

# MPE TEST REPORT

Equipment Under Test	: Private Land Mobile Radio for Vehicle(UHF)
Model No.	: SM5402
Applicant	: MAXON CIC Corp.
Address of Applicant	: Chongho Bldg, #7-61, Yangjae-Dong, Seocho-Gu, Seoul, Korea
Date of Test(s)	: 2006-05-17
Date of Issue	: 2006-05-19

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.

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Tested by : Feel Jeong  2006-05-19

Approved by : Albert Lim  2006-05-19

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## 1. Description

Maxon's SM5402 mobile radio are Compatible, Conventional radio system operation. The SM5402 is capable of up to 208 channels 13 Groups per system in conventional operation. The operation and functions for the SM5402 Series radios are described in this manual. SM5402 has a compact size with a various features in range of 440~470 MHz. SM5402 has a various features shown as below.

- Conventional radio operation, 9 character display with icons
- Wideband frequency separation, Programmable output power
- Programmable 12.5 / 25 kHz channel spacing, Multiple-function five button keypad
- Programmable On / Off hook function, Talk Around
- Scanning, Priority Scanning
- Look Back, Scan list editing
- CTCSS / CDDCS (Conventional operation), Busy channel lockout
- Time-out timer

## 2. Antenna Information

Whip Antenna for vehicle : 435 ~ 450 MHz, 1/4 wave 3 dBi

Whip Antenna for vehicle : 450 ~ 470 MHz, 1/4 wave 3 dBi

Whip Antenna for vehicle : 470 ~ 485 MHz, 1/4 wave 3 dBi

## 3. Test site

SGS Testing Korea Co., Ltd.

18-34, Sanbon-dong, Gunpo-city, Gyeonggi-do, Korea

## 4. Measurement System

- Automobile: Hyundai Verna(2000)
- E-Field Survey Meter & Probe - NARDA Model EMC 20 (100kHz~3GHz)  
Calibration due date: 2006-8-4
- Antennas - (1/4 wave 3 dBi)

## 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)	440.025	455.025	469.025
Raw Data Power(W)	43.3	42.7	42.8
Controlled Limit	1.47	1.52	1.56
Uncontrolled Limit	0.29	0.30	0.31
Cal. Factor	1	1	1
Antenna / gain(dBi)	Whip / 3	Whip / 3	Whip / 3
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 440.0250 MHz						
Antenna Location	Antenna/ gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm^2)
Trunk	Whip / 3	60	E	1	0.313	0.1565
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	19	6	120	21	
2	40	21	7	140	34	
3	60	33	8	160	44	
4	80	31	9	180	43	
5	100	31	10	200	36	

External Vehicle MPE Assessment at 455.0250 MHz						
Antenna Location	Antenna/ gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm^2)
Trunk	Whip / 3	60	E	1	0.312	0.1560
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	20	6	120	23	
2	40	20	7	140	31	
3	60	32	8	160	41	
4	80	34	9	180	40	
5	100	34	10	200	37	

External Vehicle MPE Assessment at 469.9750 MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm^2)
Trunk	Whip / 3	60	E	1	0.263	0.1315
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	14	6	120	18	
2	40	17	7	140	25	
3	60	25	8	160	36	
4	80	26	9	180	38	
5	100	29	10	200	35	

External Vehicle MPE Assessment at 440.0250 MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Pwr. Density (mW/cm^2)
Roof	Whip / 3	110	E	1	0.162	0.0810
Measurement grid						
Test position	Height (cm)	% of controlled limit	Test position	Height(cm)	% of controlled limit	
1	20	11	6	120	21	
2	40	15	7	140	23	
3	60	16	8	160	18	
4	80	13	9	180	14	
5	100	17	10	200	14	

Internal Vehicle MPE Assessment at 440.0250 MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm^2)	Pwr. Density of Higher Level (mW/cm^2)
Trunk	Whip / 3	Highest reading	E	1	0.27/0.16	0.13
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	35		31		14	
Front	17		21		11	

Internal Vehicle MPE Assessment at 455.0250 MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm^2)	Pwr. Density of Higher Level (mW/cm^2)
Trunk	Whip / 3	Highest reading	E	1	0.24/0.20	0.12
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	32		30		11	
Front	24		23		12	

Internal Vehicle MPE Assessment at 469.9750 MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm^2)	Pwr. Density of Higher Level (mW/cm^2)
Trunk	Whip / 3	Highest reading	E	1	0.24/0.17	0.12
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	31		30		11	
Front	21		20		10	

Internal Vehicle MPE Assessment at 440.0250 MHz						
Antenna Location	Antenna/gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average over Head,Chest,Leg Back/Front Seats (mW/cm^2)	Pwr. Density of Higher Level (mW/cm^2)
Roof	Whip / 3	Highest reading	E	1	0.09/0.07	0.045
Measurement grid						
Test position	% of controlled limit Head		% of controlled limit Chest		% of controlled limit Leg	
Back	11		10		5	
Front	8		9		4	

## 8. Conclusion

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