Test Report

Product Name : RF Optical Mouse
Model No. : M301
FCC ID.: O62M301

Applicant : Darfon Electronics Corp.
Address : 6 Feng-Shu Tsuen, Gueishan, Taoyuan 333, Taiwan, R.O.C.

Date of Receipt : Jul 17, 2002
Date of Test : Jul 17, 2002
Report No. : 027L043FI

Test Report Certification

Test Date : Jul 17, 2002
Report No. : 027L043FI

QuieTek Corporation
Accredited by NIST (NVLAP)
NVLAP Lab Code: 200347-0

Product Name	:	RF Optical Mouse
Applicant	:	Darfon Electronics Corp.
Address	:	6 Feng-Shu Tsuen, Gueishan, Taoyuan 333, Taiwan, R.O.C.
Manufacturer	:	Darfon Electronics Corp.
Model No.	:	M301
FCC ID.	:	O62M301
Rated Voltage	:	DC 3V (Power by Battery)
Trade Name	:	Acer, Benq
Measurement Standard	:	FCC Part 15 Subpart C Paragraph 15.227
Measurement Procedure	:	ANSI C63.4:1992
Test Result	:	Complied

NVLAP Lab Code : 200347-0

The test results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : Cherry Yu (Cherry Yu)

Tested By : Kuofeng Feng (Kuofeng Feng)

Reviewed By : Calien Kang (Calien Kang)

Approved By : Gene Chang (Gene Chang)

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	:	RF Optical Mouse
Trade Name	:	Acer, Benq
FCC ID.	:	O62M301
Model No.	:	M301
Frequency Range	:	27.045MHz
Channel Number	:	1
Type of Modulation	:	FSK
Antenna type	:	Soldered on PCB
Operator Selection of Operating Frequency	:	Not Applicable
USB Cable (Rx)		Shielded, 1.2m

Note:

1. This device is a RF Optical Mouse included a 27.045MHz transmitting function.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.227 for non-spread spectrum devices.
3. This device is a composite device in accordance with Part 15 regulations. The function for the receiver was, measured and made a test report that the report number is 027L043F, certified under Declaration of Conformity.

1.2. Operation Description

The EUT is RF Optical Mouse. The operation frequency is 27MHz with FSK modulation. The signal will be transmitted through 27MHz FSK RF signal from the Loop antenna on PCB of EUT to receiver.

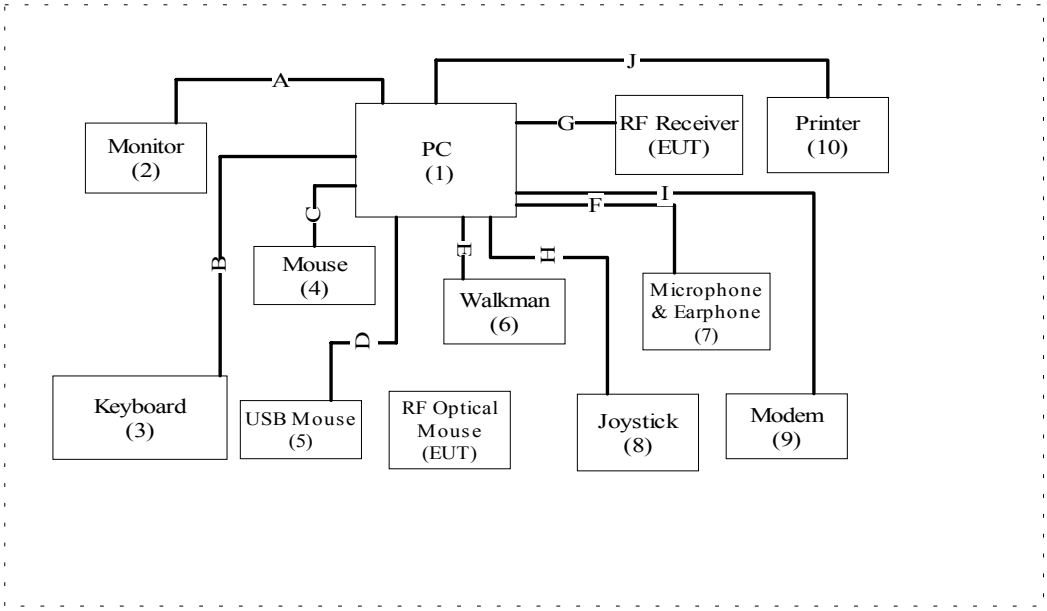
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord	FCC ID
(1)	PC	IBM	2187-16W	BNL676Z	Non-Shielded, 1.8m	FCC DoC
(2)	Monitor	ADI	CM703	038054T10203876A	N/A	FCC DoC
(3)	Keyboard	HP	SK-2506	N/A	N/A	FCC DoC
(4)	Mouse	HITACHI	PC-KM1300	N/A	N/A	JNZ201213
(5)	USB Mouse	Logitech	M-BE58	LZE11403976	N/A	FCC DoC
(6)	Walkman	AIWA	HS-TA164	N/A	N/A	FCC DoC
(7)	Microphone &Earphone	TOKTO	SX-MI	N/A	N/A	FCC DoC
(8)	Joystick	GENIUS	MAXFIRE FORCE G-09D	CJ0100200075	N/A	FSUGG09
(9)	Modem	ACEEX	DM-1414	0102027532	Non-Shielded, 1.8m	IFAXDM1414
(10)	Printer	EPSON	Color 680	017699	Non-Shielded, 1.5m	N/A

