



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

SECURITY / REMOTE CONTROL TRANSMITTER
CERTIFICATION TO FCC PART 15 REQUIREMENT

PRODUCT	MULTI CODE TRANSMITTER		
FCC ID	N55CARPER310		
MODEL NO.	CARPER310	SERIAL NO.	N/A
APPLICANT & ADDRESS	SAMHONG ENGINEERING CO., LTD. 324-4, DANG JUNG-DONG, KUMPO-SI, KYUNGKI-DO, 435-030, KOREA		

REPORT NO.	E989R-008	ISSUE DATE	September 8, 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 : N55CARPER310

MODEL : CARPER310

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)

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

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

The label included following statement will be attached on bottom side of product.

FCC ID : N55CARPER310
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 operations.
Made in Korea

“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**

SECURITY / REMOTE CONTROL TRANSMITTER CERTIFICATION TO FCC PART 15 REQUIREMENT

PRODUCT	MULTI CODE TRANSMITTER		
FCC ID	N55CARPER310		
MODEL NO.	CARPER310	SERIAL NO.	N/A
APPLICANT & ADDRESS	SAMHONG ENGINEERING CO., LTD. 324-4, DANG JUNG-DONG, KUMPO-SI, KYUNGKI-DO, 435-030, KOREA		

REPORT NO.	E989R-008	ISSUE DATE	September 8, 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			

TABLE OF CONTENTS

	page
1. VERIFICATION OF COMPLIANCE.....	1
2. GENERAL INFORMATION	2
2.1 Product Description	2
2.2 Related Submittal(s) / Grant(s).....	2
2.3 Test System Details	2
2.4 Test Methodology.....	2
2.5 Test Facility.....	2
3. SYSTEM TEST CONFIGURATION	3
3.1 Justification	3
3.2 Equipment Modifications	3
3.3 Configuration of Test System.....	3
4. PRELIMINARY TESTS	4
4.1 AC Power line Conducted Emissions Tests	4
4.2 Radiated Emissions Tests	4
5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS	5
6. FINAL RESULT OF MEASUREMENT	7
6.1 Conducted Emissions Tests.....	7
6.2 Field Strength of the Carrier Test.....	8
6.3 Spurious Emission Test	9
6.4 Bandwidth of the operating frequency	10
7. FIELD STRENGTH CALCULATION	12
8. LIST OF TEST EQUIPMENT	13

1. VERIFICATION OF COMPLIANCE

APPLICANT : SAMHONG ENGINEERING CO., LTD.
324-4, DANG JUNG-DONG, KUMPO-SI, KYUNGKI-DO, 435-030, KOREA.

CONTACT PERSON : KI-JUNG, KIM / MANAGER

TELEPHONE NO : 82-343-29-0981

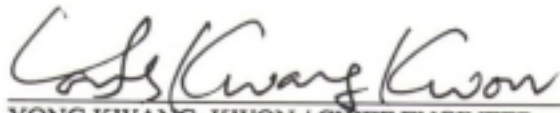
FCC ID : N55CARPER310 MODEL NO/NAME: CARPER310

SERIAL NUMBER : N/A

DATE : September 8, 1998

DEVICE TYPE	INTENTIONAL RADIATOR (SECURITY/REMOTE TRANSMITTER)
E.U.T. DESCRIPTION	DIGITAL MULTI CODE TRANSMITTER FOR ONLY GARAGE 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 §15.231
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 SAMHONG ENGINEERING CO., LTD. Model CARPER310 (referred to as the EUT in this report) is a Digital Multi Code Transmitter for use only garage door opener. The product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
TX FREQUENCY RANGE	310 MHz
MODULATION	FM
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	310 MHz, (RC Oscillator)
POWER REQUIREMENTS	Battery +12V
NUMBER OF LAYERS	2 LAYER
FUNCTION OF BUTTON	Garage Door Open and LED ON

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 EUT was tested with the following all equipment used in the tested system are: none

2.4 Test Methodology

Both Radiated emission testing 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	SAMHONG ENGINEERING CO., LTD	300/310	N/A

3.2 Equipment Modifications

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

3.3 Configuration of Test System

Line Conducted Emission Test:

It is not need to test this requirement, because the EUT supplies from a DC battery.

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, 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 50kHz/division frequency span, 10kHz-resolution bandwidth and 5dB/division logarithmic display from an 8568B spectrum analyzer. Bandwidth is determined at the point 20dB down from the modulated carrier.

