



ONETECH Corp.

2F. KUNHAN BD, 1557-11 SEOCHO-DONG, SEOCHO-KU, SEOUL 137-070 KOREA
TEL: 587-9037 FAX: 587-9039

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

RF CARD READER
CERTIFICATION TO FCC PART 15 REQUIREMENT

PRODUCT	RF CARD READER		
FCC ID	N9FLCR-2000C		
MODEL NO.	LCR-2000C	SERIAL NO.	N/A
APPLICANT & ADDRESS	LEEMA PHARMED. INC. 9F. LEEMA BLDG., 146-1 SUSONG-DONG CHONGRO-GU, SEOUL 110-140, KOREA		

REPORT NO.	E98OR-004	ISSUE DATE	October 14, 1998
PREPARED BY : ONETECH CORPORATION			
2 F. KUNHAN B/D, 1557-11, SEOCHO-DONG, SEOCHO-KU, SEOUL 137-070 KOREA (TEL)02-587-9037, (FAX)02-587-9039			

LIST OF EXHIBITS

FCC ID : N9FLCR-2000C
MODEL : LCR-2000C
“RF CARD READER”

EXHIBIT 1. IDENTIFICATION LABEL

2. AGENT AUTHORIZATION

3. MODIFICATION LIST

4. TECHNICAL INFORMATION:
ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

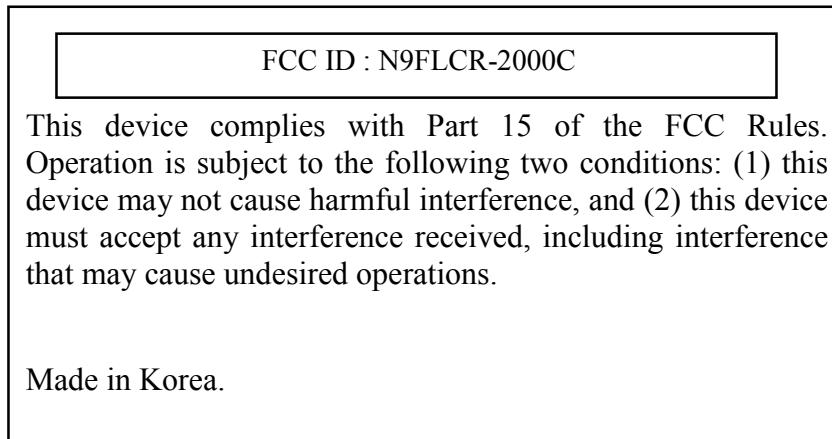
5. PHOTO REPORT

6. USER'S MANUAL & SCHEMATIC (BLOCK DIAGRAM)

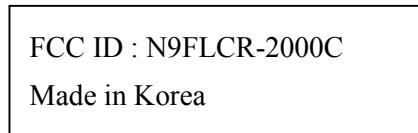
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EXHIBIT 1. IDENTIFICATION LABEL:**PROPOSED FCC LABEL (Part15 Sec. 15.19)**

The label included following statement will be attached on the rear side of transmitter.



The label included following statement will be attached on the rear side of receiver.



“Please find an ID Label for EUT at ID Label/Location Info in Exhibit Type”

EXHIBIT 2. AGENT AUTHORIZATION:

“Please find an Agent Authorization Letter at Attestation Statements in Exhibit Type”

EXHIBIT 3. MODIFICATION LIST:

“There was no modified items during EMI test”

EXHIBIT 4. TECHNICAL INFORMATION:**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**

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1. VERIFICATION OF COMPLIANCE

APPLICANT : LEEMA PHARMED. INC.
 9F., LEEMA BLDG., 146-1, SUSONG-DONG, CHONGRO-GU SEOUL 110-140 KOREA.

CONTACT PERSON : YANG J. H. / SYSTEM DIVISION ENGINEER

TELEPHONE NO : +82-2-734-3311

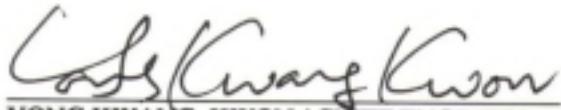
FCC ID : N9FLCR-2000C MODEL NO/NAME: LCR-2000C

SERIAL NUMBER : N/A

DATE : October 14, 1998

DEVICE TYPE	INTENTIONAL RADIATOR
E.U.T. DESCRIPTION	RF CARD READER FOR ONLY DOOR OPENER
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	PART 15 SUBPART C SECTION 15.209
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	NO
FINAL TESTS WERE CONDUCTED ON	3 METER OPEN TEST SITE

The above equipment was tested by ONETECH CORPORATION for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.