Signal Cable Type		Signal Cable Description
A.	VGA Cable	Shielded, 1.6m, one ferrite core bonded
B.	Keyboard Cable	Shielded, 1.8m
C.	Mouse Cable	Shielded, 1.5m
D.	USB Cable	Shielded, 1.8m
E.	Walkman Cable	Non-Shielded, 1.6m
F.	Microphone & Earphone Cable	Non-Shielded, 1.8m
G.	USB Cable	Shielded, 1.2m
H.	Joystick Cable	Shielded, 2.0m
I.	Modem Cable	Shielded, 1.5m
J.	Printer Cable	Shielded, 1.2m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

1.4.1 Setup the EUT and simulators as shown on 1.3.

1.4.2 Enable RF signal and confirm EUT active.

1.4.3 Modulate output capacity of EUT up to specification.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: April 22, 2001 File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2
June 29, 2001 Accreditation on NVLAP
NVLAP Lab Code: 200533-0

NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation

Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
Lin Kou Shiang, Taipei 244 Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

2. Conducted Emission

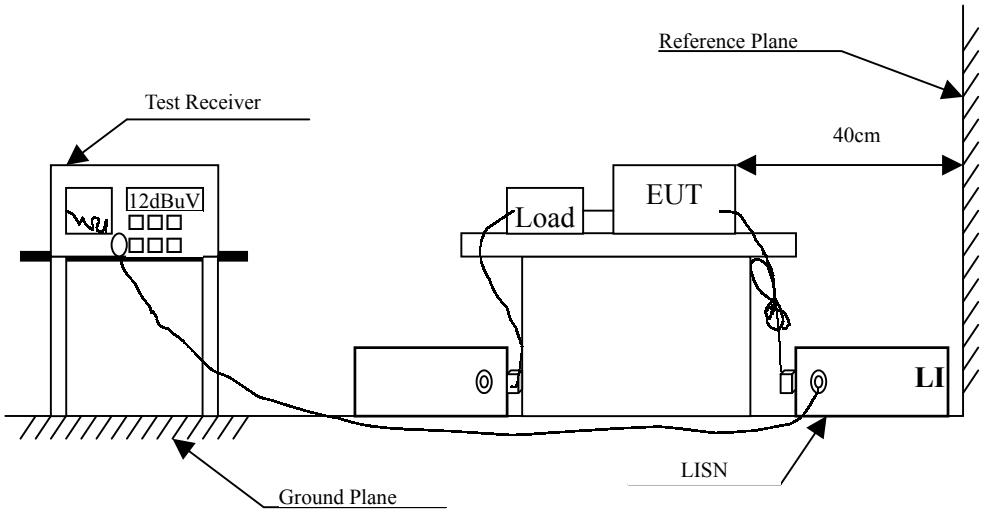
2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/838251/0001	May, 2002	
2	L.I.S.N.	R & S	ESH3-Z5/836679/0023	May, 2002	EUT
3	L.I.S.N.	R & S	ENV 4200/833209/0023	May, 2002	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2002	
5	No. 4 Shielded Room			N/A	

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Paragraph 15.207 (dBuV)		
Frequency MHz	Limits	
	uV	dBuV
0.45 - 30	250	48.0

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:1992 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.45MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Result of Conducted Emission

EUT is a battery operate device, so conducted emission were omitted.

