

Electromagnetic Emission

FCC MEASUREMENT REPORT

VERIFICATION OF COMPLIANCE FCC Part 18 Certification Measurement

PRODUCT : Ultrasonic Lens Cleansing
MODEL/TYPE NO : LENS MEDIC
FCC ID : PYR-LENSMEDIC
APPLICANT : Now Medic Co., Ltd.
147-2, Karak-Dong, Songpa-Ku, Seoul, Korea
Attn. : Du-muk, Choi / Q.A Dept, Deputy Manager
FCC CLASSIFICATION : Part 18 Class B Ultrasonic Consumer ISM Equipment
FCC RULE PART(S) : FCC Part 18 Subpart B
FCC PROCEDURE : Certification
TRADE NAME :
TEST REPORT No. : E01.1004. FCC.384N
DATES OF TEST : September 28, 2001
DATES OF ISSUE : October 4, 2001
TEST LABORATORY : ETL Inc (FCC Registration Number : 95422)
371-51, Gasan-Dong, Geumcheon-Gu, Seoul, Korea
Tel : (031) 885-0072 Fax : (031) 885-0074

This Ultrasonic Lens Cleansing, Model LENS MEDIC has been tested in accordance with the measurement procedures specified in FCC/OST MP-5 at the ETL/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part 18 : Consumer ISM Equipment

I attest to the accuracy of data. All measurement herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results of testing in this report apply to the product/ system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.



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Title : Chief Engineer & Lab.Manager

E-RAE Testing Laboratory Inc.
371-51, Gasan-Dong, Geumcheon-Gu,
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FCC MEASUREMENT REPORT

Scope – Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)

General Information

Applicant Name : Now Medic Co., Ltd.

Address : 147-2, Garak-Dong, Songpa-Gu,
Seoul, Korea

Attention : Du-muk, Choi / Q.A Dept, Deputy Manager

- **EUT Type** : Ultrasonic Lens Cleansing
- **Model Number** : LENS MEDIC
- **FCC Identifier** : PYR-LENSMEDIC
- **S/N** : N/A
- **Freq. Range** : 135KHz
- **Modulation** : N/A
- **FCC Rule Part(s)** : FCC Part 18 Subpart B
- **Test Procedure** : FCC/OST MP-5(1986)
- **FCC Classification** : FCC Part 18 CLASS B Consumer ISM Equipment
- **Dates of Tests** : October 4, 2001
- **Place of Tests** : ETL Inc
EMC Testing Lab (FCC Registration Number : 95422)
584, Sangwhal-Ri, Kanam-Myun, Yaju-Kun,
Kyounggi-Do, Korea
Tel : (031) 885-0072 Fax : (031) 885-0074
- **Test Report No.** : E01.1004.FCC.384N

1 . I N T R O D U C T I O N

The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratory Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Youju-kun, Kyoungki-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-1992 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meters site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission(Registration Number : 95422).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-1992) was used in determining radiated and conducted emissions from the Now Medic Co., Ltd. Model : LENS MEDIC

2 . P R O D U C T I N F O R M A T I O N

2.1 Equipment Description

The Equipment Under Test(EUT) is the Now Medic Co., Ltd.

Please refer to Users manual

2.2 General Specification

- SIZE : 730 X 730 X 30mm(E X W X H)
- List of Each OSC. Or X-Tal. Freq. (≥ 1 MHz) : X-TAL – 10KHz
- Chipset Brand & Part No. : PIC16C711-04/P : MICROCHIP
1RL510A : MICROCHIP
LM555CN : MICROCHIP
- Number of Layers : Main board– 1Layers
- Exterior material : ABS
- Product weight : 650g
- Cleansing Time : 2min
- Sterilizing : 3min
- Ultrasonic Frequency : 135 KHz
- Input Voltage : DC 12V, 5W (Supply form DC Adaptor)

3 . D E S C R I P T I O N O F T E S T S

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with §12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment" and FCC/OST MP-5(1986) "FCC Methods of Measurements of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment". The Measurements were performed over the frequency range of 0.01MHz to 30MHz using a 50 /5uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The Measurements were made with the detector set to Peak or CISPR quasi-peak function. The 6dB bandwidth of the measuring instrument was set to the 200Hz for measurements below 150KHz, and 9KHz for measurements from 150KHz to 30MHz.