 YONG KWANG, KWON / CHIEF ENGINEER
 EMC TESTING DEPARTMENT
 ONETECH Testing & Eval. Lab.
 SEOUL KOREA

2. GENERAL INFORMATION

2.1 Product Description

The LEEMA PHARMED INC., Model LCR-2000C (referred to as the EUT in this report) is an Identification System which consist of two basic elements, RF Card Reader and Contactless Card. The reader emits 125kHz electromagnetic field via an antenna which was inserted within an each reader and card. When a transponder passes within it's range, it is energized, causing it to transmit it's ID code back to the reader. The ID number of contactless card is compared with the data, which is stored in the memory of the reader, and decides whether access grant or deny. The product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
TX FREQUENCY RANGE	125 kHz
MODULATION	FSK
READING RANGE	10cm
SPEED	100ms
MEMORY	INTERNAL : 4kB, EXTERNAL : 4 kB
LIST OF EACH OSC. ORCRY. FREQ.(FREQ.>=1MHz)	4 MHz
POWER REQUIREMENTS	DC 12V, 3A
NUMBER OF LAYERS	2 LAYER
I/O PORT	DOOR LOCK, ALARM, POWER, DOOR-CONTACT, EXIT BUTTON

Model Differences:

No other model differences have been mentioned.

2.2 Related Submittal(s) / Grant(s)

ORIGINAL SUBMITTAL ONLY

2.3 Test System Details

The Model numbers for all equipment connected to the tested system are:

Device	Model No	Manufacturer	FCC ID	Description	Connected to
DOOR	Door Lock	1571	SDC	N/A	Magnetic Lock
	Alarm	LED LAMP	N/A	N/A	LED Lamp Buzzer
	Door Contact	2707	Sentrol	N/A	Magnetic Switch
	Exit Button	LOCAL	N/A	N/A	Push Button
CARD READER(EUT)	LCR-2000C	Leema Pharmed	N9FLCR-2000C	Transmitter	N/A
AC ADAPTOR	EO-2585	IO Electronics	N/A	AC/DC Adapter	EUT
Contactless Card	LC-100	Leema Pharmed	N9FLCR-2000C	Receiver	EUT

2.4 Test Methodology

The measurements for Radiated Emissions, Line Conducted Emissions and Bandwidth of operating frequency were performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at an antenna to EUT distance of 3 meters.

2.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Detailed description of test facility was submitted to the Commission on January 24, 1996(31040/SIT, 1200F2).

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following components inside the EUT were installed.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN BOARD	Leema Pharmed Inc	CR-2000CV	N/A
KEYPAD	Leema Pharmed Inc	LCR-KEYPAD	N/A

3.2 Equipment Modifications

To achieve compliance to FCC part 15 rule, the following change(s) were made by LEEMA PHARMED. INC. during compliance testing: **“There was no Modified items during EMI test”**

3.3 Operating Conditions.

The EUT and accessories were operated at the rated operating voltage and typical conditions-mechanical, electrical- for which are designed, but the door size was smaller than it's nominal size. Because we think that actual door size does not emit a maximum emission. The interconnecting cables of 1m length were used in a door.

3.4 Cable Description and Noise Suppression Parts on Cable

Device Type	I/O Cable Shield	Length(m)	Ferrite Bead(Y/N)	Location
DOOR	Door Lock	Non-shielded	1.2	N
	Alarm	Non-shielded	1.5	N
	Temp	Non-shielded	1.3	N
	Door Contact	Non-shielded	1.3	N
	Exit Button	Non-shielded	1.2	N
CARD READER	N/A	N/A	N/A	N/A
AC/DC ADAPTOR	Non-shielded	2.7	N	N/A
CONTACTLESS CARD	N/A	N/A	N/A	N/A

.3.4 Configuration of Test System

Line Conducted Emission Test:

EUT was connected to LISN, all supporting equipment were connected to another LISN. Preliminary Powerline Conducted Emission tests were performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test

Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

Field Strength of the Carrier Test:

The field strength of the carrier frequency shall be tested at open field test site with normal supply voltage. In addition, the variation of the fundamental transmitted by the device is shown for variation in supply voltage to 80% and 115% of the normal supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Spurious Emission Test:

Preliminary radiated emissions tests were conducted using the procedure in ANSI C63.4/1992, 8.3.1.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meters open area test site.