3. Radiated Emission

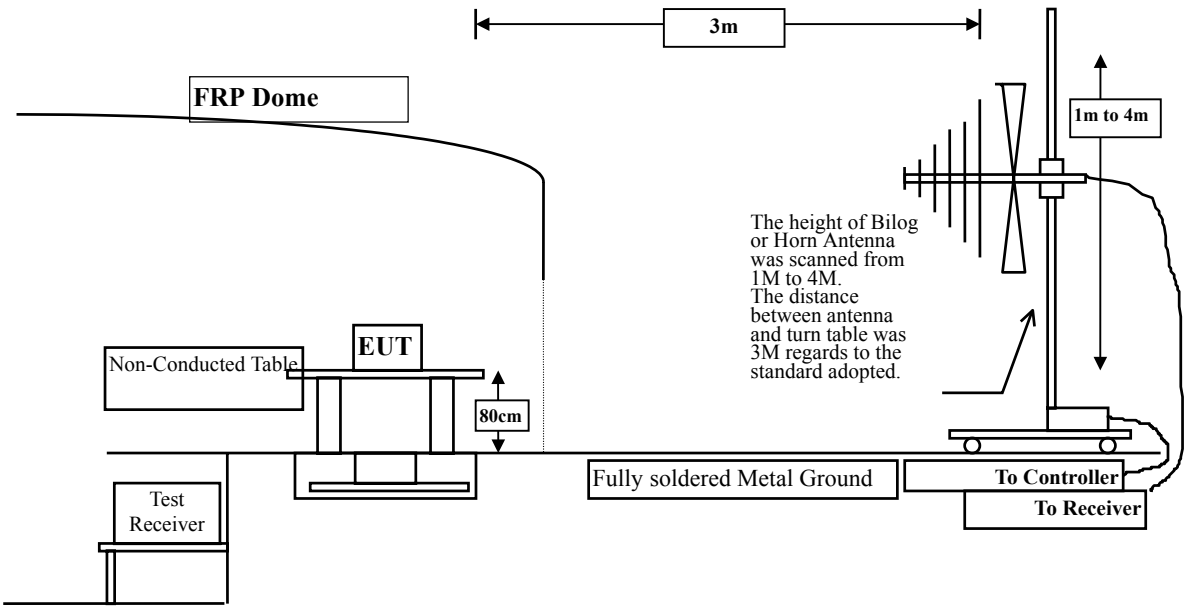
3.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 1		Test Receiver	R & S	ESVS 10 / 834468/003	July, 2002
		Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2002
		Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2002
		Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Nov., 2001
		Horn Antenna	ETS	3115 / 0005-6160	July, 2002
		Pre-Amplifier	QTK	QTK-AMP-01/ 0001	July, 2002
Site # 2	X	Test Receiver	R & S	ESCS 30 / 836858/022	Nov., 2001
	X	Spectrum Analyzer	Advantest	3162 / 100803466	May, 2002
	X	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2002
		Bilog Antenna	SCHAFFNER	CBL6112B / 2705	Oct., 2001
	X	BiconiLog Antenna	SCHWARZBECK	VUIB9166	July, 2002
	X	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	July, 2002

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.
2. Mark "X" test instruments are used to measure the final test results.

3.2. Test Setup



3.3. Limits

➢ FCC Part 15 Subpart C Paragraph 15.227 Limit

Fundamental Frequency MHz	Field strength of fundamental	
	uV/m	dBuV/m
26.96-27.28	10000	80.0

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➢ Frequencies in restricted band are complied to limits on Paragraph15.209.

Frequency MHz	15.209 Limits (dBuV/m @3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
2. In the above table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.
Radiated emissions were invested over the frequency range from 30MHz to1GHz using a receiver bandwidth of 120kHz. Radiated was performed at an antenna to EUT distance of 3 meters.
The frequency range from 30MHz to 10th harminics is checked.