4. PRELIMINARY TESTS**4.1 AC Power line Conducted Emissions Tests**

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
N/A	N/A

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
TX mode	X

Tested by: GEA WON, LEE

Date: September 08, 1998

5. CONDUCTED AND RADIATED MEASUREMENT PHOTOS

<Conducted Measurement Photos>

Not Applicable

Not Applicable

<Radiated Measurement Photos>



6. FINAL RESULT OF MEASUREMENT

Per preliminary tests, the following TX mode of operations were selected which shown the maximum emissions level.

6.1 Conducted Emissions Tests

Humidity Level : % Temperature : □

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

Result : PASSED BY dB

Operating Condition : Date:

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

Power Line Conducted Emissions			FCC Limit	
Frequency (MHz)	Amplitude (dBuV)	conductor	Limit (dBuV)	Margin (dB)
It is not need to test this requirement, because the EUT supplies from a DC battery.				

Line Conducted Emissions Tabulated Data

6.2 Field Strength of the Carrier Test

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

Humidity Level : 56 % Temperature : 27°C

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

Result : PASSED BY -8.91 dB

Operating Condition : TX mode

Date: September 8, 1998

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Radiated Emissions		Ant	Correction Factors		Total	FCC Limit	
Carrier Freq. (MHz)	Ampl. (dBuV)	Pol.	Ant. (dBuV)	Cable (dB)	Ampl (dBuV/m)	Limit (dBuV/m)	Margin (dB)
310	46.80	H	14.41	5.20	66.41	75.32	-8.91

*Remark: FCC Limit: 3,750 ~ 12,500uV/m to 260 ~ 470 MHz (linear interpolations)

Limit calculation at 310 MHz = $(12,500 - 3,750)/(470 - 260) \times (310 - 260) + 3,750 = 5,833.3\text{uV/m}$

$20\text{Log } 5,833.3 = 75.32\text{dBuV/m}$


 Measuring by : Gea Won, Lee / Project Engineer

6.3 Spurious Emission Test

Humidity Level : 56 % Temperature : 27 °CLimits apply to : FCC CFR 47, PART 15, SUBPART CResult : PASSED BY -14.25 dB

Operating Condition : TX mode Date: September 8, 1998

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Radiated Emissions		Ant	Ext.	Correction Factors		Total	FCC Limit	
Freq. (MHz)	Amp. (dBuV)	Pol.	RF Amp. (dBuV)	Ant. (dBuV)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
620.00	15.00	H	0	19.29	6.78	41.07	55.32	-14.25
930.00	6.50	H	0	23.17	7.76	37.43	55.32	-17.89
1240.00	24.20	H	25	27.97	8.30	35.47	55.32	-19.85
Other spurious frequencies were not found up to 3000 MHz.								

*Remark: FCC Limit: 375 ~ 1,250uV/m to 260 ~ 470MHz (linear interpolations)

Limit calculation at 310 MHz (Carrier Freq.) = $(1,250 - 375)/(470 - 260) \times (310 - 260) + 375 = 583.33\text{uV/m}$ $20\text{Log } 583.33 = 55.32\text{dBuV/m}$

 Measuring by : Gea Won, Lee / Project Engineer

6.4 Bandwidth of the operating frequency

Humidity Level : 56 % Temperature : 25 °CLimits apply to : FCC CFR 47, PART 15, SUBPART CResult : PASSED