Occupied Bandwidth Measurement:

This measurement is performed with the antenna located close enough to give a full-scale deflection of the modulated carrier on the spectrum analyzer. The plot is taken at 2kHz/division frequency span, 1kHz-resolution bandwidth and 10dB/division logarithmic display from an 8568B spectrum analyzer. Bandwidth is determined at -26dB with respect to the reference level.

4. PRELIMINARY TESTS

4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode (TX Mode)	X
Receiving Mode(RX Mode)	

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode (TX Mode)	X
Receiving Mode(RX Mode)	

Tested by: GEA WON, LEE

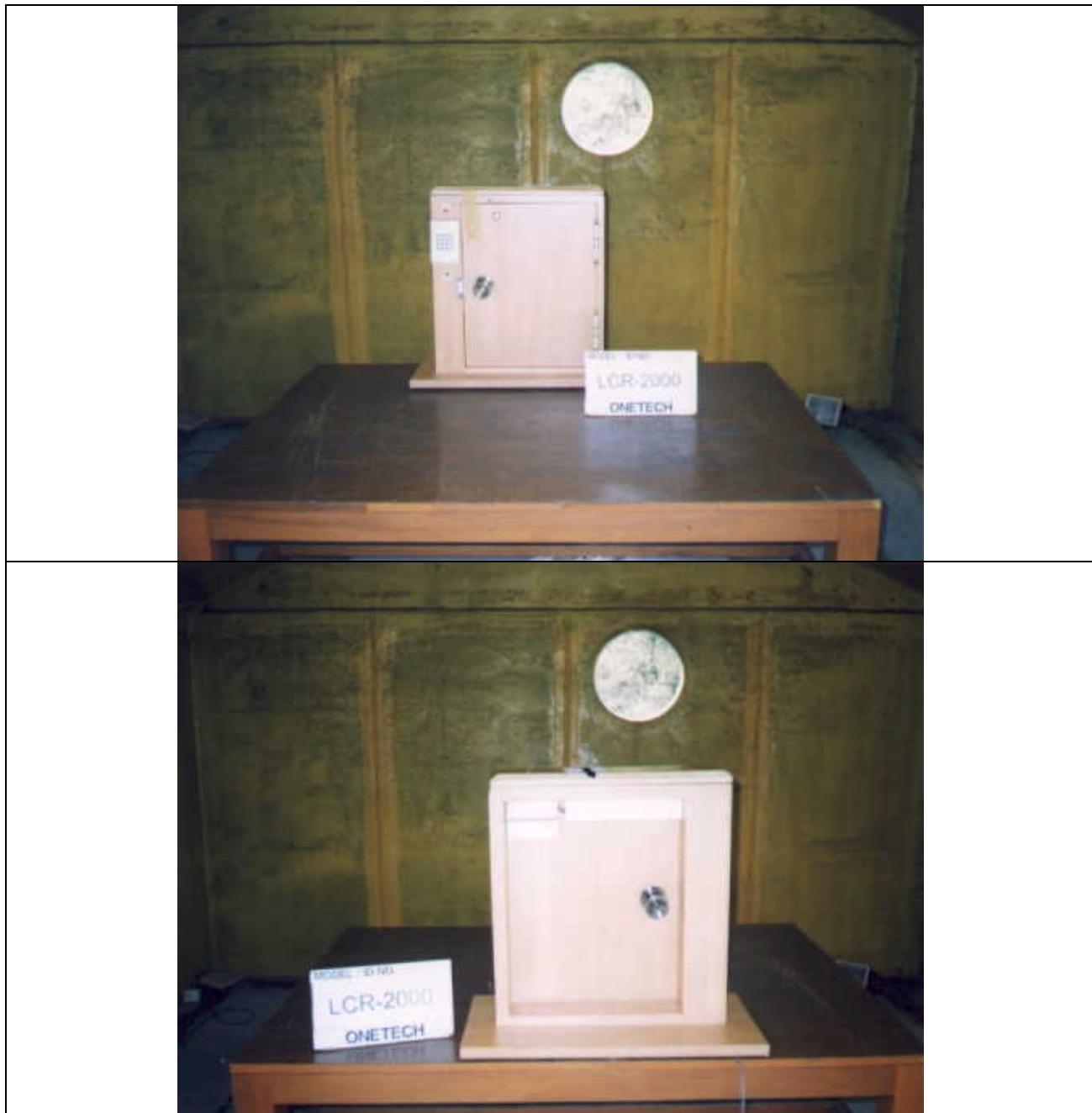