3.5. Test Result of Radiated Emission

Product : RF Optical Mouse
Test Item : Fundamental Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Normal Operation

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission Level	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
Peak Detector (Horizontal)							
27.053	0.20	4.24	20.70	67.17	50.91	49.09	100.00
Peak Detector (Vertical)							
27.053	0.20	10.41	20.70	52.30	42.21	57.79	100.00

Note:

1. All Readings are Peak detector.
2. Emission Level = Reading Level + Probe Factor + Cable loss-PreAMP
3. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : RF Optical Mouse
Test Item : General Radiated Emission Data
Test Site : No.2 OATS
Test Mode : Normal Operation

Freq.	Cable Loss	Probe Factor	PreAMP	Reading Level	Emission Level	Margin	Limit
MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal:							
147.370	0.60	13.77	0.00	12.02	26.39	17.11	43.50
323.910	1.00	15.25	0.00	11.73	27.98	18.02	46.00
432.550	1.00	19.06	0.00	17.05	37.11	8.89	46.00
*459.710	1.00	21.22	0.00	17.19	39.41	6.59	46.00
621.700	1.20	22.39	0.00	12.10	35.69	10.31	46.00
648.860	1.40	23.01	0.00	10.31	34.72	11.28	46.00
Vertical:							
*51.340	0.20	18.06	0.00	11.81	30.07	9.93	40.00
161.920	0.60	16.85	0.00	6.45	23.90	19.60	43.50
189.080	0.80	12.59	0.00	12.71	26.10	17.40	43.50
323.910	1.00	13.90	0.00	12.72	27.62	18.38	46.00
459.710	1.00	17.00	0.00	10.02	28.02	17.98	46.00
486.870	1.20	18.32	0.00	8.32	27.84	18.16	46.00

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " * ", means this data is the worst emission level.
3. Emission Level = Reading Level + Probe Factor + Cable loss

4. Band Edge

4.1. Test Equipment

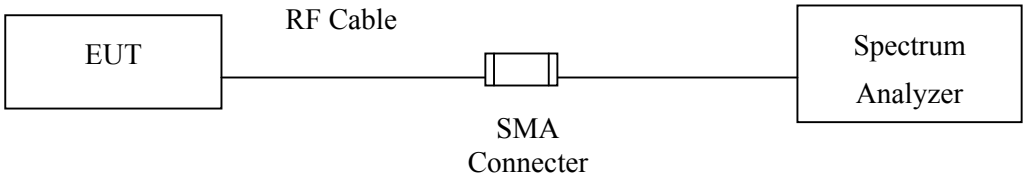
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESCS 30 / 836858/022	Nov., 2001
X	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	July, 2002
X	BiconiLog Antenna	SCHWARZBECK	VUIB9166	July, 2002
X	Spectrum Analyzer	Advantest	3162 / 100803466	May, 2002

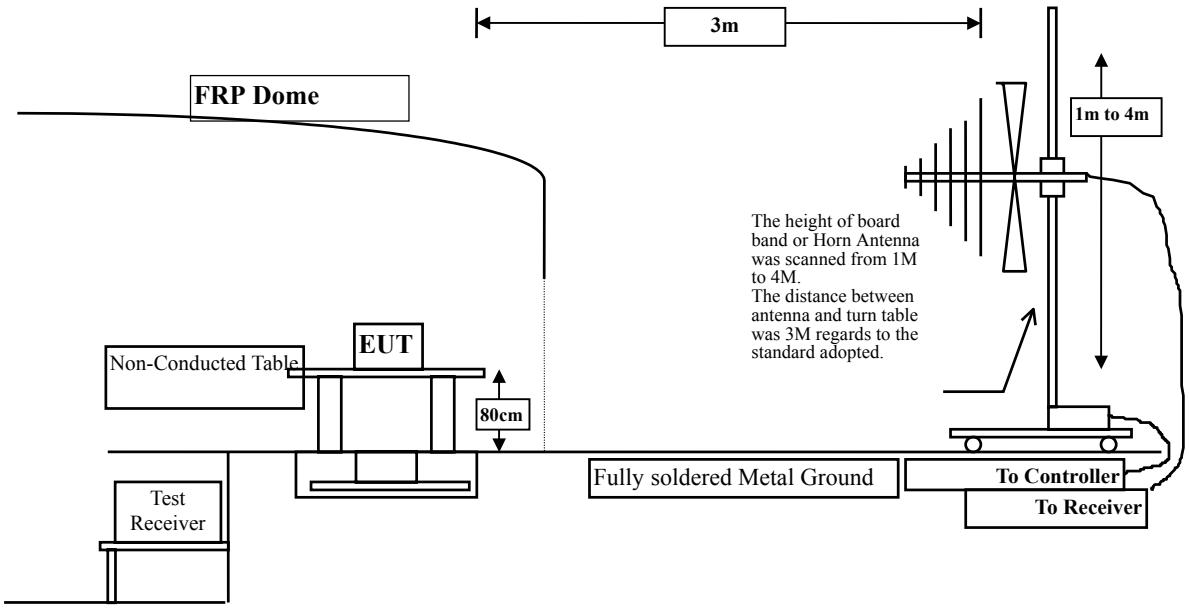
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.
2. Mark "X" test instruments are used to measure the final test results.

