

# TEST REPORT

**Reference No.**..... : WTS20S05028697W001  
**FCC ID** ..... : ZLZ-WMTSTM70  
**Applicant**..... : Shenzhen Mindray BIO-Medical electronics Co.,LTD.  
**Address**..... : Mindray Building, Keji 12th Road South, Hi-tech Ind, Shenzhen, China  
**Manufacturer** ..... : The same as above  
**Address**..... : The same as above  
**Product**..... : Telemetry Monitor  
**Model(s)** ..... : TM70  
**Brand Name** ..... : Mindray  
**Standards**..... : FCC CFR47 Part 95 Subpart H  
**Date of Receipt sample** .... : 2020-05-19  
**Date of Test** ..... : 2019-05-20 to 2020-05-21  
**Date of Issue**..... : 2020-05-22  
**Test Result**..... : **Pass**  
**Remark** : This report is based on WTS19S09066147W001 V1 for updated the antenna information, Field Strength of Fundamental and Field Strength of Spurious Emissions.

**Remarks:**

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

**Waltek Services (Shenzhen) Co., Ltd.**

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China  
Tel :+86-755-83551033  
Fax:+86-755-83552400

Compiled by:

*Ford Wang*

Ford Wang / Project Engineer

Approved by:



*Philo Zhong*

Philo Zhong / Manager

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### 3 Revision History

| Test report No.        | Date of Receipt sample | Date of Test                   | Date of Issue | Purpose  | Comment | Approved |
|------------------------|------------------------|--------------------------------|---------------|----------|---------|----------|
| WTS20S05028<br>697W001 | 2020-05-19             | 2019-05-20<br>to<br>2020-05-21 | 2020-05-22    | original | -       | Valid    |

## 4 General Information

### 4.1 General Description of E.U.T.

|                    |                   |
|--------------------|-------------------|
| Product:           | Telemetry Monitor |
| Model(s):          | TM70              |
| Model Description: | N/A               |
| Support:           | WMTS              |
| Hardware Version:  | 1.0               |
| Software Version:  | 1.0               |

### 4.2 Details of E.U.T.

|                       |                                                                    |
|-----------------------|--------------------------------------------------------------------|
| Operation Frequency:  | 608MHz(608-614MHz)<br>1.4GHz(1395-1400MHz)<br>1.4GHz(1427-1432MHz) |
| Max. RF output power: | 608MHz: 102.06 dBuV/m ,1.4GHz: 93.78 dBuV/m                        |
| Type of Modulation:   | GFSK                                                               |
| Antenna installation: | WMTS: External antenna                                             |
| Ratings:              | DC 3.8V 3800mA                                                     |

### 4.3 Test Mode

All channels and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

| Support Band                                | Channel Frequency |
|---------------------------------------------|-------------------|
| 608-614MHz                                  | 608.66 MHz        |
|                                             | 611.06 MHz        |
|                                             | 613.46 MHz        |
| 1395-1400MHz and 1427-1432 MHz(wide band)   | 1395.5 MHz        |
|                                             | 1399.5 MHz        |
|                                             | 1431.5 MHz        |
| 1395-1400MHz and 1427-1432 MHz(narrow band) | 1395.4 MHz        |
|                                             | 1399.6 MHz        |
|                                             | 1431.6 MHz        |

## 5 Test Summary

| Test Items                           | Test Requirement | Result |
|--------------------------------------|------------------|--------|
| FIELD STRENGTH OF FUNDAMENTAL        | 95.2369(a)(b)    | PASS   |
| FIELD STRENGTH OF SPURIOUS EMISSIONS | 95.2379(a)(b)    | PASS   |

## 6 Test Facility

The test facility has a test site registered with the following organizations:

**ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, October 15, 2016.

**FCC Designation No.: CN1201. Test Firm Registration No.: 523476.**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration number 523476, September 10, 2019.