Date: October 08, 1998

5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS

<Conducted Measurement Photos>



<Radiated Measurement Photos>



6. FINAL RESULT OF MEASUREMENT

6.1 Conducted Emissions Tests

Per preliminary tests, the standby (TX) mode of operations was selected which shown the maximum emissions level.

Humidity Level : 56 % Temperature : 21

Limits apply to : FCC CFR 47, PART 15, SUBPART C, Section 15.207

Result : PASSED BY -5.70dB

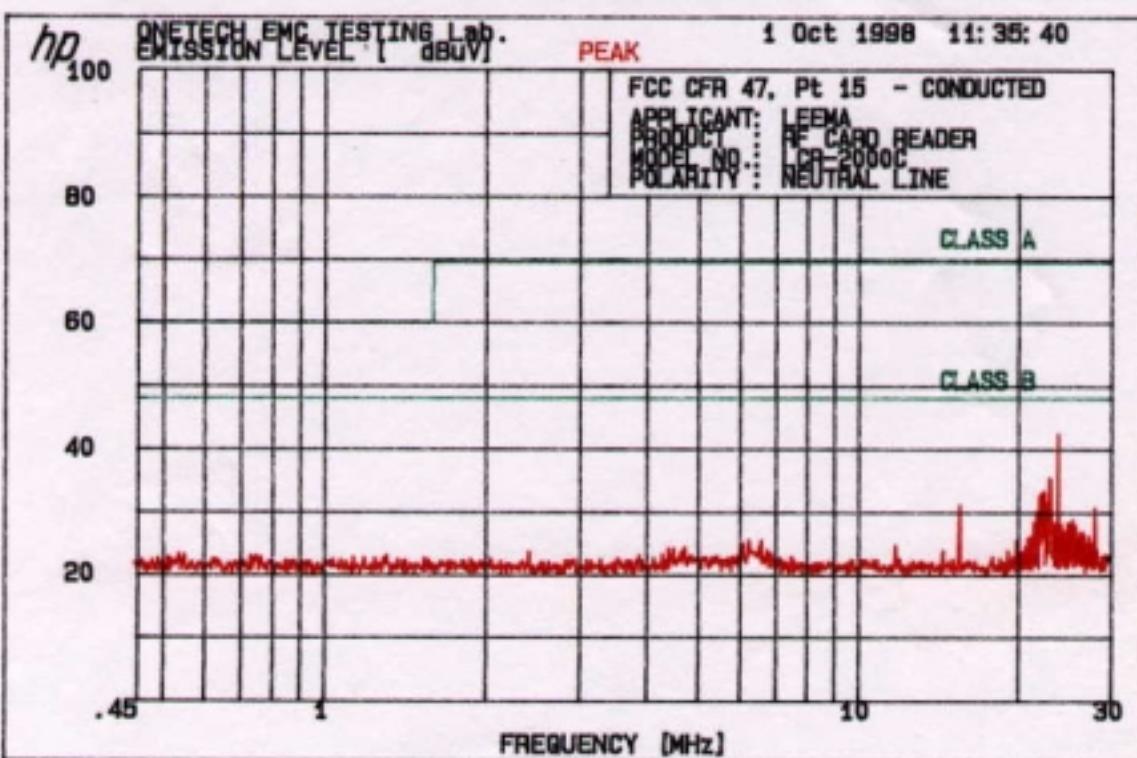
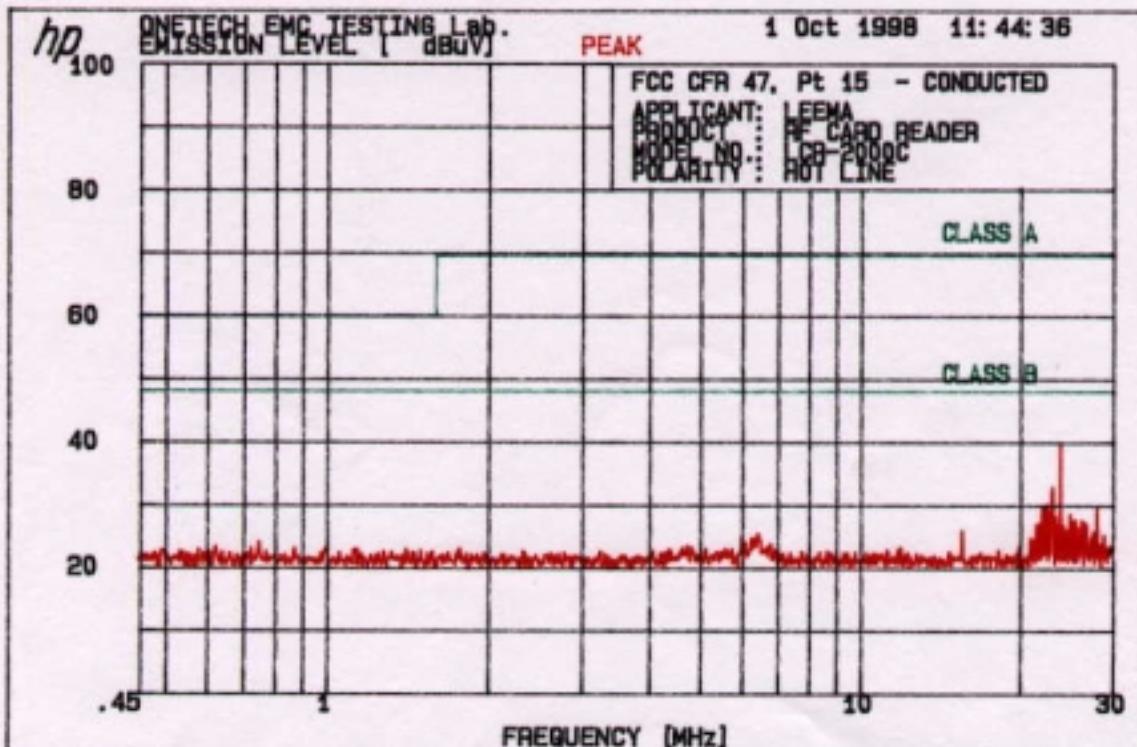
EUT	: RF CARD READER	Date: October 01, 1998
Operating Condition	: STANDBY MODE (TX)	
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 120kHz)	

