

# MPE TEST RESULT

Equipment Under Test: Mobile Radio

Model No.: TM-600V

Date of Test(s): 2006-10-14

Standards: FCC 47CFR 2.1091(b)

**Tested by : Army**

The details of the testing results 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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## 1. Description

HYT'S TM-600V mobile radio are Compatible, Conventional radio system operation. The operation and functions for the TM-600V Series radios are described in this manual. TM-600V has a compact size with a various features in range of 136 MHz ~ 174 MHz. TM-600V has a various features shown as below.

- Wideband frequency separation, Programmable output power
- Programmable 12.5 / 25 kHz channel spacing
- 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 : 136 ~ 174 MHz, 1/4 wave 3 dBi

## 3. Test site

Accurate Technology Co. Ltd.  
F1, Bldg, A, Changyuan New Meterial Port, Keyuan Rd. Science & Industry Park, Nanshan District, 518057, Shenzhen P.R. China.

## 4. Measurement System

- Automobile: Hyundai Verna(2000)
  - E-Field Survey Meter & Probe - NARDA Model EMC 20 (100kHz~3GHz)
- Calibration due date: 2007-5-4
- 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.

Description	Error
NARDA Survey Meter:	± 4%
Repeatability Accuracy:	± 7%

## **6. Method of measurement**

### **6.1 MPE measurements made on trunk mounted antennas**

#### **6.1.1 External vehicle MPE 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 MPE 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 MPE measurements made on center roof mounted antennas**

#### **6.2.1 External vehicle MPE measurement**

With the survey meter and probe, take ten (10) measurements, at the standard test distance of 60 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 MPE 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

### **6.3 Presentation of Result**

**Average Over Body = The average value of all the measurement points ( Expressed in Percentage of the controlled limits)**

**Power Density= The maximum value of all the measure points / 2 ( The Duty Cycle of 50% was considered by deviding the maximum value by 2 and Expressed in mW/ cm<sup>2</sup>)**

## 7. Test result

Measurement Information			
Measurement Freq.(MHz)	136.00	155.00	174.00
Raw Data Power(W)	25	25	25
Controlled Limit	1	1	1
Uncontrolled Limit	0.2	0.2	0.2
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 136.00 MHz						
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Power. Density (mW/cm <sup>2</sup> )
Trunk	Whip/3	60	E	1	8.4 % of Controlled Limit	11% / 2 = 0.055 mW/cm <sup>2</sup>
Measurement Grid						
Test Position	Height	% of controlled Limit	Test Position	Height (cm)	% of controlled limit	
1	20	5	6	120	6	
2	40	6	7	140	10	
3	60	8	8	160	10	
4	80	9	9	180	11	
5	100	9	10	200	10	

External Vehicle MPE Assessment At 155.00 MHz						
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Power. Density (mW/cm <sup>2</sup> )
Trunk	Whip/3	60	E	1	15.2 % of Controlled Limit	20 % / 2 = 0.10 mW/cm <sup>2</sup>
Measurement Grid						
Test Position	Height	% of controlled Limit	Test Position	Height (cm)	% of controlled limit	
1	20	13	6	120	11	
2	40	11	7	140	13	
3	60	10	8	160	20	
4	80	16	9	180	20	
5	100	19	10	200	19	

External Vehicle MPE Assessment At 174.00 MHz						
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Power. Density (mW/cm <sup>2</sup> )
Trunk	Whip/3	60	E	1	12.1 % of Controlled Limit	14% / 2 = 0.07mW/cm <sup>2</sup>
Measurement Grid						
Test Position	Height	% of controlled Limit	Test Position	Height (cm)	% of controlled limit	
1	20	10	6	120	10	
2	40	12	7	140	12	
3	60	14	8	160	12	
4	80	13	9	180	12	
5	100	13	10	200	13	

External Vehicle MPE Assessment At 136.00 MHz						
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Average Over Body	Power. Density (mW/cm <sup>2</sup> )
Roof	Whip/3	60	E	1	8.5% of Controlled Limit	12% / 2 = 0.06 mW/cm <sup>2</sup>
Measurement Grid						
Test Position	Height	% of controlled Limit	Test Position	Height (cm)	% of controlled limit	
1	20	7	6	120	10	
2	40	7	7	140	12	
3	60	9	8	160	12	
4	80	5	9	180	8	
5	100	8	10	200	7	

Internal Vehicle MPE Assessment At 136.00 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> )	Power Density HigherLevel (mW/cm <sup>2</sup> )
Trunk	Whip/3	Highest Reading	E	1	14.7 % of Controlled Limit = 0.147 mW/cm <sup>2</sup>	29% / 2= 0.145mW/cm <sup>2</sup>
Measurement Grid						
Test Position	% of controlled Limit Head		% of controlled Limit Chest		% of controlled Limit Leg	
Front	11		9		8	
Back	29		20		11	

Internal Vehicle MPE Assessment At 155.00 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> )	Power Density HigherLevel (mW/cm <sup>2</sup> )
Trunk	Whip/3	Highest Reading	E	1	14.17 % of Controlled Limit = 0.142 mW/cm <sup>2</sup>	27% / 2 = 0.135mW/cm <sup>2</sup>
Measurement Grid						
Test Position	% of controlled Limit Head		% of controlled Limit Chest		% of controlled Limit Leg	
Front	10		9		8	
Back	27		21		10	

Internal Vehicle MPE Assessment At 174.00 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> )	Power Density HigherLevel (mW/cm <sup>2</sup> )
Trunk	Whip/3	Highest Reading	E	1	14.7 % of Controlled Limit = 0.147 mW/cm <sup>2</sup>	28 % / 2 = 0.14mW/cm <sup>2</sup>
Measurement Grid						
Test Position	% of controlled Limit Head		% of controlled Limit Chest		% of controlled Limit Leg	
Front	13		10		8	
Back	28		19		10	

Internal Vehicle MPE Assessment At 136.00 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> )	Power Density HigherLevel (mW/cm <sup>2</sup> )
Roof	Whip/3	Highest Reading	E	1	5.5 % of Controlled Limit = 0.055 mW/cm <sup>2</sup>	11% / 2 = 0.055 mW/cm <sup>2</sup>
Measurement Grid						
Test Position	% of controlled Limit Head		% of controlled Limit Chest		% of controlled Limit Leg	
Front	5		4		2	
Back	11		6		5	

## 8. Conclusion

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