FCC Part 15 Subpart C

EMI TEST REPORT

of

E.U.T. : Universal FM Transmitter Hands-free Kits

FCC ID. : QDFIUH-0014-1

MODEL : IUH-0014-1

Working Frequency: 88.5 MHz

Issused Dated: May 29, 2002

for

APPLICANT : MONOERIC INTERNATIONAL CO., LTD.

ADDRESS : Suite B. 9Fl, No. 192, Sec.3, Chung Yang Rd., Sanchung City, Taiwan, 241, R. O. C.

Test Performed by

ELECTRONICS TESTING CENTER, TAIWAN
NO. 8 LANE 29, WENMIMG ROAD,
LOSHAN TSUN, KWEISHAN HSIANG,
TAOYUAN, TAIWAN, R.O.C.

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Report Number: ET91S-04-179

TEST REPORT CERTIFICATION

Applicant : MONOERIC INTERNATIONAL CO., LTD.
Suite B. 9Fl, No. 192, Sec.3, Chung Yang Rd., Sanchung City, Taiwan, 241, R. O. C.

Manufacturer : STAR UNITED INTERNATIONAL GROUP LTD.
Hecheng Industrial Zone, DongiJang Village, Qiaotau Town, Dongguan City, Guangdong Province. China

Description of EUT :

a) Type of EUT	: Universal FM Transmitter Hands-free Kits
b) Trade Name	: MONOERIC
c) Model No.	: IUH-0014-1
d) FCC ID	: QDFIUH-0014-1
e) Working Frequency	: 88.5 MHz
f) Power Supply	: DC 12V Battery

Regulation Applied : FCC Rules and Regulations Part 15 Subpart C (2001)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The results of the testing report relate only to the items tested.
2. The testing report shall not be reproduced except in full, without the written approval of ETC.

Test Date: May 22, 2002

Test Engineer: Rick Hu May 28, 2002

Approve & Authorized Signer: Win-Po Tsai May 29, 2002

Win-Po Tsai, Manager, NVLAP Signatory
EMC Dept. I of ELECTRONICS
TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : Universal FM Transmitter Hands-free Kits
b) Trade Name : MONOERIC
c) Model No. : IUH-0014-1
d) FCC ID : QDFIUH-0014-1
e) Working Frequency : 88.5MHz
f) Power Supply : DC 12V Battery

1.2 Characteristics of Device:

It allows you to hear phone conversation through the car audio system. Radio frequency is FM 88.5MHz.
All you have to do is to insert the plug into the car audio system immediately stop to become the phone ring voice. The sound volume transfer from the car speaker.

1.3 Test Methodology

Radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4.
The Universal FM Transmitter Hands-free Kits under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, rewiring in the circuit was done by the manufacturer so as to affect its intended operation.
The receiving antenna was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the Universal FM Transmitter Hands-free Kits under test. The hand-held or body-worn devices rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relatives to the limit.

1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.
This site has been accreditation as a FCC filing site.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:
A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

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

2.3 Limitation

(1) Conducted Emission Limits:

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency (MHz)	Emission (μV)	Emission (dBμV)
0.45 - 30.0	250	48.0

(2) Radiated Emission Limits:

According to 15.239 (b), the field strangth of any emissions within the permitted 200 kHz band shall not exceed 250 microrolts/ meter at 3 meters. The emission limit in ths paragraph is based on measurement instrumentation employing an average detector.
As shown in 15.35(b), for frequencies below 1000MHz, the field strength limits are based on average detector, however, 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.

According to 15.239 (c), the field strength of any emissions radiated on any frequency outside of the specified 200 kHz band shall not exceed the general radiated emission limits in Section 15.209, as following table:

Other Frequencies (MHz)	Field Strength of Fundamental	
	μV/meter	dBμV/meter
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

(3) Emission Band Limits

According to 15.239 (a), emission from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating freqency. The 200 kHz bank shall lie wholly within the frequency range of 88-108 MHz.

(4) Antenna Requirement:

For intentional device, according to 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.

2.4 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.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

3. RADIATED EMISSION MEASUREMENT

3.1 Applicable Standard

1. The field strength of any emission within this band shall not exceed 250 microvolts/meter at 3meters. The emission limit in this paragraph is base on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.
2. The field strength of any emissions, which appear outside of this band, shall not exceed the general radiated emission limit in Section 15.209.