- Procedure of Test

The line-conducted facility is located inside a shielded room. 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the side wall of the shielded room. Two EMCO 3625/2 LISN are bonded to the shielded room. The EUT is powered from the EMCO LISN and the support equipment is powered from the another EMCO LISN. Power to the LISN are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ø1.2cm. If the EUT is a DC powered device, power will be derived from the typical power supply it normally will be powered from and these supply lines will be connected to the EMCO LISN. Non-inductive bundling to a 1m length shortened all interconnecting cables more than 1m. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the R3261A Spectrum Analyzer to determine the frequency producing the max. emission from the EUT. The frequency producing the max. level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.01 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 200Hz for measurement below 150KHz, and set to 9KHz for measurements from 150KHz to 30MHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

3 . D E S C R I P T I O N O F T E S T S

3.2 Radiated Emission Measurement

Radiated emission measurements were in accordance with §12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment" and FCC/OST MP-5(1986) "FCC Methods of Measurements of Radio Noise Emissions from Industrial, Scientific, and Medical Equipment". The measurements were performed over the frequency range of 9KHz to 1GHz using antenna as the Input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurements were made with the detector set for "CISPR Quasi-peak" within a bandwidth of 9KHz, 120KHz or Average, unless otherwise specified for a given device.

- Procedure of Test

Preliminary measurements were made at 3 meter using a loop, broadband antenna as appropriate and spectrum analyzer to determine the frequency profile of the EUT in shield room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 9KHz to 30MHz using EMCO LOOP antenna. For above 30MHz, a tuned dipole or broadband antennas were used and above 1GHz, Linearly polarized double ridge horn antennas were used. Final measurements were made open site at 3meters. The test equipment was placed on a wooden table of 80cm height on the turn-table. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR Quasi-peak mode and the bandwidth of the receiver was set to 200Hz, 9KHz, 120KHz or 1MHz depending on the measurement frequency. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8meter high nonmetallic 1 x 1.5 meter table. The turntable containing the system was rotated; the antenna height was varied 1 to 4meter (for a loop antenna, up to 2 meters) and stopped at the azimuth or height producing the max. emission. Each emission was maximized by; varying the mode of operation to the EUT and/or support equipment and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Photographs of the worst-case emission test setup can be seen in Appendix B.

4 . T E S T C O N D I T I O N

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

4.2 EUT operation

The EUT was operated with Lens Cleansing & Sterilize for the following operating conditions. The worst case emission Lens Cleansing

Operation Mode	Worst Case
Standby	X
Lens Cleansing	X
Lens Sterilize	

4.3 Support Equipment Used

Following peripheral devices and interface cables were connected during the measurement:

EUT – Ultrasonic Lens Cleansing

FCC ID : PYR-LENSMEDIC
Model Name : LENS MEDIC
Serial No. : N/A
Manufacturer : Now Medic Co., Ltd.
Power Supply Type : Switching
Power Cord : Non-shielded, Detachable: 1.2m
Data Cable : N/A

Support 1 – AC Adapter

FCC ID : N/A
Model Name : DG-12500
Serial No. : N/A
Manufacturer : Dong Gin Co., Ltd.
Power Supply Type : Non-Switching
Power Cord : Non-shielded, Detachable: 1.2m
Data Cable : N/A

5 . T E S T R E S U L T S

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

The data collected shows that the Now Medic Co., Ltd. Ultrasonic Lens Cleansing, LENS MEDIC complies with technical requirements of the FCC PART 18 Consumer ISM Equipment

Test Rule Parts	Measurement Required	Result
18.307(a)	Conducted Emissions Measurement	Passed by – 9.73 dB
18.305(b)	Radiated Emissions Measurement	Passed by – 13.22 dB

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

5 . T E S T R E S U L T S

5.2 Conducted Emissions Measurement

EUT	Ultrasonic Lens Cleansing / LENS MEDIC(SN:N/A)
Limit apply to	Section 18.307(a)
Test Date	September 29, 2001
Operating Condition	LENS Cleansing
Environment Condition	Humidity Level : 40 %RH, Temperature : 25
Result	Passed by – 9.73 dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarization of live and neutral line.