## 7 Equipment Used during Test

### 7.1 Equipments List

| 3m Semi-anechoic Chamber for Radiation Emissions Test site 1# |                            |                                  |             |            |                       |                      |
|---------------------------------------------------------------|----------------------------|----------------------------------|-------------|------------|-----------------------|----------------------|
| Item                                                          | Equipment                  | Manufacturer                     | Model No.   | Serial No. | Last Calibration Date | Calibration Due Date |
| 1                                                             | Spectrum Analyzer          | R&S                              | FSP         | 100091     | 2020-04-20            | 2020-04-19           |
| 2                                                             | Trilog Broadband Antenna   | SCHWARZBECK                      | VULB9163    | 336        | 2020-04-20            | 2020-04-19           |
| 3                                                             | Coaxial Cable (below 1GHz) | Top                              | TYPE16(13M) | -          | 2020-04-20            | 2020-04-19           |
| 4                                                             | Amplifier                  | Agilent                          | 8447D       | 2944A10178 | 2020-04-20            | 2020-04-19           |
| 5                                                             | Broad-band Horn Antenna    | SCHWARZBECK                      | BBHA 9120 D | 667        | 2020-04-25            | 2020-04-24           |
| 6                                                             | Broadband Preamplifier     | COMPLIANCE DIRECTION             | PAP-1G18    | 2004       | 2020-04-20            | 2020-04-19           |
| 7                                                             | Coaxial Cable (above 1GHz) | Top                              | 1GHz-25GHz  | EW02014-7  | 2020-04-20            | 2020-04-19           |
| 3m Semi-anechoic Chamber for Radiation Emissions Test site 2# |                            |                                  |             |            |                       |                      |
| Item                                                          | Equipment                  | Manufacturer                     | Model No.   | Serial No  | Last Calibration Date | Calibration Due Date |
| 1                                                             | Test Receiver              | R&S                              | ESCI        | 101296     | 2019-04-20            | 2020-04-19           |
| 2                                                             | Trilog Broadband Antenna   | SCHWARZBECK                      | VULB9160    | 9160-3325  | 2019-05-24            | 2020-05-23           |
| 3                                                             | Amplifier                  | Compliance pirection systems inc | PAP-0203    | 22024      | 2019-04-19            | 2020-04-18           |
| 4                                                             | Cable                      | HUBER+SUHNER                     | CBL2        | 525178     | 2019-04-20            | 2020-04-19           |
| 5                                                             | Active Loop Antenna        | Com-Power Corp.                  | AL-130R     | 10160007   | 2020-04-20            | 2020-04-19           |

### 7.2 Measurement Uncertainty

| Parameter                                       | Uncertainty                             |
|-------------------------------------------------|-----------------------------------------|
| Conducted Emission                              | ± 3.64 dB(AC mains 150KHz~30MHz)        |
| Radiated Spurious Emissions                     | ± 5.08 dB (Bilog antenna 30M~1000MHz)   |
|                                                 | ± 5.47 dB (Horn antenna 1000M~25000MHz) |
| Radio Frequency                                 | ± 1 x 10 <sup>-7</sup> Hz               |
| RF Power                                        | ± 0.42 dB                               |
| RF Power Density                                | ± 0.7dB                                 |
| Conducted Spurious Emissions                    | ± 2.76 dB (9kHz~26500MHz)               |
| Confidence interval: 95%. Confidence factor:k=2 |                                         |

### 7.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

## 8 FIELD STRENGTH OF FUNDAMENTAL

|                   |                     |
|-------------------|---------------------|
| Test Requirement: | 95.2369(a)(b)       |
| Test Method:      | ANSI/TIA-603-E-2016 |
| Test Mode:        | TX transmitting     |

### 8.1 EUT Operation

Operating Environment :

|                       |           |
|-----------------------|-----------|
| Temperature:          | 23.5 °C   |
| Humidity:             | 52.4 % RH |
| Atmospheric Pressure: | 101.4kPa  |

### 8.2 Test Procedure

Radiated method:

1. The setup of EUT is according with per TIA/EIA/EIA Standard 603-C.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

### 8.3 Test limits

(a) For WMTS transmitter types operating in the 608-614 MHz band, the field strength of the transmitted signal must not exceed 200 mV/m, measured at a distance of 3 meters, using instrumentation with a CISPR quasi-peak detector.

(b) For WMTS transmitter types operating in the 1395-1400 MHz and 1427-1432 MHz bands, the field strength of the transmitted signal must not exceed 740 mV/m, measured at 3 meters, using instrumentation with an averaging detector and a 1MHz reference bandwidth.

## 8.4 Test Result

### FIELD STRENGTH OF FUNDAMENTAL

| Test channels(MHz) | Field Strength(dBuv/m) | limits(dBuv/m) | Result |
|--------------------|------------------------|----------------|--------|
| 608.66 MHz         | 102.06                 | 106            | PASS   |
| 611.06 MHz         | 100.33                 | 106            | PASS   |
| 613.46 MHz         | 101.76                 | 106            | PASS   |
| 1395.5 MHz(WB)     | 91.17                  | 117.4          | PASS   |
| 1399.5 MHz(WB)     | 92.85                  | 117.4          | PASS   |
| 1431.5 MHz(WB)     | 93.78                  | 117.4          | PASS   |
| 1395.4 MHz(NB)     | 90.15                  | 117.4          | PASS   |
| 1399.6 MHz(NB)     | 90.59                  | 117.4          | PASS   |
| 1431.6 MHz(NB)     | 91.53                  | 117.4          | PASS   |

## 9 FIELD STRENGTH OF SPURIOUS EMISSIONS

Test Requirement: 95.2379(a)(b)  
Test Method: ANSI/TIA-603-E-2016  
Test Mode: TX transmitting