3.2 Measurement Procedure

1. Setup the configurationa per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in normal function.
2. For emission frequencies measured a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured.
3. For emission measured, set the spectrum analyzer on a 100 kHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from0° to 360° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.
5. Repeat step 4 until all frequencies that need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the frequencies of highest emission with varying the placement of cables (if any) associated with ETU to obtain the worse case and record the result.

Figure 1: Frequencies measured below 1 GHz configuration

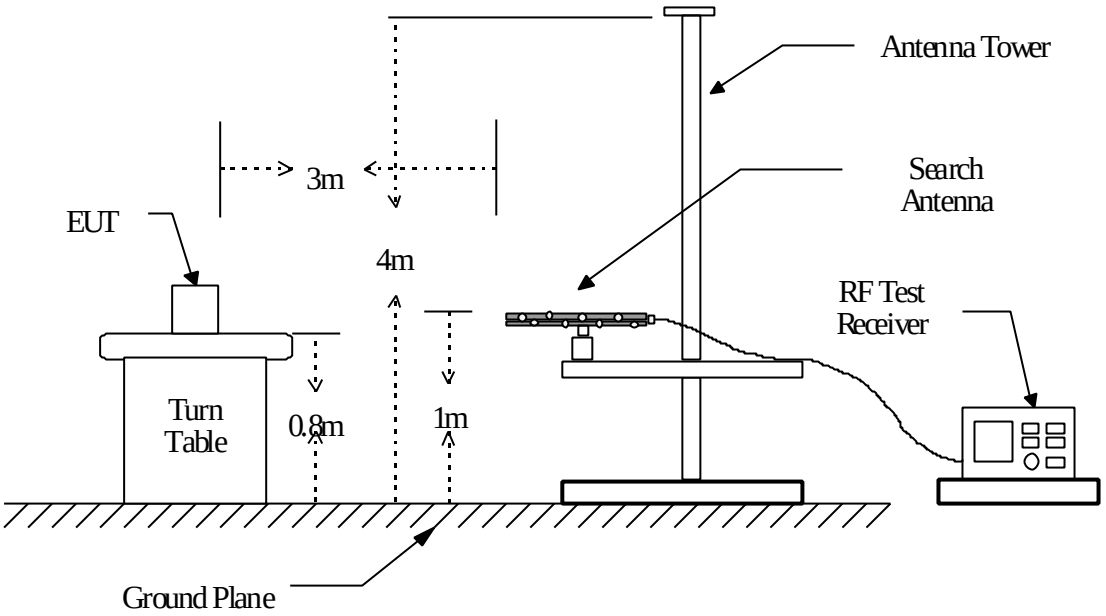
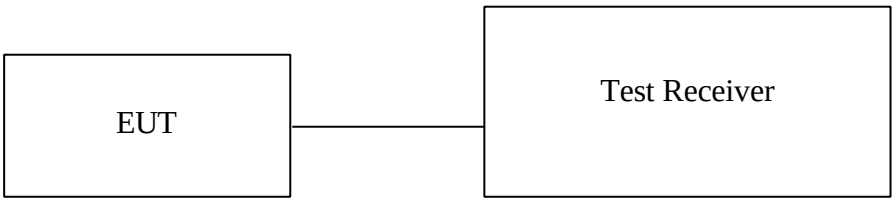


Figure 2: Emission band measurement configuration



3.3 Test Data

Temperature : 18 ℃
Humidity : 65%
Test Date : May 22, 2002

Carrier

Frequency (kHz)	Ant Pol H/V	Reading (dBuV) Peak	Correct Factor (dB)	Result @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Peak	Limit @3m (dBuV/m) AVG.	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
88.348	H	27.3	9.9	37.2	68.0	48.0	-10.8	360	2.0
88.348	V	26.6	9.9	36.5	68.0	48.0	-11.5	260	2.3

Spurious

Frequency (kHz)	Ant Pol H/V	Reading (dBuV) Peak	Correct Factor (dB)	Result @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Q.P.	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
31.890	V	9.6	13.9	23.5	40.0	-16.5	120	1.2
33.780	V	10.8	12.4	23.2	40.0	-16.8	240	1.0
44.580	H	11.6	9.5	21.1	40.0	-18.9	230	2.2
44.580	V	16.9	9.5	26.4	40.0	-13.6	70	1.5
170.130	V	13.8	11.6	25.4	43.5	-18.1	45	2.0