Detector mode : CISPR Quasi-Peak mode 0.01 to 0.15MHz (6dB Bandwidth : 200Hz)

CISPR Quasi-Peak mode 0.15 to 30MHz (6dB Bandwidth : 9KHz)

Frequency [MHz]	Reading [dB]	Phase (*H/**N)	Limit [dB]	Margin [dB]
	Quasi-peak		Quasi-peak	Quasi-Peak
0.010	44.75	H	60.0	15.25
0.018	50.27	N		9.73
0.013	33.02	H		26.98
0.031	30.95	N		29.05
0.043	33.90	N		26.10
0.620	21.80	N	46.0	24.20
13.75	18.02	N		27.98
28.29	19.52	N		26.48

NOTES :

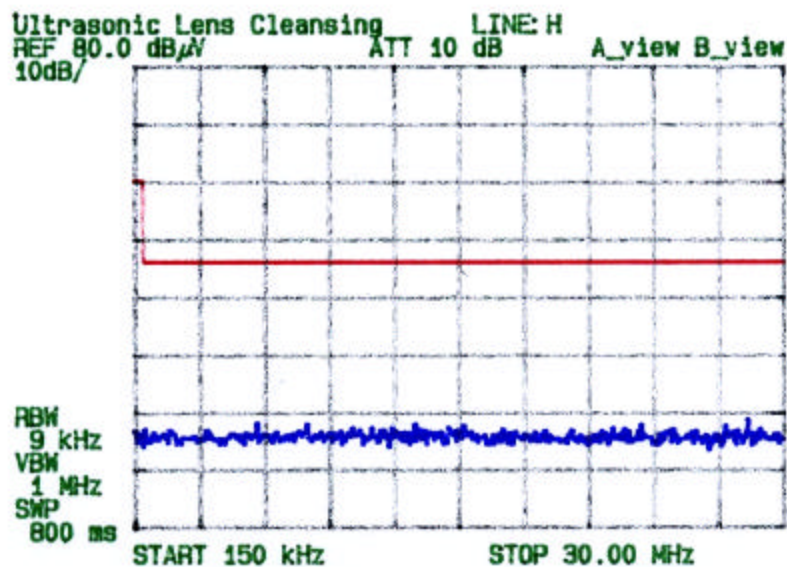
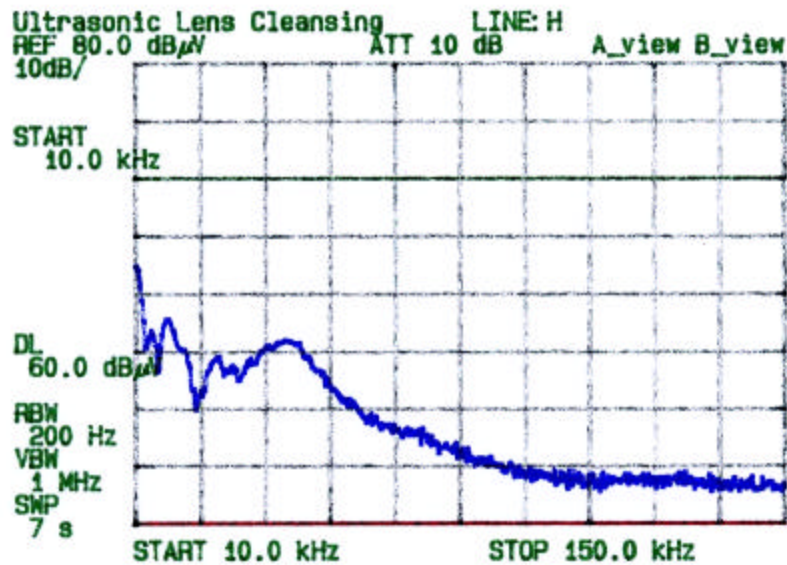
- * H : HOT Line , **N : Neutral Line
- Margin value = Limit – Reading
- Measurement were performed at the AC Adapter Inlet in the frequency band of 0.01MHz ~ 30MHz according to the FCC PART 18 Ultrasonic equipment



