



ONETECH Corp.

#505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City,
Kyunggi-Do, 462-121, Korea. (TEL: 82-342-746-8500 FAX: 82-342-746-8700)

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

REMOTE TRANSMITTER CERTIFICATION TO FCC PART 15 REQUIREMENT
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PRODUCT	RF KEYLESS ENTRY SYSTEM FOR VEHICLE		
FCC ID	OSLOKA-220T		
MODEL NO.	OKA-220T	SERIAL NO.	N/A
APPLICANT & ADDRESS	OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD. 481-2, KASAN-DONG, KUMCHUN-KU, SEOUL, 153-023, KOREA		

REPORT NO.	E99NR-005	ISSUE DATE	November 03, 1999
PREPARED BY: ONETECH CORP. #505 SK APT. FACTORY 223-28, SANGDAEWON 1 DONG, JUNGWON-GU, SEONGNAM-CITY, KYUNGGI-DO, 462-121, KOREA. (TEL: 82-342-746-8500 FAX: 82-342-746-8700)			

LIST OF EXHIBITS

FCC ID : OSLOKA-220T

MODEL : OKA-220T

EXHIBIT 1. IDENTIFICATION LABEL

2. AGENT AUTHORIZATION

3. TECHNICAL INFORMATION:

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

4. PHOTO REPORT

5. 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 bottom side of product.

FCC ID : OSLOKA-220T
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. TECHNICAL INFORMATION:

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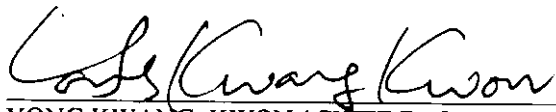
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1. VERIFICATION OF COMPLIANCE

APPLICANT : OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD.
 ADDRESS : 272-2, KYERUKRI, MYANG-MYON, ANSONG-CITY, KYONGGI-DO, 456-840, KOREA
 CONTACT PERSON : K. Y. JANG / SECTION MANAGER
 TELEPHONE NO : 82-2-8505-747
 FCC ID : OSLOKA-220T MODEL NO/NAME: OKA-220T
 SERIAL NUMBER : N/A
 DATE : November 03, 1999

DEVICE TYPE	INTENTIONAL RADIATOR
E.U.T. DESCRIPTION	RF KEYLESS ENTRY SYSTEM FOR VEHICLE
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 Corp. 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 OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD., Model OKA-220T (referred to as the EUT in this report) is a transmitter that it controls locking and unlocking the door and the trunk of a vehicle by wireless remote controller. The product specification information described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
TX FREQUENCY RANGE	307.9 MHz
MODULATION	FSK
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	308.00 MHz
ANTENNA TYPE	Built-in on the PCB in the EUT
TRANSMISSION TIME	Not longer than 1 sec
POWER REQUIREMENTS	DC 3V, 10mA (Lithium cell)
NUMBER OF LAYERS	2 LAYERS
FUNCTION OF BUTTON	Doors Lock, Doors Unlock, Trunk Open

* Remark: This equipment automatically deactivates the transmitter within not more than 1 second of being released.

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 12, 1999. (Registration Number: 92819)

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	OMRON Automotive Electronics Korea Co., Ltd.	OKA-300T	N/A

3.2 Equipment Modifications

To achieve compliance to FCC part 15 rule, the following change(s) were made by OMRON Automotive Electronics Korea Co., Ltd. during compliance testing:

“There was no Modified items during EMI test”

3.3 Mode of operation during the test

To get a maximum radiated emission from the EUT, the button on the EUT was continuously pressed to transmit the signal

3.4 Configuration of Test System

Line Conducted Emission Test:

It is not need to test this requirement, because the power of 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