Harmonic

Frequency (kHz)	Ant Pol H/V	Reading (dBuV) Peak	Correct Factor (dB)	Result @3m (dBuV/m) Peak	Limit @3m (dBuV/m) Q.P.	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
176.696	V	----	----	----	43.5	----	----	----
176.696	H	----	----	----	43.5	----	----	----
265.044	V	----	----	----	46.0	----	----	----
265.044	H	----	----	----	46.0	----	----	----
353.392	V	----	----	----	46.0	----	----	----
353.392	H	----	----	----	46.0	----	----	----
441.740	V	----	----	----	46.0	----	----	----
441.740	H	----	----	----	46.0	----	----	----
530.088	V	----	----	----	46.0	----	----	----
530.088	H	----	----	----	46.0	----	----	----
618.436	V	----	----	----	46.0	----	----	----
618.436	H	----	----	----	46.0	----	----	----
706.784	V	----	----	----	46.0	----	----	----
706.784	H	----	----	----	46.0	----	----	----
795.132	V	----	----	----	46.0	----	----	----
795.132	H	----	----	----	46.0	----	----	----
883.480	V	----	----	----	46.0	----	----	----
883.480	H	----	----	----	46.0	----	----	----

Note:

If the data table appeared symbol of "***" means the noise is too low to be measured.

3.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + CORR. FACTOR

where CORR. FACTOR = Antenna FACTOR + Cable FACTOR

Assume a receiver reading of 22.5 dBμV is obtained. The Antenna Factor of 14.5 and a Cable Factor of 1.5 is added. The total of field strength is 38.5 dBμV/m.

RESULT = 22.5 + 14.5 + 1.5 = 38.5 dBμV/m
Level in μV/m = Common Antilogarithm[(38.5 dBμV/m)/20]
= 84.14 μV/m

3.5 Radiated Test Equipment

The following instrument are used for radiated emissions measurement:

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Test Receiver	Hewlett-Packard	8546A	13054404-001	Jun. 20, 2002
LogBicone Antenna	Schwarzbeck	VULB9160	13057310-001	Oct. 18, 2002

Note: The standards used to perform this calibration are traceable to NML/ROC, NIST/USA and NPL.

Measuring instrument setup in measured frequency band when specified detector function is used:

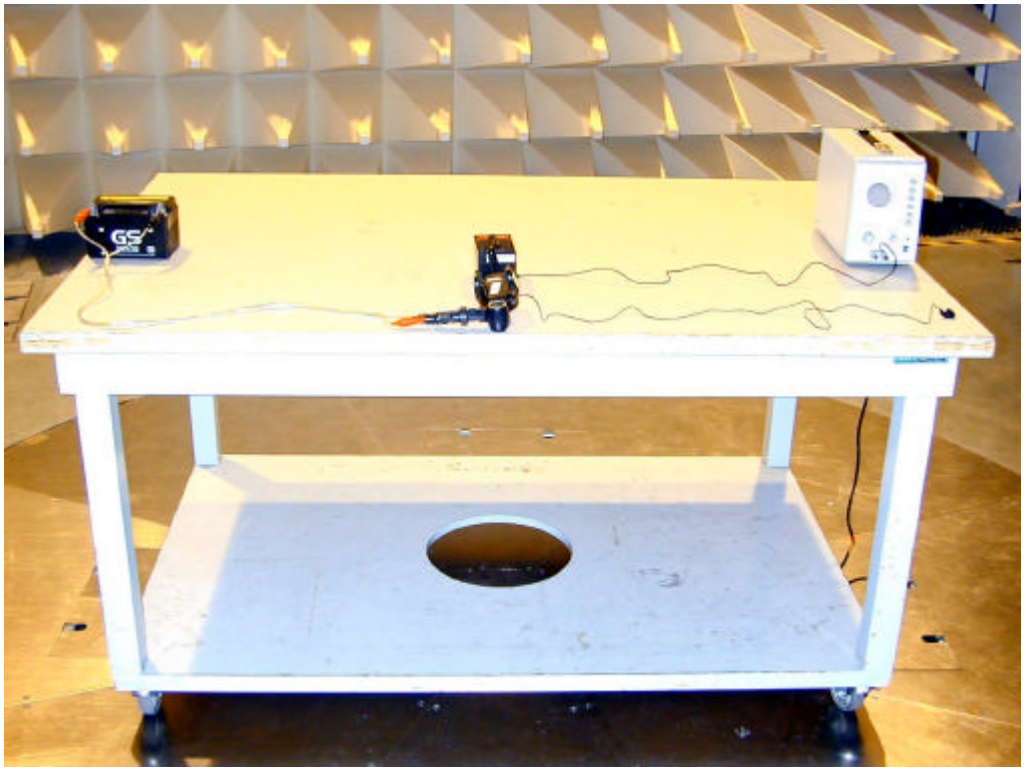
Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz

