

TEST REPORT # EMCC-X040009L, 2005-01-18**EQUIPMENT UNDER TEST:**

Model: IM100
Serial No: None
Application: Mobile VHF Radio
Equipment Category: Transceiver
Manufacturer: E-Tech Co., Ltd.
Address: #202-807, Techno Park Complex,
192, Yakdae-dong, Wonmi-gu, Bucheon,
Kyunggi-do,
Korea

RELEVANT STANDARD: 47 CFR §2.1091

MEASUREMENT PROCEDURE USED:

☒ FCC / OET Bulletin 65 Supplement C Edition 01-01

☐ Other

TEST REPORT PREPARED BY:

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TEST OF E-TECH CO., LTD. MODEL IM100 TO 47 CFR §2.1091

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1 GENERAL INFORMATION

1.1 Purpose

The purpose of this report is to show compliance to 47 CFR §2.1091 and the MPE limits for General Population / Uncontrolled Exposure defined in 47 CFR §1.1310.

1.2 Limits and Reservations

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

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1.3 Test Location

Company Name:	EMCC DR. RAŠEK
Street:	Moggast 72-74
City:	91320 Ebermannstadt
Country:	Germany
Laboratory:	Test Laboratory of EMCC DR. RAŠEK
	FCC Registration Number: 90566
	This site has been fully described in a report submitted to the FCC and accepted in the letter dated February 04, 2003, Registration Number 90566.
Phone:	+49-9194-9016
Fax:	+49-9194-8125
E-Mail:	emc.cons@emcc.de
Web:	www.emcc.de

1.4 Manufacturer

Company Name:	E-Tech Co., Ltd.
Street / City:	#202-807, Techno Park Complex, 192, Yakdae-dong, Wonmi-gu, Bucheon, Kyunggi-do,
Country:	Korea

1.5 Dates

Date of receipt of EUT:	CW 2/2005
Test date:	CW 2/2005

2 PRODUCT DESCRIPTION

2.1 Equipment Under Test (EUT)

Device:	Private land mobile VHF radio / transceiver
Model:	IM100
Serial number:	None
FCC ID:	R72IM100
Transmit frequency band:	136 MHz – 174 MHz
Rated output power:	5 W / 50 W
Modulation:	FM
Intended use:	Push-to-talk (PTT) radio for vehicle installation
Duty cycle:	Maximum operational transmit duty cycle is 50%

2.2 EUT Peripherals

Antennas

FC140:	130 – 150 MHz, ¼ wave, 0 dBi, 13.5 cm
FC150:	140 – 160 MHz, ¼ wave, 0 dBi, 13.5 cm
FC160:	158 – 178 MHz, ¼ wave, 0 dBi, 12.0 cm

2.3 Mode of Operation During Testing

The EUT was operated in continuous transmit mode (by means of a test box) at three test frequencies: 136 MHz, 155 MHz and 174 MHz. The transmitter was operated with max. power level (50 W rated) and in unmodulated state (power of frequency modulated signal is identical to power of unmodulated carrier).

2.4 Modifications Required for Compliance

None.

3 TEST RESULTS SUMMARY

Summary of Test Results

Requirement	CFR Sections	Report Section	Test Result
Radiofrequency radiation exposure	2.1091, 1.1310	4	Passed *

* according to manufacturer's order, only H-field measured

The measurements contained in this report were made in accordance with OET Bulletin 65 Supplement C Edition 01-01.

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in this report.

Test Personnel: Klaus Pfister

Issuance Date: 2005-01-18

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4 RADIOFREQUENCY RADIATION EXPOSURE

Test Requirement: 47 CFR §2.1091
 Test Procedure: OET Bulletin 65 Supplement C Edition 01-01

4.1 Test Equipment

Instrument	Manufacturer/ Model No.	Serial No.	Last Cal.	Next Cal.	Remarks
H-field probe	Holaday HI-4433-HCH	90416	JAN 2005	JAN 2006	
Field probe interface (fiber optic / RS 232)	Holaday HI-4413G		n.a.	n.a.	
Automobile	Volvo 760 GLE * (1988, 4-door)		n.a.	n.a.	
RF Power Meter	Rohde & Schwarz URY	891647/085	OCT 2004	OCT 2006	used for conducted power measurement, only
100-V-Insertion Probe	Rohde & Schwarz URV 5-Z4	880572/73	NOV 2003	NOV 2005	used for conducted power measurement, only
600 W Termination	Bird 8404	3273	OCT 2003	OCT 2005	used for conducted power measurement, only
Radio Communication Tester	Rohde & Schwarz CMTA 84	883530/005	OCT 2003	OCT 2005	used for frequency measurement, only
150 W / 6 dB Attenuator	RES-NET RFA150NMF6	001	JUL 2003	JUL 2005	used for frequency measurement, only

