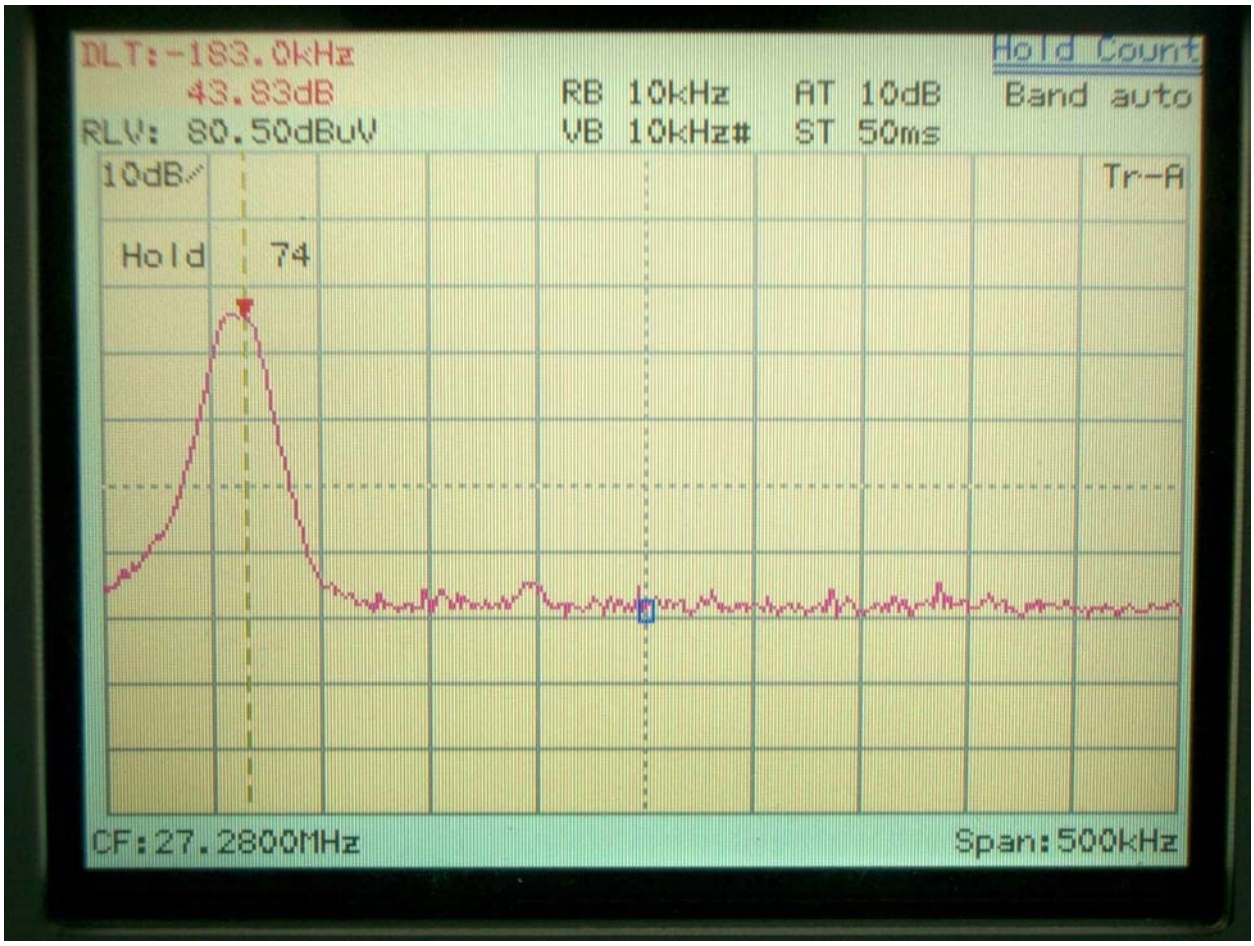
Band Edge of Measurement: (Frequency Band: 26.96 ~ 27.28)

Lower channel



26.96MHz << Class B Limit.

Upper channel:



27.28 MHz << Class B Limit.