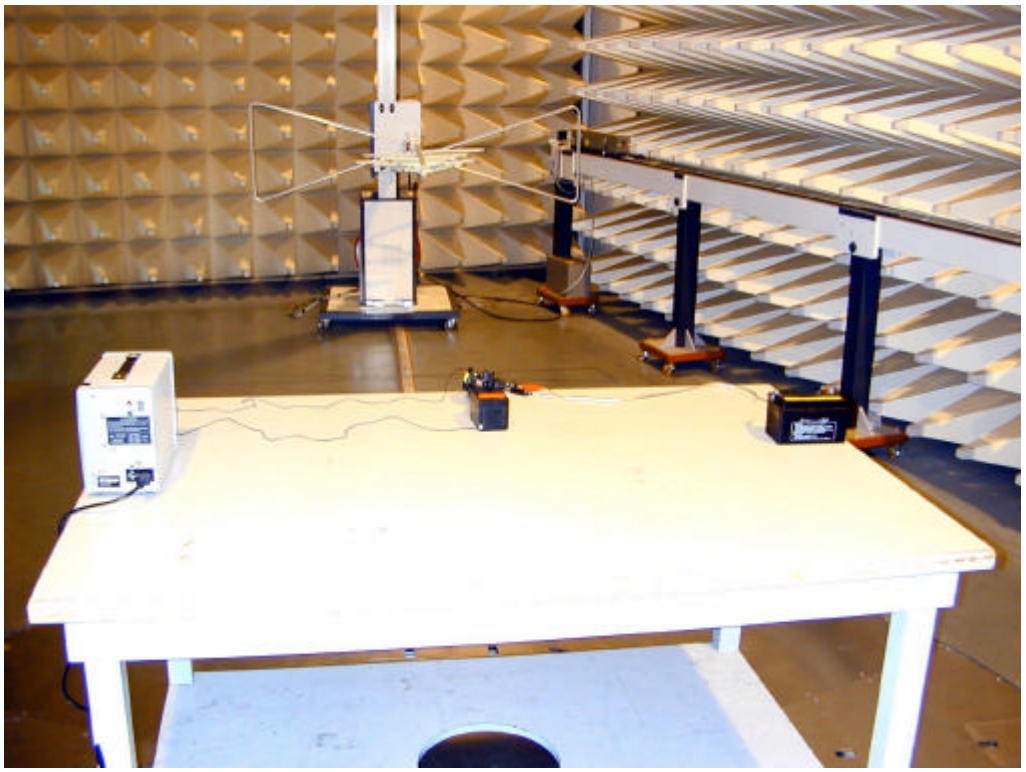
3.6 Measuring Instrument Setup

Explanation of measuring instrument setup in frequency band measured is as following:

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi Peak	120 kHz	N/A
	Spectrum Analyzer	Peak	100 kHz	100 kHz

3.7 Radiated Measurement Photos





4. EMISSION BAND MEASUREMENT

4.1 Standard Applicable

According to 15.239 (a), emissions from the intentional radiator shall be confined within a bank 200kHz wide centered on the operating frequenc. The 200 kHz bank shall lie wholly within the frequency range of 88-108 MHz.

4.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 2 and measurement the turn on the EUT. Then set it to any one measured frequency within its operating range and makes sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 30 kHz and 100 kHz respectively with a convenient frequency span including 200 kHz bandwidth of the emission.
4. Mark the bandwidth of 200 kHz points and plot the graph on spectrum analyzer.
5. Repeat above procedures until all measured frequencies were complete.