* Dimensions: 484 cm x 175 cm x 143 cm (L x W x H), rooftop width: 125 cm

4.2 H-Field Measurement Accuracy

Contribution	Error
H-field probe HI-4433-HCH	+ 2 / - 3 dB
Repeatability	± 0.5 dB

4.3 Measurement Procedure

The measurement procedure follows OET Bulletin 65 Supplement C Edition 01-01.

a) External vehicle MPE evaluation

The field probe is placed in the closest distance to the antenna where a person can stand under normal conditions, without dropping below the minimum separation distance of 20 cm *[Remark: In case of the antenna mounted in the trunk center this distance was 50 cm, in case of the antenna mounted in the roof center this distance was 100 cm].*

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Keeping the above distance, measurements are taken at ten heights ranging from 20 cm above ground to 200 cm above ground with a spacing of 20 cm. These measurements are spatially averaged to evaluate the average over an exposed person's body.

b) Internal vehicle MPE evaluation

The front seat area is scanned for maximum reading. Around the maximum's location, measurements are taken at leg height, chest height and head height. These measurements are spatially averaged to evaluate the average over an exposed person's body.

The same procedure is repeated for the back seat area.

4.4 Test Results

4.4.1 Test Conditions

Measurements outside the vehicle and inside the vehicle.

Antennas installed in trunk center and in roof center.

Test frequencies: 136.000 MHz, 155.000 MHz and 174.000 MHz.

EUT in transmit mode, unmodulated, max. power level (50 W rated).

Measured power levels:

Test frequency in MHz	Measured conducted power level in W
136.000	50.1
155.000	55.1
174.000	53.7

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4.4.2 External Vehicle MPE Evaluation

External Vehicle MPE Evaluation / H-Field								
Antenna location: trunk center								
Measurement distance: 50 cm								
Frequency: 136.000 MHz Antenna: FC140			Frequency: 155.000 MHz Antenna: FC150			Frequency: 174.000 MHz Antenna: FC160		
Height [cm]	H-field reading [mA/m]		Height [cm]	H-field reading [mA/m]		Height [cm]	H-field reading [mA/m]	
20	< 20		20	27		20	30	
40	< 20		40	< 20		40	54	
60	22		60	75		60	130	
80	36		80	98		80	105	
100	40		100	88		100	46	
120	90		120	47		120	51	
140	151		140	120		140	87	
160	198		160	190		160	121	
180	199		180	216		180	117	
200	167		200	199		200	80	
Average over body [A/m]	Maximum duty cycle [%]	Result [A/m]	Average over body [A/m]	Maximum duty cycle [%]	Result [A/m]	Average over body [A/m]	Maximum duty cycle [%]	Result [A/m]
0.094	50	0.047	0.108	50	0.054	0.082	50	0.041

H-Field Limits for General Population / Uncontrolled Exposure

47 CFR §1.1310 Table 1

Frequency range [MHz]	Magnetic field strength [A/m]	Averaging time [min]
0.3 – 1.34	1.63	30
1.34 – 30	2.19/(frequency in MHz)	30
30 – 300	0.073	30

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External Vehicle MPE Evaluation / H-Field								
Antenna location: roof center								
Measurement distance: 100 cm								
Frequency: 136.000 MHz Antenna: FC140			Frequency: 155.000 MHz Antenna: FC150			Frequency: 174.000 MHz Antenna: FC160		
Height [cm]	H-field reading [mA/m]		Height [cm]	H-field reading [mA/m]		Height [cm]	H-field reading [mA/m]	
20	< 20		20	< 20		20	< 20	
40	< 20		40	< 20		40	23	
60	< 20		60	35		60	34	
80	28		80	43		80	33	
100	33		100	44		100	25	
120	28		120	24		120	< 20	
140	24		140	22		140	35	
160	38		160	43		160	41	
180	63		180	48		180	36	
200	86		200	51		200	55	
Average over body [A/m]	Maximum duty cycle [%]	Result [A/m]	Average over body [A/m]	Maximum duty cycle [%]	Result [A/m]	Average over body [A/m]	Maximum duty cycle [%]	Result [A/m]
0.036	50	0.018	0.035	50	0.018	0.032	50	0.016