Power Line Conducted Emissions			FCC Limit	
Frequency (MHz)	Amplitude (dBuV)	conductor	Limit (dBuV)	Margin (dB)
2.43	23.5	N	48.0	-24.50
4.76	24.2	N	48.0	-23.80
6.27	25.5	N	48.0	-22.50
15.59	31.1	N	48.0	-16.90
23.92	42.3	N	48.0	-5.70
28.05	30.6	N	48.0	-17.40

Line Conducted Emissions Tabulated Data



Measuring by : Gea Won, Lee / Project Engineer



6.2 Radiated Emission Test

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

Humidity Level : 56 % Temperature : 23
 Limits apply to : FCC CFR 47, PART 15, SUBPART C Section 15.209
 Result : PASSED BY -4.55dB

EUT	: RF CARD READER			Date: October 08, 1998
Operating Condition	: STANDBY (TX) MODE			
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 120kHz)			
Distance	: 3 Meter			

Radiated Emissions		Ant Pol.	Correction Factors		Total	FCC Limit	
Freq. (MHz)	Amp. (dBuV)		Ant. (dBuV)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dBuV/m)
56.00	17.8	V	11.67	2.54	30.11	40.00	-9.89
68.00	23.8	V	8.35	3.30	35.45	40.00	-4.55
80.00	23.8	V	6.47	3.20	33.47	40.00	-6.53
140.00	12.3	V	12.88	4.81	25.59	43.50	-20.41


 Measuring by : Geon Won, Lee / Project Engineer

6.3 Field Strength of the Carrier Test

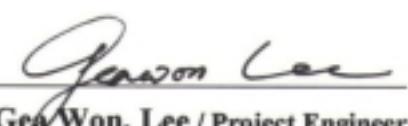
The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Humidity Level	: <u>56 %</u>	Temperature : <u>23</u>	
Limits apply to	: <u>CFR 47, PART 15, SUBPART C Section 15.209</u>		
Result	: <u>PASSED BY -9.70 dB</u>		
Operating Condition	: STANDBY (TX) MODE		Date: October 08, 1998
Detector	: AVERAGE MODE		
Distance	: 3 Meter		

