

# MPE TEST REPORT

Equipment Under Test	: Private Land Mobile Radio for Vehicle (VHF)
Model No.	: IM100
FCC ID	: R72IM100
Applicant	: E-Tech Co., Ltd.
Address of Applicant	: #202-807, Techno Park Complex, 192, Yakdae-dong, Wonmi-gu, Bucheon, Kyunggi-do, Korea
Date of Test(s)	: Dec. 20, 2004
Date of Issue	: Dec. 21, 2004


Standards : FCC 47CFR 2.1091(b)

In the configuration tested, the EUT complied with the standards specified above.

## Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Testing Korea Co., Ltd. or testing done by SGS Testing Korea Co., Ltd. in connection with distribution or use of the product described in this report must be approved by SGS Testing Korea Co., Ltd. in writing.

Tested by	: Leo Kim		Dec. 20, 2004
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Approved by	: Albert Lim		Dec. 21, 2004
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## 1. Description

Private LMR(Land Mobile Radio), IM100, has a compact size with a various features in the range of 136~174MHz. IM100 constructed with a microprocessor controlled, temperature compensated Phase Locked Loop(PLL) frequency synthesizer. The radio features a double conversion receiver and a direct FM transmitter modulator. A special integrated circuit provides support to sub-audible signaling(CTCSS & DCS) and most of the receiving parts are switched off periodically in the power save mode to reduce battery current drain during standby.

## 2. Antenna Information

FC140	130-150 MHz ¼ wave 0dBi; 1350mm
FC150	140-160 MHz ¼ wave 0dBi; 1350mm
FC160	158-178 MHz ¼ wave 0dBi; 1200mm

## 3. Test site

SGS Testing Korea Co., Ltd.

No 705, Dongchon-dong, Yongin-city, Kyunggi-do, Korea449-840

## 4. Measurement System

- Automobile: 2001 Hyundai EF SONATA, 4-Door, Battery 14volts
- E-Field Survey Meter & Probe - NARDA Model EMC 20 (100kHz~3GHz)  
Calibration due date: 8/5/05
- Antennas - (1/4 wave 0dBi)

## 5. Measurement Uncertainty

The information below presents an estimate of the possible errors that are associated with the measurement system.

<u>Description</u>	<u>Error</u>
NARDA Survey Meter	± 3%
Repeatability Accuracy	± 7%

## 6. Method of measurement

### 6.1 EME measurements made on trunk mounted antennas

#### 6.1.1 External vehicle EME measurement

(Antenna mounted in trunk center)

With the survey meter and probe, take ten (10) measurements, at the standard test distance of 60 cm to the antenna, from the back of the vehicle in a vertical line and then average the results. These measurements are taken and recorded at every twenty (20) centimeters over a range starting at twenty (20) centimeters above ground and ending at 2.0 meters.

#### 6.1.2 Internal vehicle EME measurement

(Antenna mounted in trunk center)

While rotating survey meter probe through 180 degrees to ensure that the highest level is found, scan the inside of the vehicle, both front and back seating areas, for the highest level in each location. After the highest level is found, scan vertically making two (2) additional measurements within an area approximately 40 cm wide (representing the width of a person) so as to have a total of three (3) measured points as indicated below that will be averaged.

- a) Head area
- b) Chest area
- c) Lower Trunk area

### 6.2 EME measurements made on center roof mounted antennas

#### 6.2.1 External vehicle EME measurement

With the survey meter and probe, take ten (10) measurements, at the standard test distance of 110 cm from the vehicle-mounted antenna, in a vertical line and

then average the results. These measurements are taken and recorded at every twenty (20) centimeters over a range starting at twenty (20) centimeters above ground and ending at 2.0 meters; this would be representative of a person standing next to a vehicle during a mobile radio transmission.

#### 6.2.2 Internal vehicle EME measurement

While rotating survey meter probe through 180 degrees to ensure that the highest level is found, scan the inside of the vehicle, both front and back seating areas, for the highest level in each location. After the highest level is found, scan vertically making two (2) additional measurements within an area approximately 40 cm wide (representing the width of a person) so as to have a total of three (3) measured points as indicated below that will be averaged.

- a) Head area
- b) Chest area**
- c) Lower Trunk area

## 7. Test result

Measurement Information			
Measurement Freq.(MHz)	136	155	174
Raw Data Power(W)	52.81	52.42	52.01
Controlled Limit	1	1	1
Uncontrolled Limit	0.2	0.2	0.2
Cal. Factor	0.96	0.97	0.97
Antenna / gain(dBi)	FC140 / 0	FC150 / 0	FC168 / 0
External Vehicle Power Density(50% duty)	average over body/2		
Internal Vehicle Power Density(50% duty)	average over (head/chest/leg)/2		

External Vehicle MPE Assessment at 136MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm <sup>2</sup> )
Trunk	FC140 / 0	60	E	0.96	0.479	0.239
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	5	6	120	68	
2	40	10	7	140	79	
3	60	23	8	160	77	
4	80	21	9	180	84	
5	100	39	10	200	73	

External Vehicle MPE Assessment at 155MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm <sup>2</sup> )
Trunk	FC150 / 0	60	E	0.97	0.322	0.161
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	16	6	120	34	
2	40	29	7	140	53	
3	60	30	8	160	52	
4	80	19	9	180	36	
5	100	14	10	200	39	

External Vehicle MPE Assessment at 174MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm <sup>2</sup> )
Trunk	FC168 / 0	60	E	0.97	0.459	0.229
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	24	6	120	74	
2	40	36	7	140	78	
3	60	35	8	160	57	
4	80	13	9	180	46	
5	100	33	10	200	63	

External Vehicle MPE Assessment at 136MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm <sup>2</sup> )
Roof	FC140 / 0	110	E	0.96	0.069	0.034
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	3	6	120	6	
2	40	3	7	140	8	
3	60	2	8	160	10	
4	80	3	9	180	14	
5	100	4	10	200	16	

Internal Vehicle MPE Assessment at 136 MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm <sup>2</sup> )	Pwr. Density of Higher Level (mW/cm <sup>2</sup> )
Trunk	FC140 / 0	Highest	E	0.96	0.113/0.027	0.056
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	19		14		1	
Front	4		3		1	

Internal Vehicle MPE Assessment at 155MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm <sup>2</sup> )	Pwr. Density of Higher Level (mW/cm <sup>2</sup> )
Trunk	FC150 / 0	Highest	E	0.97	0.087/0.020	0.043
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	17		6		3	
Front	3		2		1	

Internal Vehicle MPE Assessment at 174MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm <sup>2</sup> )	Pwr. Density of Higher Level (mW/cm <sup>2</sup> )
Trunk	FC168 / 0	Highest	E	0.97	0.140/0.087	0.043
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	23		10		9	
Front	10		6		10	

Internal Vehicle MPE Assessment at 136MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm <sup>2</sup> )	Pwr. Density of Higher Level (mW/cm <sup>2</sup> )
Roof	FC140 / 0	Highest	E	0.96	0.010/0.010	0.005
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	1		1		1	
Front	2		1		0	



## 8. Conclusion

The measurement results complies with the FCC Limit Per 47 CFR 2.1091 (b) for the Controlled RF Exposure.