H-Field Limits for General Population / Uncontrolled Exposure

47 CFR §1.1310 Table 1

Frequency range [MHz]	Magnetic field strength [A/m]	Averaging time [min]
0.3 – 1.34	1.63	30
1.34 – 30	2.19/(frequency in MHz)	30
30 – 300	0.073	30

Test Personnel: Klaus Pfister
 Test Date: 2005-01-14

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4.4.3 Internal Vehicle MPE Evaluation

Internal Vehicle MPE Evaluation / H-Field								
Antenna location: trunk center								
Measurement distance: highest reading								
A) Front seat area								
Frequency: 136.000 MHz Antenna: FC140			Frequency: 155.000 MHz Antenna: FC150			Frequency: 174.000 MHz Antenna: FC160		
Height	H-field reading [mA/m]		Height	H-field reading [mA/m]		Height	H-field reading [mA/m]	
Leg	36		Leg	60		Leg	50	
Chest	< 20		Chest	< 20		Chest	< 20	
Head	40		Head	51		Head	43	
Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]
0.032	50	0.016	0.044	50	0.022	0.038	50	0.019
B) Back seat area								
Frequency: 136.000 MHz Antenna: FC140			Frequency: 155.000 MHz Antenna: FC150			Frequency: 174.000 MHz Antenna: FC160		
Height	H-field reading [mA/m]		Height	H-field reading [mA/m]		Height	H-field reading [mA/m]	
Leg	105		Leg	120		Leg	96	
Chest	56		Chest	66		Chest	< 20	
Head	38		Head	78		Head	38	
Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]
0.066	50	0.033	0.088	50	0.044	0.051	50	0.026

H-Field Limits for General Population / Uncontrolled Exposure

47 CFR §1.1310 Table 1

Frequency range [MHz]	Magnetic field strength [A/m]	Averaging time [min]
0.3 – 1.34	1.63	30
1.34 – 30	2.19/(frequency in MHz)	30
30 – 300	0.073	30

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Test Date: 2005-01-14

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Internal Vehicle MPE Evaluation / H-Field								
Antenna location: roof center								
Measurement distance: highest reading								
A) Front seat area								
Frequency: 136.000 MHz Antenna: FC140			Frequency: 155.000 MHz Antenna: FC150			Frequency: 174.000 MHz Antenna: FC160		
Height	H-field reading [mA/m]		Height	H-field reading [mA/m]		Height	H-field reading [mA/m]	
Leg	< 20		Leg	72		Leg	54	
Chest	53		Chest	104		Chest	71	
Head	140		Head	165		Head	113	
Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]
0.071	50	0.036	0.114	50	0.057	0.079	50	0.040
B) Back seat area								
Frequency: 136.000 MHz Antenna: FC140			Frequency: 155.000 MHz Antenna: FC150			Frequency: 174.000 MHz Antenna: FC160		
Height	H-field reading [mA/m]		Height	H-field reading [mA/m]		Height	H-field reading [mA/m]	
Leg	< 20		Leg	45		Leg	< 20	
Chest	< 20		Chest	49		Chest	< 20	
Head	50		Head	56		Head	30	
Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]	Spatial average [A/m]	Maximum duty cycle [%]	Result [A/m]
0.030	50	0.015	0.050	50	0.025	0.023	50	0.012