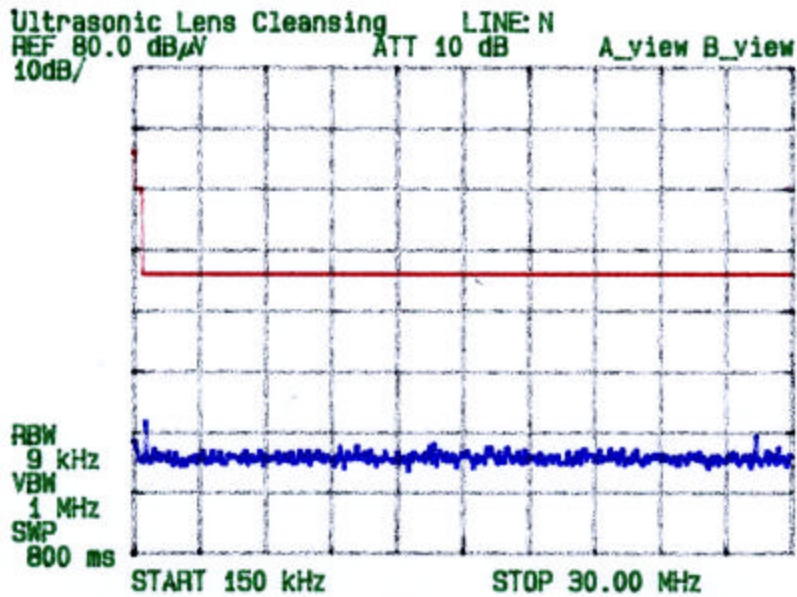
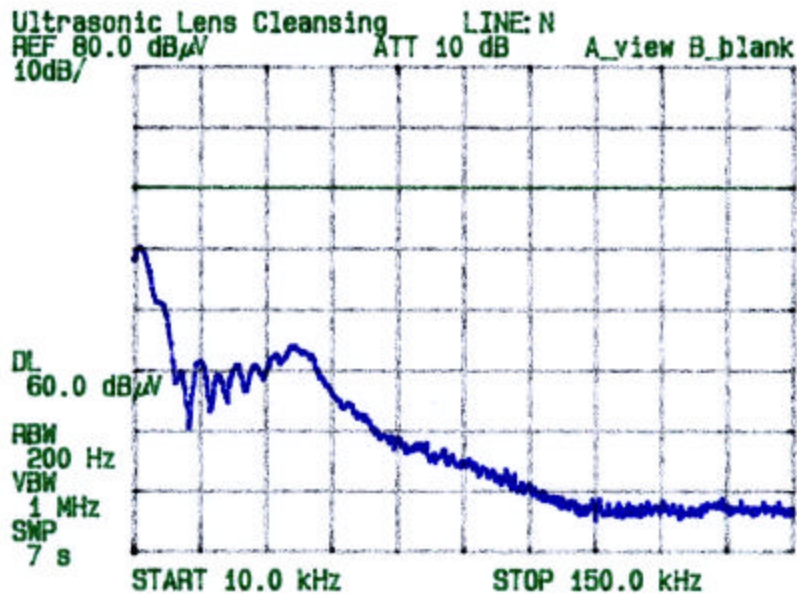
Test Engineer : C. S. Kim