4.3 Measurement Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Test Receiver	Hewlett-Packard	8546A	June 15,2002
Plotter	Hewlett-Packard	7470A	N/A

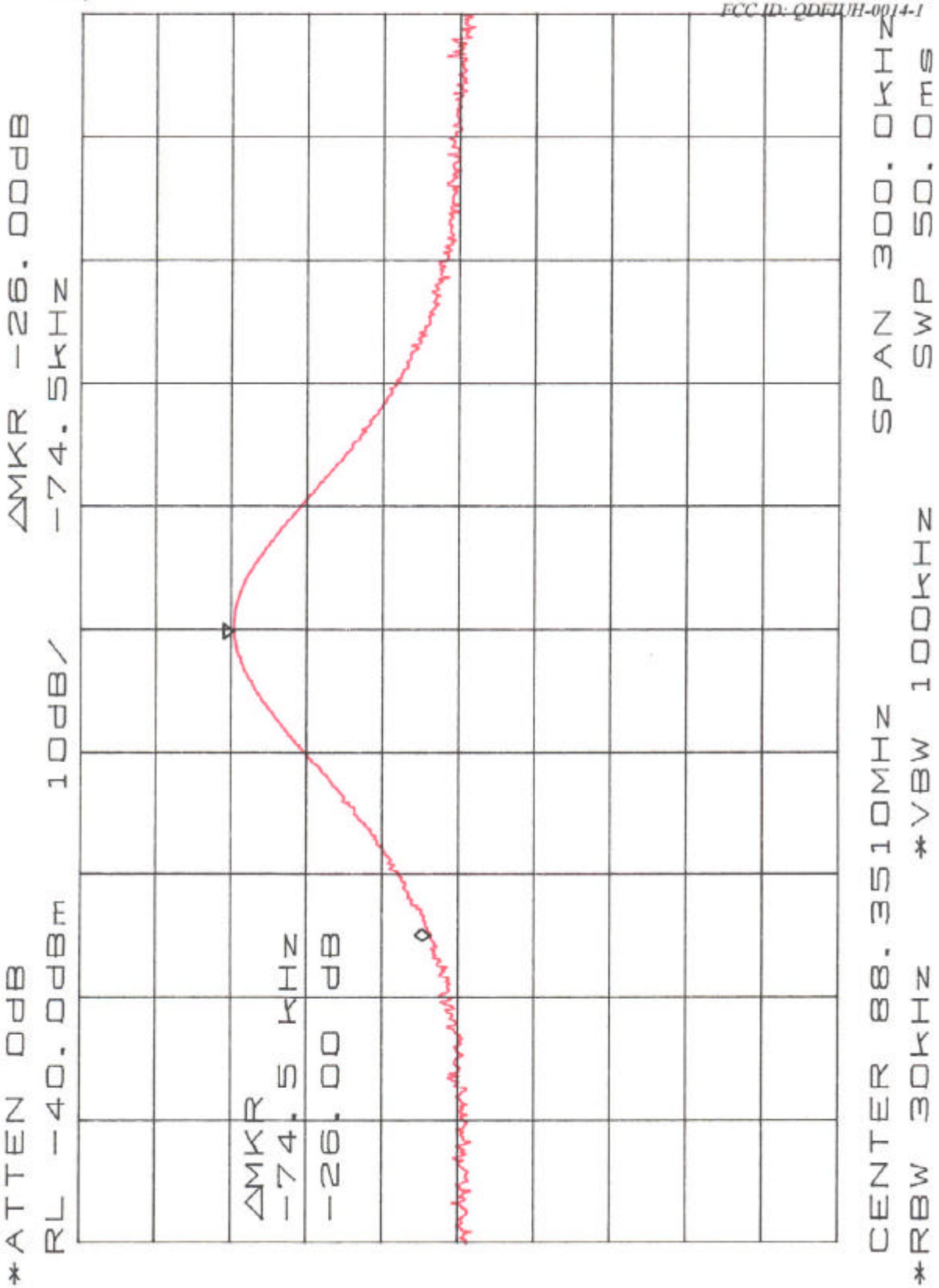
4.4 Measurement Data

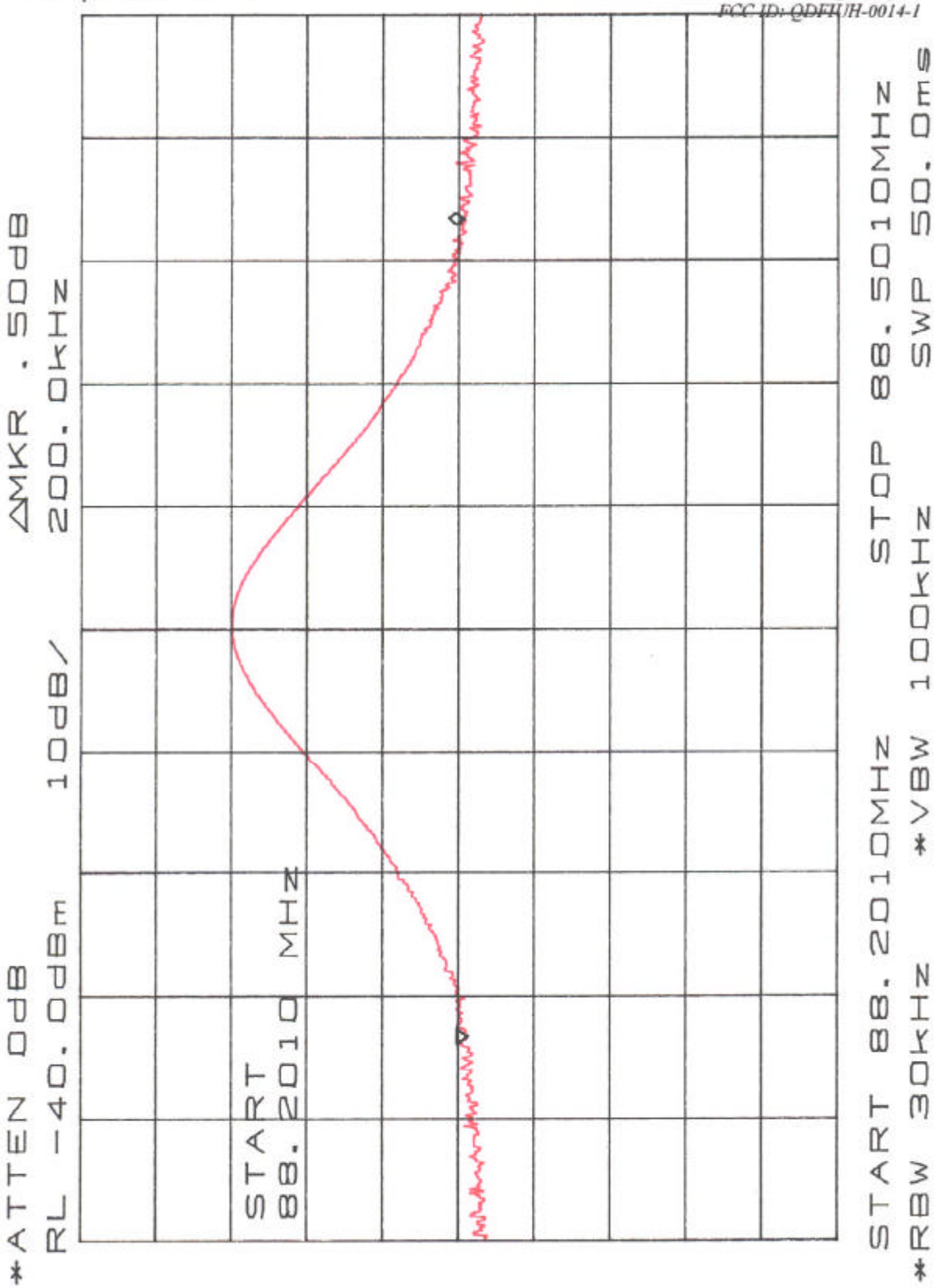
Test Date: May 22, 2002 Temperature: 20℃ Humidity: 67%