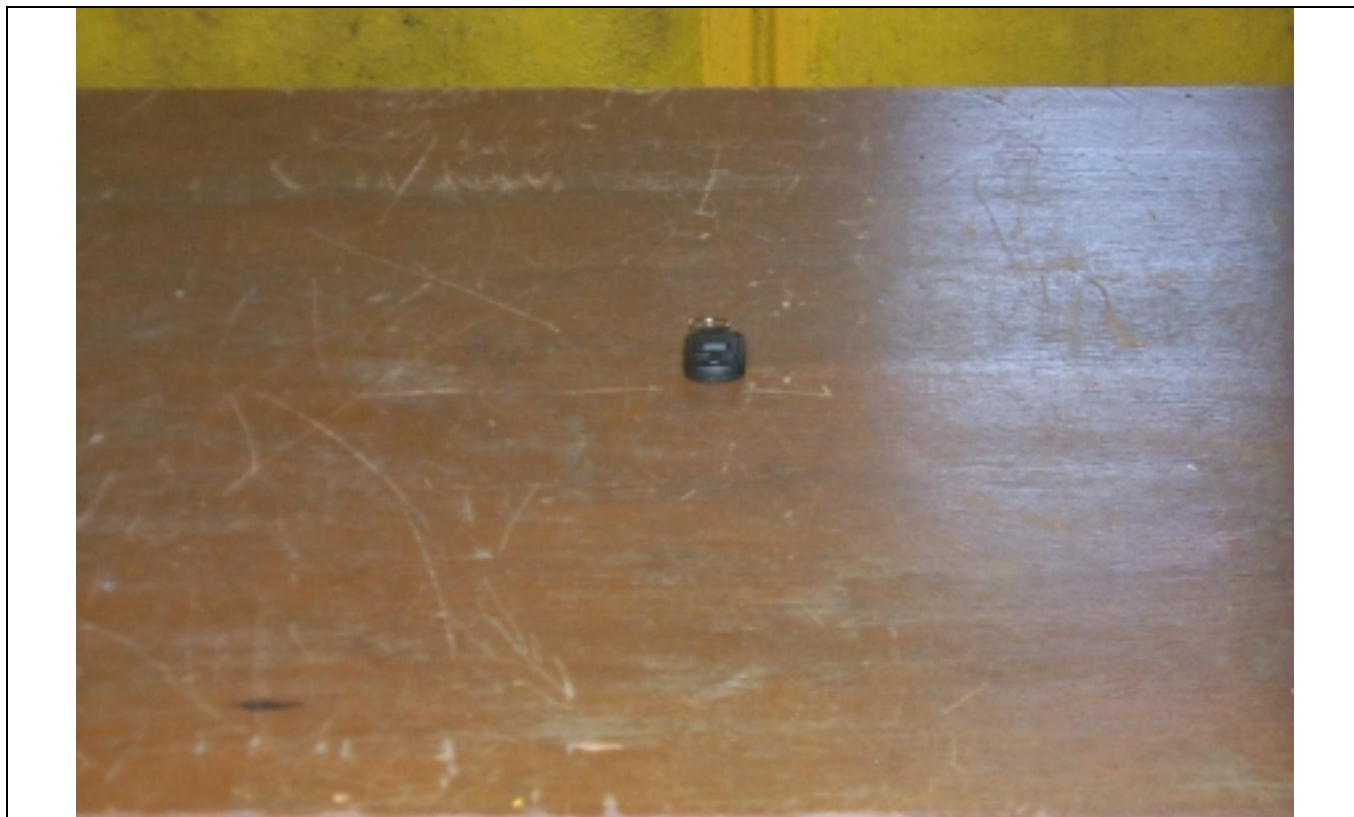
4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

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

5. RADIATED MEASUREMENT PHOTOS

<Radiated Measurement Photos>



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 : 54 % Temperature : 22
 Limits apply to : FCC CFR 47, PART 15, SUBPART C
 Result : PASSED BY -16.43 dB
 Operating Condition : TX mode Date: October 04, 1999
 Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Carrier Freq. (MHz)	Ampl. (dBuV)	Detect Mode	Pol.	Ant. (dBuV)	Cable (dB)	Ampl (dBuV/m)	Limit (dBuV/m)	Margin (dB)
307.9	37.7	Average	H	15.86	5.20	58.76	75.19	-16.43

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

$$\text{Limit calculation at 307.9 MHz} = (12,500 - 3,750)/(470 - 260) \times (307.9 - 260) + 3,750 = 5,745.83 \text{ uV/m}$$

$$20\text{Log } 5,745.83 = 75.19\text{dBuV/m}$$



Measuring by: Gea Won, Lee / Project Engineer

6.3 Spurious Emission Test

Humidity Level : 54 % Temperature : 22

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

Result : PASSED BY -7.79dB at 1231.62 MHz

Operating Condition : TX mode

Date: October 04, 1999

Distance : 3 Meter

Radiated Emissions			Ant	Correction Factors		Total(dBuV/m)		FCC Limit(dBuV/m)		
Freq. (MHz)	Amp. (dBuV)	Detect Mode	Pol.	Ant. (dBuV)	Cable (dB)	Average	Peak	Limit	Margin(dB)	
									Average	Peak
307.06	14.6	Average	H	15.86	5.20	35.66	-	55.19	-19.53	-
308.66	14.2	Average	H	15.85	5.20	35.25	-	55.19	-19.94	-
615.85	13.4	Average	H	19.02	6.76	39.18	-	55.19	-16.01	-
923.80	13.1	Average	H	22.72	7.70	43.52	-	55.19	-11.67	-
1231.62	13.3	Peak	H	25.55	8.55	-	47.40	55.19	-	-7.79
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 307.9 MHz (Carrier Freq.) = (1,250 – 375)/(470 – 260) X (307.9 – 260) + 375 = 574.58uV/m