5 . T E S T R E S U L T S

Line: HOT Line



Line: Neutral Line



5. TEST RESULTS

5.3 Radiated Emissions Measurement

EUT	Ultrasonic Lens Cleansing / LENS MEDIC(SN:N/A)
Limit apply to	Section 18.305(b)
Test Date	September 29, 2001
Operating Condition	LENS Cleansing
Environment Condition	Humidity Level : 41 %RH, Temperature : 25
Result	Passed by – 13.22dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector mode : CISPR Quasi-Peak mode (6dB Bandwidth : 9 kHz)

Measurement Distance : 3 meters

Frequency [MHz]	Reading [dB]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Emission Level [dB /m]	Limit [dB /m]	Margin [dB]
0.017	39.50	H	20.0	0.5	60.00	83.00	23.00
0.016	39.08	H	20.0	0.5	59.58	83.52	23.94
0.032	36.37	H	20.0	0.5	56.87	77.50	20.63
0.048	29.80	H	20.0	0.5	50.30	73.97	23.67
0.063	26.30	H	20.0	0.5	46.80	71.62	24.82
0.098	33.15	H	20.0	0.5	53.65	67.77	13.92
0.140	30.96	H	20.0	0.5	51.46	64.68	13.22
0.150	24.31	H	20.0	0.5	44.81	64.08	19.27

NOTE : 1. * H : Horizontal polarization , ** V : Vertical polarization

2. Emission Level = Reading + Antenna factor + Cable loss

3. Margin value = Limit - Emission Level

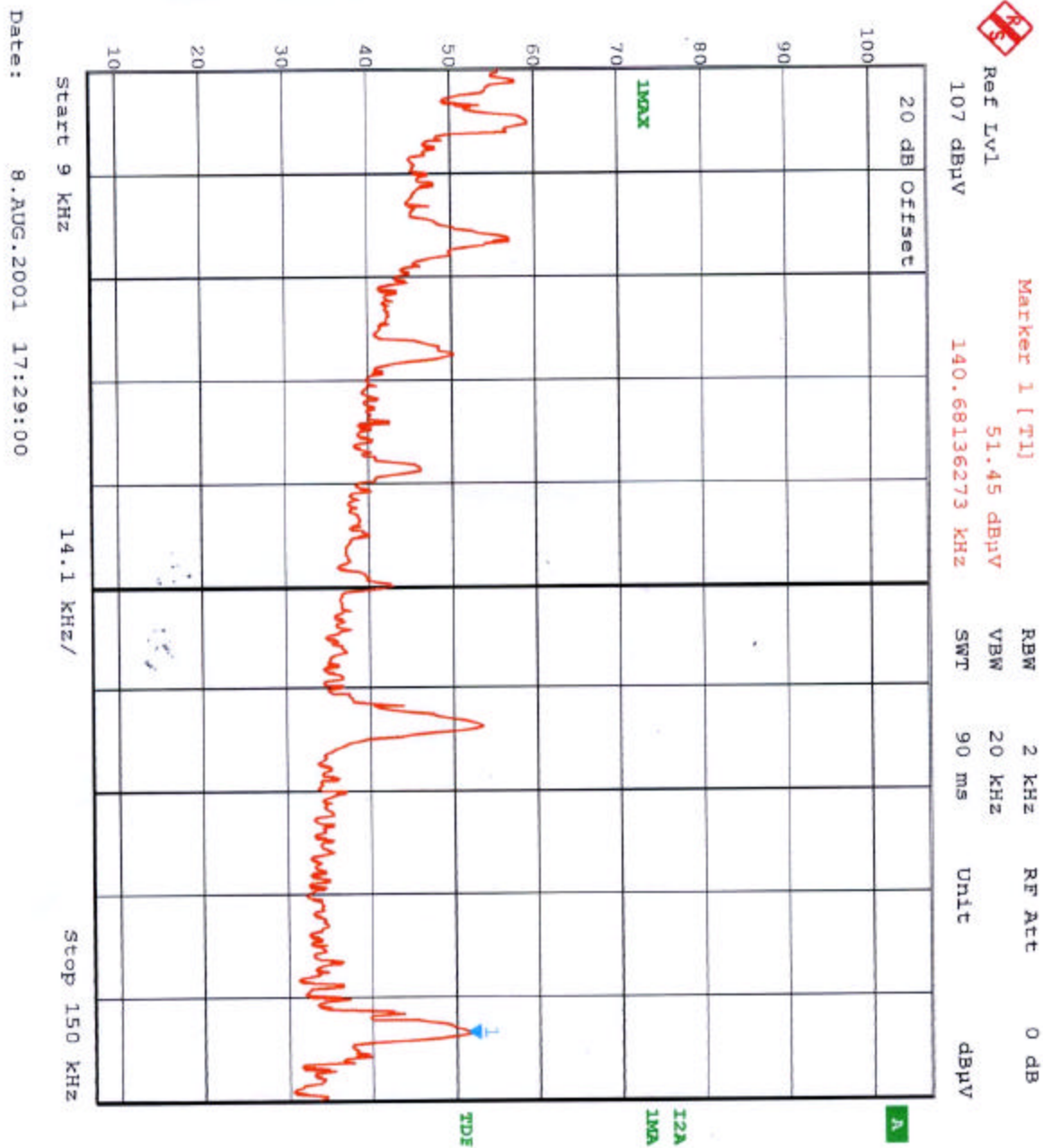
4.The measurement was performed for the frequency range 9KHz ~ 30MHz according to the FCC PART 18 Ultrasonic equipment.