Operating Condition : TX mode

Date: September 8, 1998

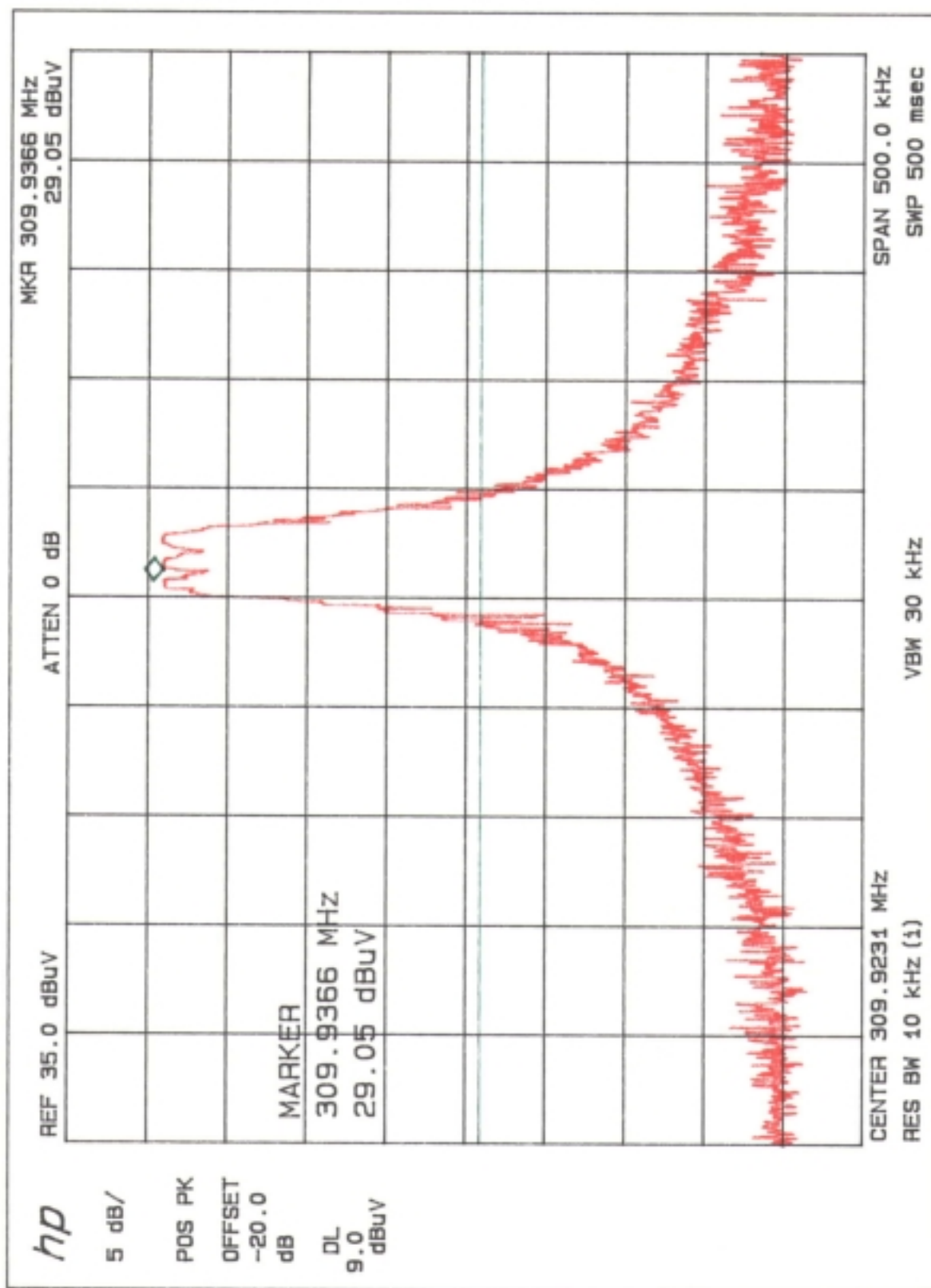
Minimum Resolution

Bandwidth : 10 kHz

Carrier Freq. (MHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
310	63	780	<u>The point 20dB down from the modulated carrier</u>

Remark: FCC Limit for above testing is: 310 MHz X 0.0025 = 780kHz. Please refer to Plot #1 for 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	DEC/96	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	AUG/98	12MONTH	■
11.	RF Amplifier	HP	8447F	3113A04554	N/A	N/A	■
12.	Spectrum Analyzer	HP	8591A	3131A02312	APR/98	12MONTH	
13.	Spectrum Analyzer	ADVANTEST	R4131BN	91520070	FEB/98	12MONTH	■
14.	Computer System	HP	98581C	98543A	N/A	N/A	■
	Hard disk drive		9153C	CMC762Z9153	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

SECURITY / REMOTE CONTROL TRANSMITTER CERTIFICATION TO FCC PART 15 REQUIREMENT

PRODUCT	MULTI CODE TRANSMITTER		
FCC ID	N55CARPER310		
MODEL NO.	CARPER310	SERIAL NO.	N/A
APPLICANT & ADDRESS	SAMHONG ENGINEERING CO., LTD. 324-4, DANG JUNG-DONG, KUMPO-SI, KYUNGKI-DO, 435-030, KOREA		

REPORT NO.	E989R-008	ISSUE DATE	September 8, 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			

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

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

SECURITY / REMOTE CONTROL TRANSMITTER CERTIFICATION TO FCC PART 15 REQUIREMENT

PRODUCT	MULTI CODE TRANSMITTER		
FCC ID	N55CARPER310		
MODEL NO.	CARPER310	SERIAL NO.	N/A
APPLICANT & ADDRESS	SAMHONG ENGINEERING CO., LTD. 324-4, DANG JUNG-DONG, KUMPO-SI, KYUNGKI-DO, 435-030, KOREA		

REPORT NO.	E989R-008	ISSUE DATE	September 8, 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			

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