20Log 574.58 = 55.19dBuV/m



Measuring by: Gea Won, Lee / Project Engineer

6.4 Bandwidth of the operating frequency

Humidity Level : 52 % Temperature : 22

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

Result : PASSED

Operating Condition : TX mode Date: October 04, 1999

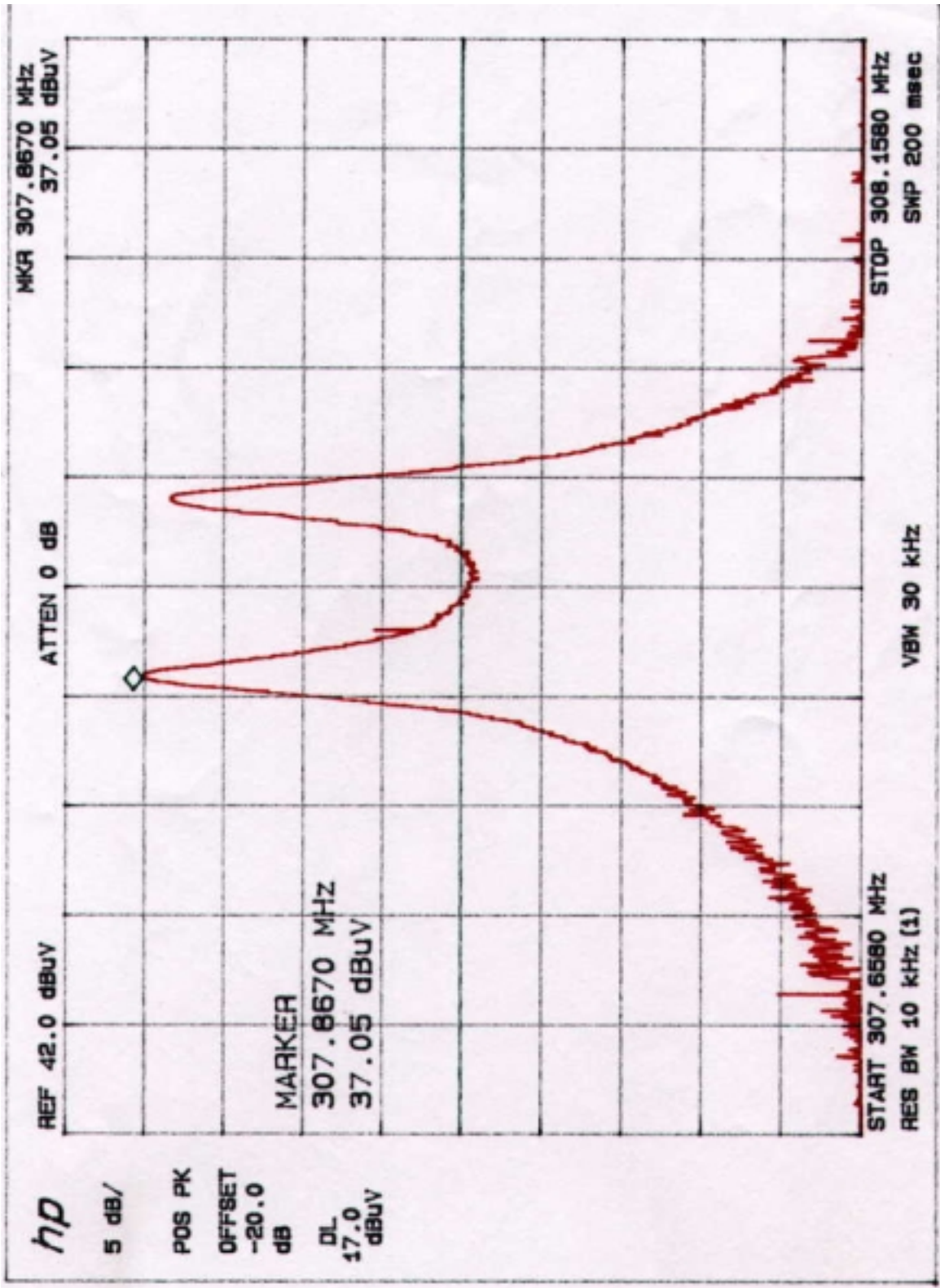
Minimum Resolution Bandwidth : 10 kHz

Carrier Freq. (MHz)	Bandwidth of the emission. (kHz)	Limit (kHz)	Remark
307.9	92.5	770	<u>The point 20dB down from the modulated carrier</u>

Remark: FCC Limit for above testing is: 307.9 MHz X 0.0025 = 770 kHz. 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 10	827864/005	SEP/99	12MONTH	■
2.	Spectrum analyzer	HP	8568B	3026A0226	SEP/99	12MONTH	■
3.	RF preselector	HP	85685A	3107A01264	SEP/99	12MONTH	■
4.	Quasi-Peak Adapter	HP	85650A	3107A01542	SEP/99	12MONTH	■
5	Signal Generator	Philips	PM5518-TX	N/A	APR./99	12MONTH	
6.	Pattern generator	N/A	LCG-401	SG-0010126	N/A	N/A	
7.	Dipole Antenna	EMCO	3121C	9107-745	FEB/99	12MONTH	
8.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	MAR/99	12MONTH	■
9.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	MAR/99	12MONTH	■
10.	Conical Log spiral Antenna	EATON	93491-2	340	FEB/99	12MONTH	■
11.	LISN	EMCO	3825/2	9109-1867 9109-1869	MAR/99	12MONTH	■
12.	RF Amplifier	HP	8447F	3113A04554	AUG/99	N/A	
13.	Spectrum Analyzer	ADVANTEST	R4131BN	91520070	FEB/99	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 4. PHOTO REPORT

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

EXHIBIT 5. USER'S MANUAL & SCHEMATIC (BLOCK DIAGRAM)

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