H-Field Limits for General Population / Uncontrolled Exposure

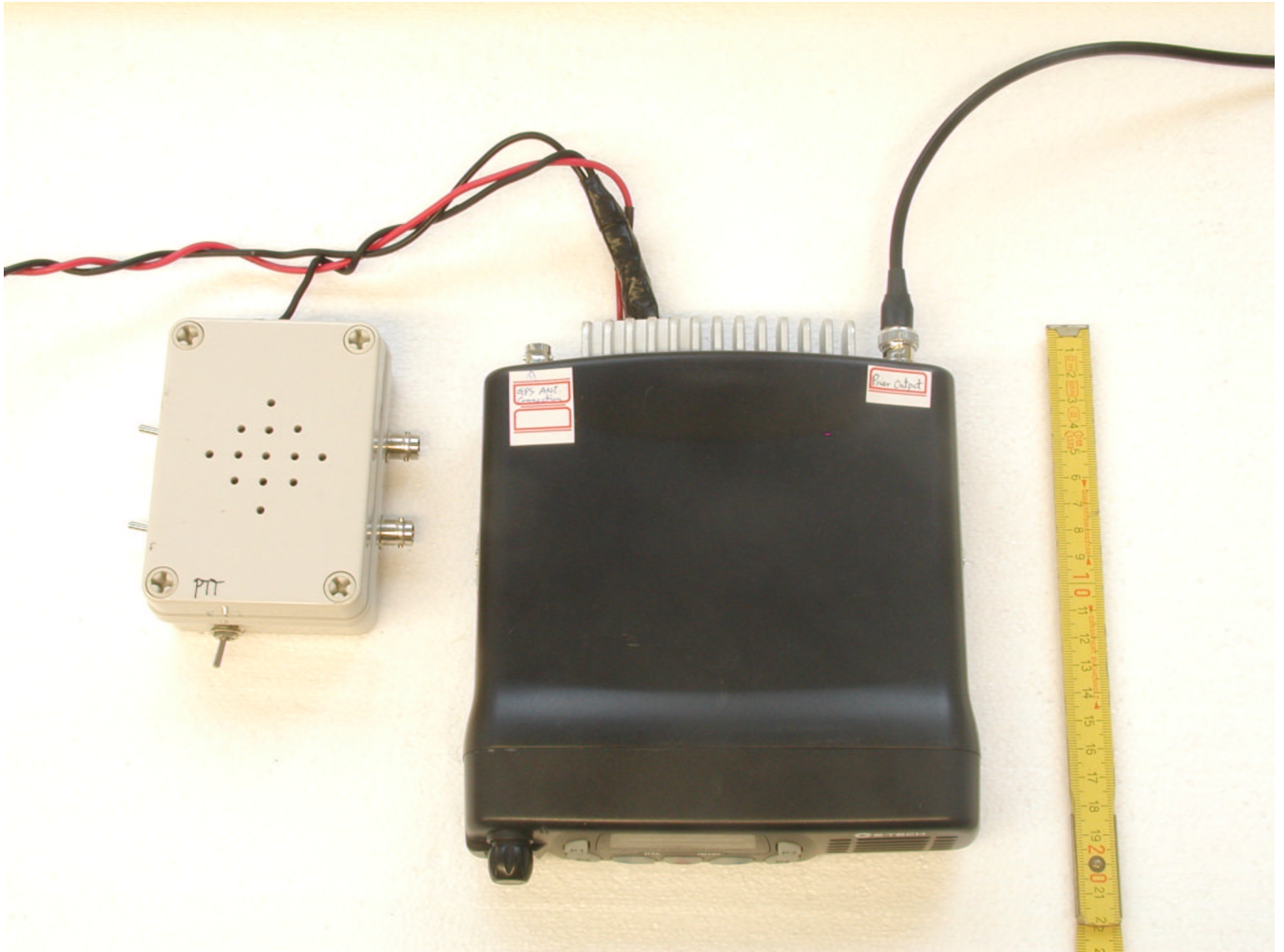
47 CFR §1.1310 Table 1

Frequency range [MHz]	Magnetic field strength [A/m]	Averaging time [min]
0.3 – 1.34	1.63	30
1.34 – 30	2.19/(frequency in MHz)	30
30 – 300	0.073	30

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5 PHOTOGRAPHS OF THE EQUIPMENT UNDER TEST

Photograph 1: EUT with test box



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Photograph 2: Front external view of TX



TEST OF E-TECH CO., LTD. MODEL IM100 TO 47 CFR §2.1091

Photograph 3: Rear external view of TX



TEST OF E-TECH CO., LTD. MODEL IM100 TO 47 CFR §2.1091

Photograph 4: Top external view of TX



TEST OF E-TECH CO., LTD. MODEL IM100 TO 47 CFR §2.1091

Photograph 5: Bottom external view of TX