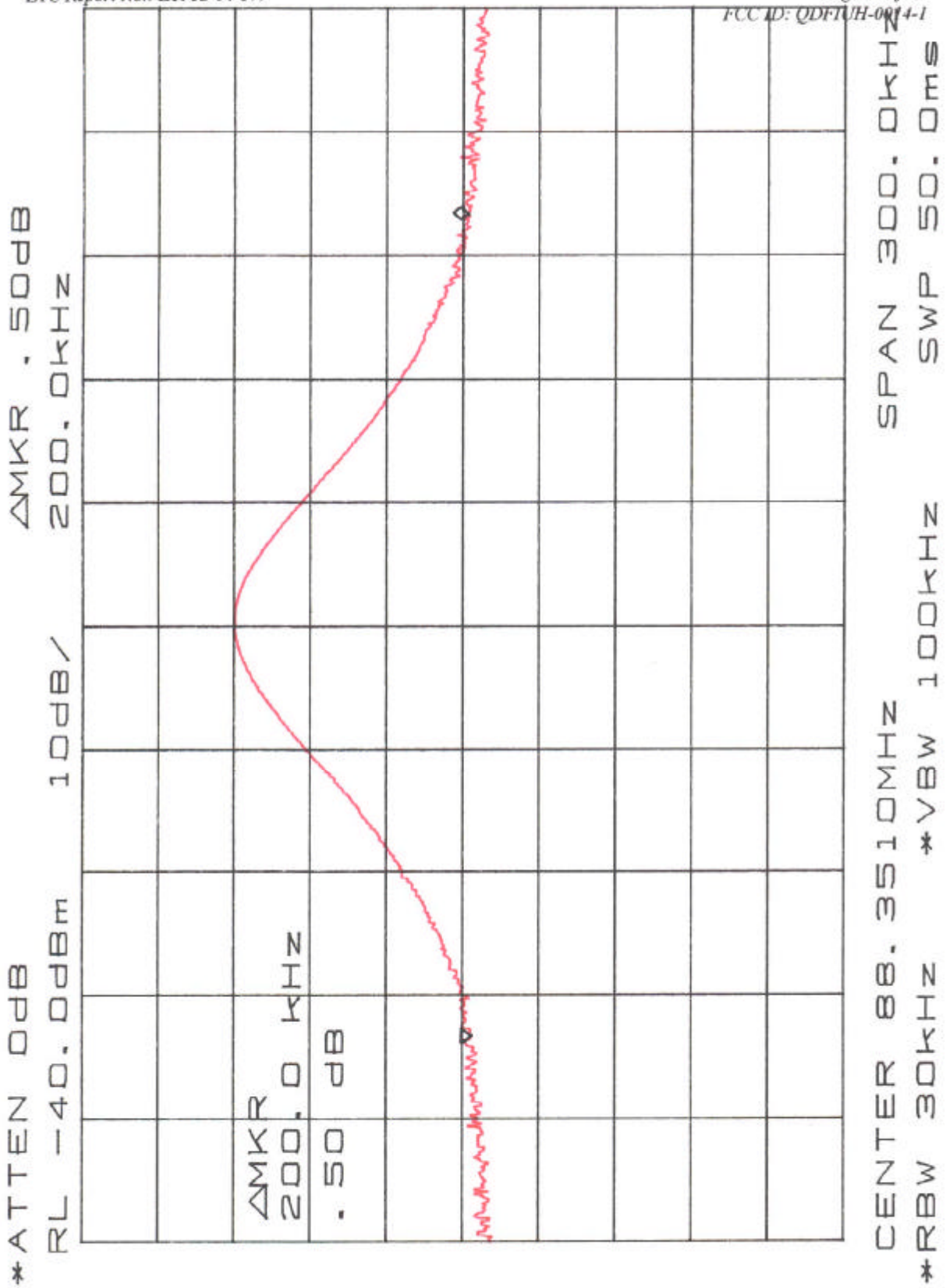
(1) The 26 dB Bandwidth is 74.5 +77.5=152.0 kHz

(2) The 200 kHz band lied wholly within the frequency rage of 88-108MHz

＊Plotted graphics please see Page 10~ 12.


*ATTEN 0dB
RL -40.0dBm
10dB/
ΔMKR -26.00dB
-74.5kHz
ΔMKR
-74.5 kHz
-26.00 dB
CENTER 88.3510MHz
*RBW 30kHz
*VBW 100kHz
SPAN 300.0kHz
SWP 50.0ms


*ATTEN 0dB
RL -40.0dBm
10dB/
ΔMKR .50dB
200.0kHz
START
88.2010 MHz
START 88.2010MHz
*RBW 30kHz
*VBW 100kHz
STOP 88.5010MHz
SWP 50.0ms


*ATTEN 0dB
RL -40.0dBm
10dB/
ΔMKR .50dB
200.0KHZ
ΔMKR
200.0 KHZ
.50 dB
CENTER 88.3510MHZ
SPAN 300.0KHZ
*RBW 30KHZ
*VBW 100KHZ
SWP 50.0S

5. ANTENNA REQUIREMENT

5.1 Standard Applicable

According to §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.

5.2 Antenna Construction

The antenna is permanently mounted on PCB, no consideration of replacement.

6. CONDUCTED EMISSION MEASUREMENT

6.1 Standard Applicable

The EUT is excused from investigation of conducted emission, for it is powered by battery only. According to § 15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.