4.2. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



4.3. Limits

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:1992 on radiated measurement.
The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field dtrength of harmonics measurement.
The bandwidth below 30MHz setting on the field strength meter is 10 kHz, above 1GHz are 1 MHz.

4.5. Test Result of Band Edge

Product : RF Optical Mouse
Test Item : Band Edge Data
Test Site : No.2 OATS
Test Mode : Normal Operation

RF Radiated Measurement: (Quasi-Peak Detector)

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Result
1(Horizontal)	26.945	33.36	17.10	49.50	Pass
	28.650	26.24	9.98	49.50	Pass
1(Vertical)	26.950	17.14	7.05	49.50	Pass
	28.645	23.30	13.21	49.50	Pass

Figure Channel 2: (Horizontal)

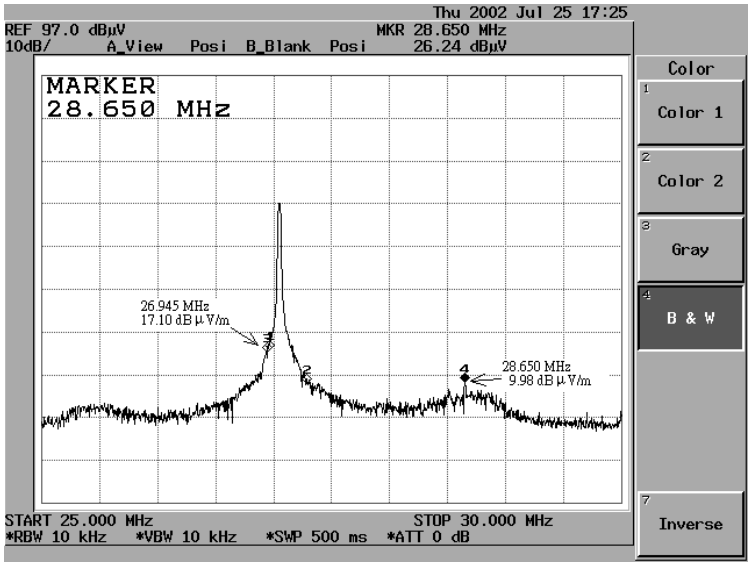
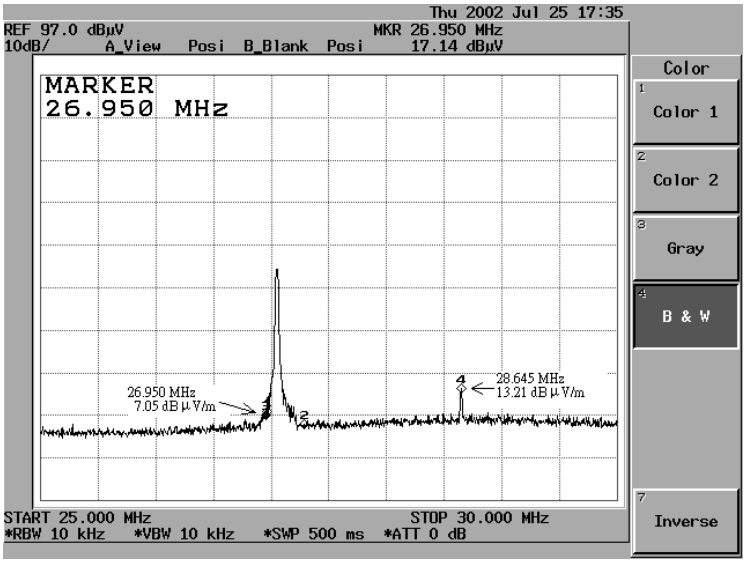


Figure Channel 2: (Vertical)



5. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1 : EUT Test Photographs

Attachment 2 : EUT Detailed Photographs