



# MPE EVALUATION

## TEST REPORT

*For*

**Vehicle Radio**

**Model Name: ST-5189 (135-175 MHz)**

**Trade Name: Soontone**

**FCC ID: T4KST-5189V1**

**Report No.: SZAGC013080301E9**

**Date of Issue: Apr.02, 2008**

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## 1. DESCRIPTION

**ST-5189** Mobile Radio are Compatible, Conventional radio system operation.

The operation and functions for the **ST-5189** Series radios are described in this manual.

**ST-5189** has a compact size with a various features in range of 135 MHz ~ 175 MHz.

**ST-5189** has a various features shown as below.

- Wideband frequency separation,
- 12.5 / 25 kHz channel spacing
- 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: 135 ~ 175 MHz,

1/4 wave 3 dBi antenna gain

## 3. TEST SITE

The test site (WorldStandardizationCertification&TestingCo., Ltd.) used to collect the radiated data is located on the address of 1-2/F, Dachong Keji Building, No.28 of Tonggu Road, Nanshan District, Shenzhen, 518057, China

The registration number is 989301. The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

## 4. MEASUREMENT SYSTEM

- Automobile: Hyundai Verna (2000)
- E-Field Survey Meter & Probe - NARDA Model EMC 20 (100kHz~3GHz)
- Calibration due date: 2008-05
- 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

**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

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (Minute)
<b>Limits for Occupational / Controlled Exposure</b>				
0.3 – 3.0	614	1.63	(100)*	6
3.0 – 30	1842/f	4.89/f	(900/f)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100 000	/	/	5	6

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (Minute)
<b>Limits for General population / Uncontrolled Exposure</b>				
0.3 – 3.0	614	1.63	(100)*	30
3.0 – 30	842/f	2.19/f	(180/f)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100 000	/	/	1.0	30

F = Frequency in MHz

\* = Plane-wave equivalent power density

Limit for Occupational / Controlled Exposure: 1.0

Limit for General Population / Uncontrolled Exposure: 0.2

External Vehicle MPE Assessment At Bottom Channel					
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Power. Density (mW/cm^2)
Trunk	Whip/3	60	E	1	0.119
Measurement Grid					
Test Position	Height	Test Value (mW/cm^2)	Test Position	Height (cm)	Test Value (mW/cm^2)
1	20	0.09	6	120	0.11
2	40	0.11	7	140	0.12
3	60	0.11	8	160	0.11
4	80	0.12	9	180	0.13
5	100	0.15	10	200	0.14

External Vehicle MPE Assessment At Middle Channel					
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Power. Density (mW/cm^2)
Trunk	Whip/3	60	E	1	0.124
Measurement Grid					
Test Position	Height	Test Value (mW/cm^2)	Test Position	Height (cm)	Test Value (mW/cm^2)
1	20	0.10	6	120	0.12
2	40	0.12	7	140	0.12
3	60	0.12	8	160	0.11
4	80	0.13	9	180	0.13
5	100	0.15	10	200	0.14

External Vehicle MPE Assessment At Top Channel					
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Power. Density (mW/cm^2)
Trunk	Whip/3	60	E	1	0.130
Measurement Grid					
Test Position	Height	Test Value (mW/cm^2)	Test Position	Height (cm)	Test Value (mW/cm^2)
1	20	0.11	6	120	0.12
2	40	0.12	7	140	0.13
3	60	0.12	8	160	0.13
4	80	0.16	9	180	0.14
5	100	0.17	10	200	0.14

Internal Vehicle MPE Assessment At Bottom Channel					
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Power Density HigherLevel (mW/cm^2)
Trunk	Whip/3	Highest Reading	E	1	0.16
Measurement Grid					
Test Position	Test Value (mW/cm^2)		Test Value (mW/cm^2)		controlled Limit
Front	0.13		0.11		0.20
Back	0.16		0.15		0.20

Internal Vehicle MPE Assessment At Middle Channel					
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Power Density HigherLevel (mW/cm^2)
Trunk	Whip/3	Highest Reading	E	1	0.17
Measurement Grid					
Test Position	Test Value (mW/cm^2)		Test Value (mW/cm^2)		controlled Limit
Front	0.12		0.10		0.20
Back	0.17		0.16		0.20

Internal Vehicle MPE Assessment At Middle Channel					
Antenna Location	Antenna / Gain	Meas. Distance (cm)	E/H Field	Calibration Factor	Power Density HigherLevel (mW/cm^2)
Trunk	Whip/3	Highest Reading	E	1	0.15
Measurement Grid					
Test Position	Test Value (mW/cm^2)		Test Value (mW/cm^2)		controlled Limit
Front	0.12		0.10		0.20
Back	0.15		0.13		0.20

## **8. CONCLUSION**

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