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Carrier Freq. (kHz)	Supply Voltage	Ampl. (dBuV)	Ant.	Cable (dB)	Ampl	Limit (dBuV/m)	Margin (dB)	
125.00	85 %	78.5	H	17.5	0.0	96.00	105.7	-9.70
	100 %							
	115 %							

*Remark: To get a FCC Limit, we used a linear equation as below. Please refer to section 15.31(f)(2).

1) Below 0.490 MHz, FCC Limit = $20 \log(2400/F(\text{kHz})) + 40 \log(300/3)$


Measuring by : Gea Won, Lee / Project Engineer

6.3 Spurious Emission Test

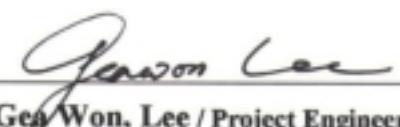
Humidity Level : 56 % Temperature : 23
 Limits apply to : CFR 47, PART 15, SUBPART C Section 15.209.
 Result : PASSED BY -35.8dB
 Operating Condition : STANDBY (TX) MODE Date: October 08, 1998
 Detector : AVERAGE MODE
 Distance : 3 Meter

Radiated Emissions		Ant	Correction Factors		Total	FCC Limit	
Freq. (kHz)	Amp. (dBuV)		Ant. (dB/m)	Cable (dB)		Amp. (dBuV/m)	Limit (dBuV/m)
250.06	39.0	H	14.00	0.00	53.0	99.6	-46.60
375.07	31.8	H	12.90	0.00	44.7	96.1	-51.40
500.04	25.9	H	11.90	0.00	37.8	73.6	-35.8
625.06	22.8	H	11.70	0.00	34.5	71.7	-37.2
750.07	22.7	H	10.20	0.00	32.9	70.1	-37.2

There are no emissions from 6th harmonic frequency to 30MHz.

*Remark: To get a FCC Limit, we used a linear equation as below. Please refer to section 15.31(f)(2).

- 1) Below 0.490 MHz, FCC Limit = $20 \log(2400/F(\text{kHz})) + 40 \log(300/3)$
- 2) Above 0.490 MHz, FCC Limit = $20 \log(24000/F(\text{kHz})) + 40 \log(30/3)$