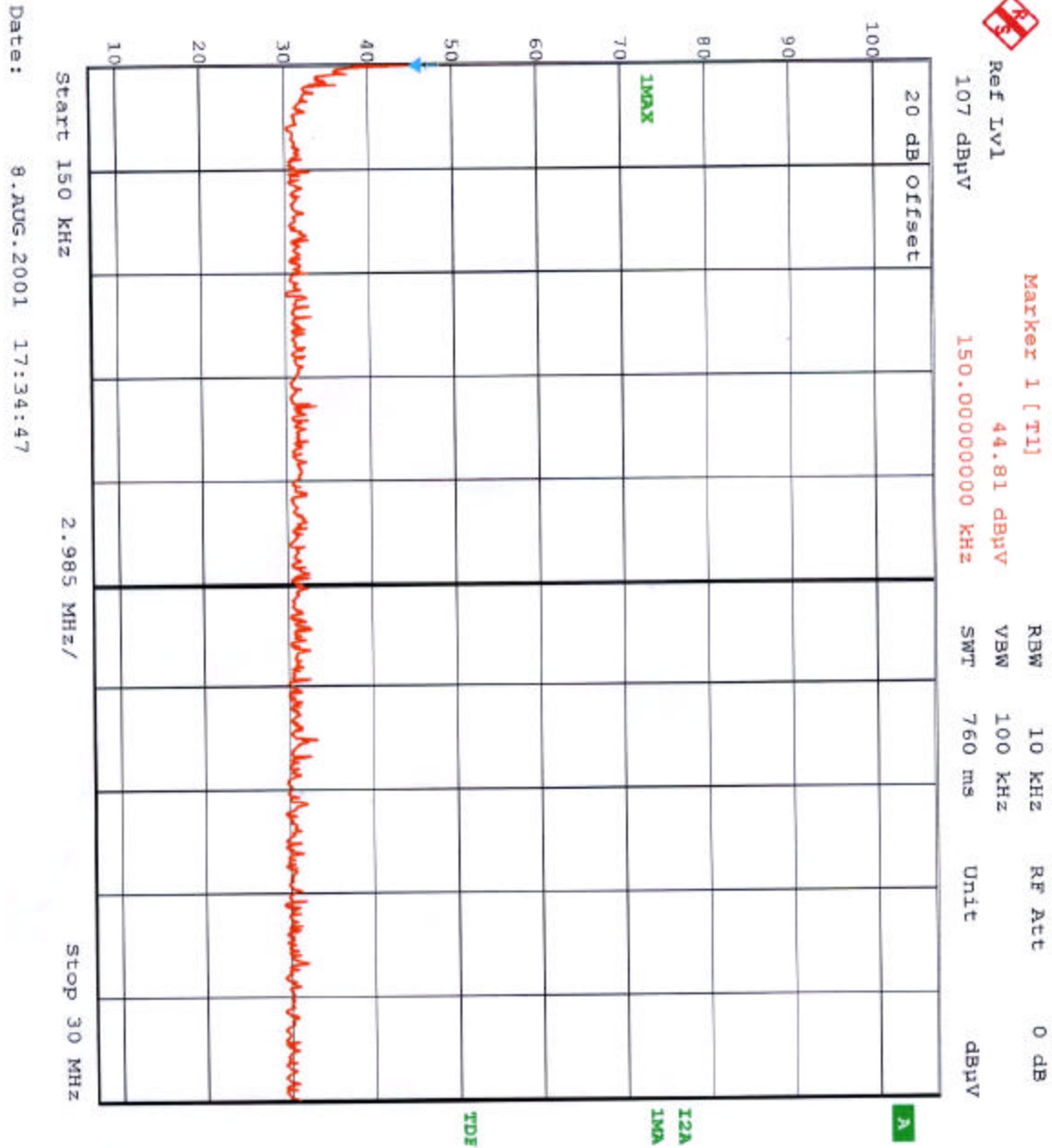


Test Engineer : C. S. Kim

5. TEST RESULTS

5.4 Radiated Emissions Measurement Graph





6 . S A M P L E C A L C U L A T I O N

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

$$\text{dB}(\mu\text{V}/\text{m}) = 20 \log_{10} (\mu\text{V}/\text{m}) : \text{Equation 1}$$

$$\text{dB}\mu\text{V} = \text{dBm} + 107 : \text{Equation 2}$$

Example 1 : @ 0.018 MHz

Limit	= 1000 μV = 60.00 dBuV
Reading	= 50.27 dBuV
Convert to μV	= 326.5
Margin	= 50.27 – 60.00 = -9.73
	= -9.73 dB below Limit

7 . T E S T E Q U I P M E N T L I S T

List of Test Equipments Used for Measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
☒	Spectrum Analyzer	R3261A	Advantest	21720033	01-10-08
☐	Spectrum Analyzer	ESA-L1500A	H.P	US37360920	01-10-20
☒	Receiver	ESVS 10	R & S	835165/001	02-04-06
☒	Spectrum Analyzer	R3265A	Advantest	45060321	02-02-28
☒	Preamplifier	HP8447D	HP	2944A07626	02-01-10
☐	Preamplifier	HP 8347A	HP	2834A00544	01-05-23
☐	TriLog Antenna	VULB9160	Schwarz Beck	3082	02-05-08
☐	LogBicon	VULB9165	Schwarz Beck	2023	02-05-08
☐	Dipole Antenna	VHAP	Schwarz Beck	964	02-05-03
☐	Dipole Antenna	VHAP	Schwarz Beck	965	02-05-03
☐	Dipole Antenna	UHAP	Schwarz Beck	949	02-05-03
☐	Dipole Antenna	UHAP	Schwarz Beck	950	02-05-03
☒	LISN	3625-2	EMCO		
☐	Double Ridged Horn	3115	EMCO	9809-2334	01-09-20
☒	Magnetic Loop Antenna	6502	EMCO	9810-2111	01-12-11
☒	Turn-Table	DETT-03	Daeil EMC	-	N/A
☒	Antenna Master	DEAM-03	Daeil EMC	-	N/A
☒	Plotter	7440A	H.P	2725A 75722	N/A
☒	Chamber	DTEC01	DAETONG	-	N/A
☐	Impedance Matching Pad	6001.01.A	SUNNER	3252	01-09-22
☒	Thermo Hygograph	3-3122	ISUZU	3312201	01-12-20
☒	BaroMeter	-	Regulus	-	-