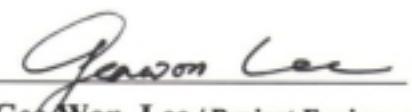

 Measuring by : Geon Won, Lee / Project Engineer

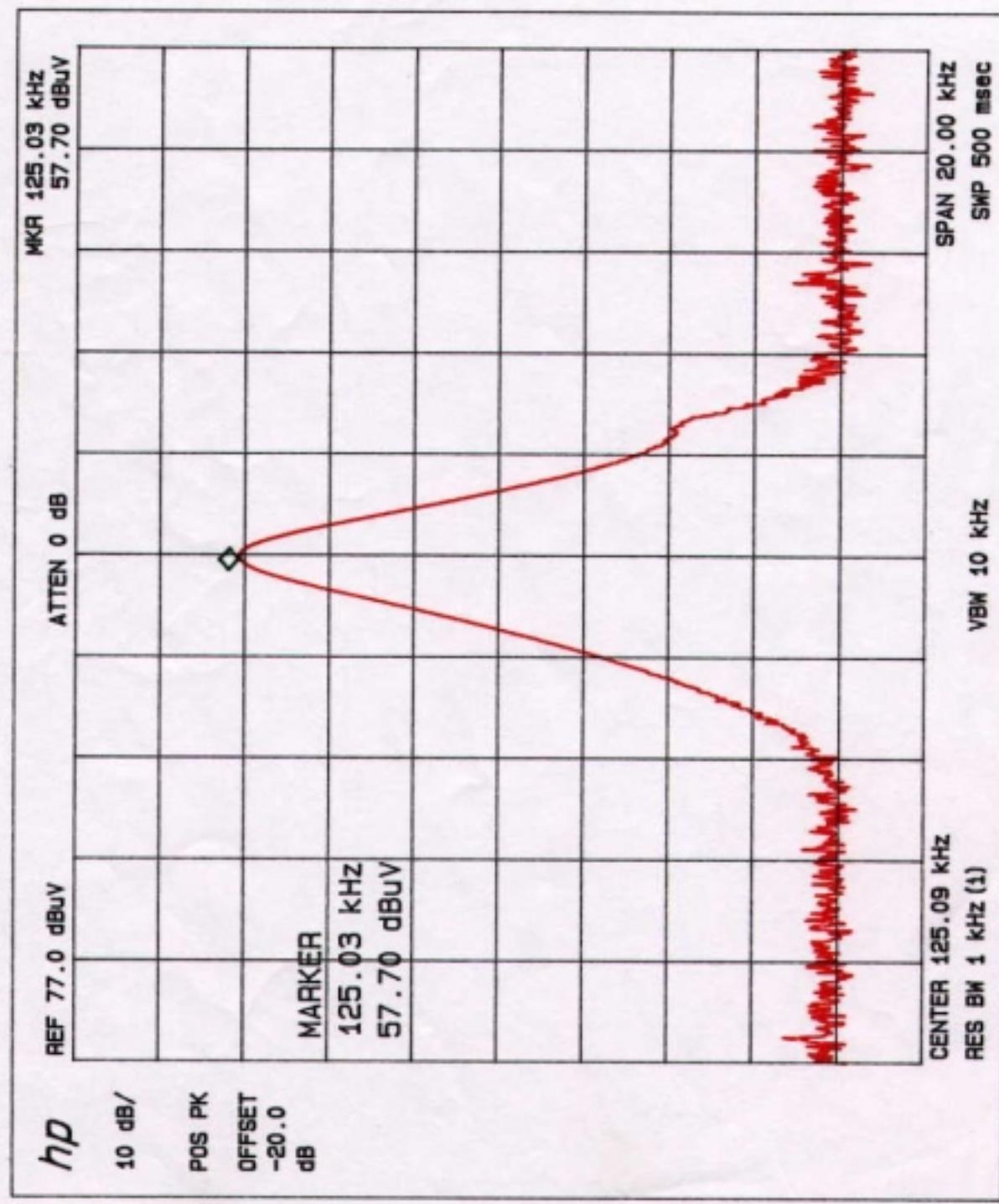
6.5 Bandwidth of the operating frequency

Humidity Level : 56 % Temperature : 21
Limits apply to : FCC CFR 47, PART 15, SUBPART C
Result : PASSED
Operating Condition : STANDBY (TX) MODE Date: October 08, 1998
Minimum Resolution Bandwidth : 1 kHz

Carrier Freq. (kHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
125	3.5	N/A	<u>-26dB with respect to the</u> <u>reference level</u>

Remark: Enclosed please find a Plot #1 for a test data in next page


Measuring by : Gea Won, Lee / Project Engineer



7. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)

8. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 30	826638/008	AUG/98	12MONTH	■
2.	Spectrum analyzer	HP	8568B	3026A0226	AUG/98	12MONTH	■
3.	RF preselector	HP	85685A	3107A01264	AUG/98	12MONTH	■
4.	Quasi-Peak Adapter	HP	85650A	3107A01542	AUG/98	12MONTH	■
5.	Loop Antenna	EMCO	6502	9108-2668	FEB/98	12MONTH	■
6.	Dipole Antenna	EMCO	3121C	9107-745	FEB/98	12MONTH	■
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	FEB/98	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	FEB/98	12MONTH	■
9.	Conical Log spiral Antenna	EATON	93491-2	340	FEB/98	12MONTH	
10.	LISN	EMCO	3825/2	9109-1867 9109-1869	FEB/98	12MONTH	■
11.	RF Amplifier	HP	8447F	3113A04554	AUG/98	N/A	■
12.	Spectrum Analyzer	HP	8591A	3131A02312	APR/98	12MONTH	
13.	Spectrum Analyzer	ADVANTEST	R4131BN	91520070	FEB/98	12MONTH	
14.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	■ ■
15.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
16.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
17.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
18.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

EXHIBIT 5. PHOTO REPORT

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“Please find in/outside photos of EUT at External Photos in Exhibit Type”

EXHIBIT 6. USER'S MANUAL & SCHEMATIC (BLOCK DIAGRAM)

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“Please find a manual and schematic diagram for EUT at User Manual in Exhibit Type”