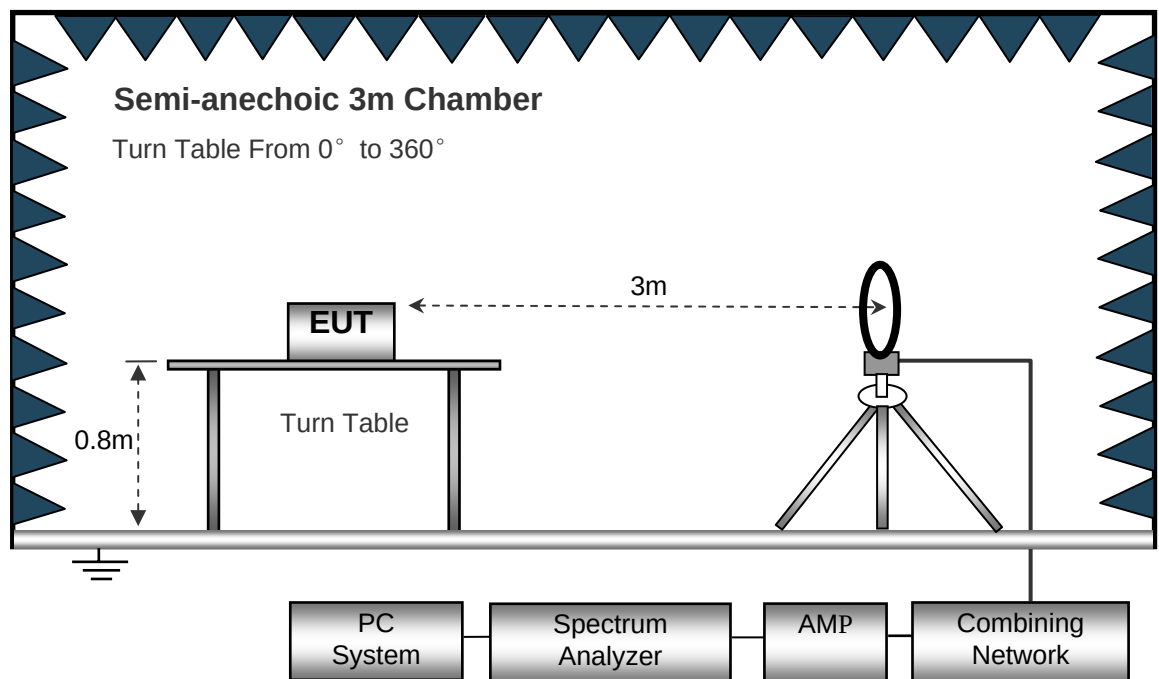
### 9.1 EUT Operation

Operating Environment :

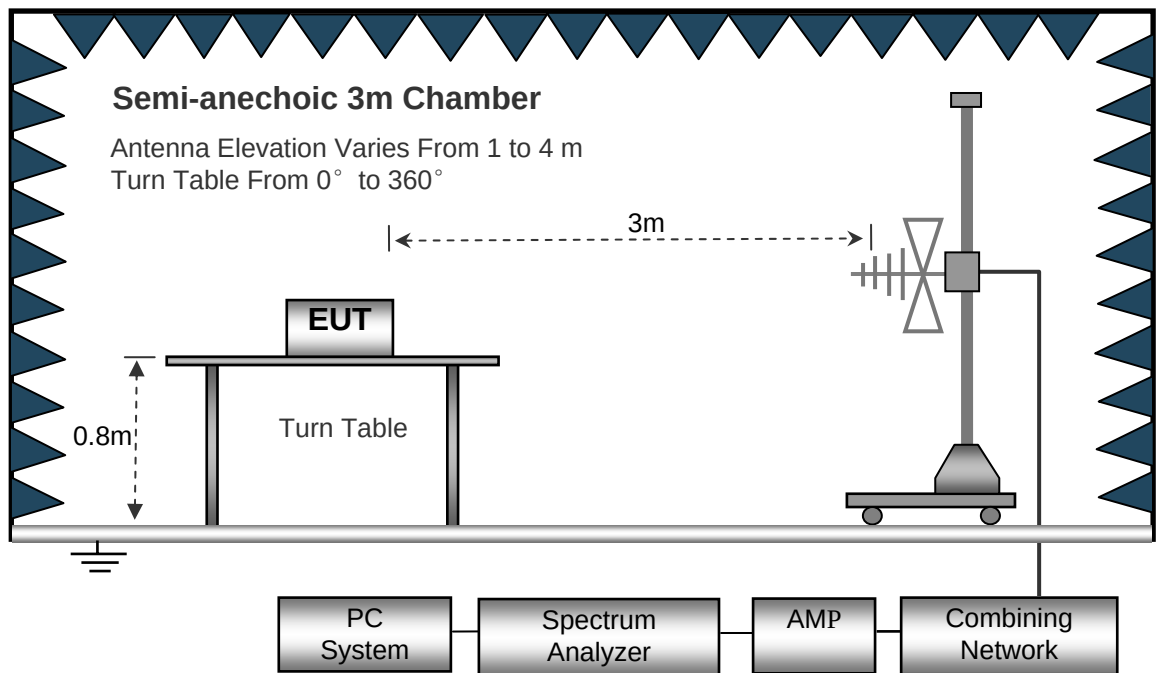
Temperature: 23.5 °C  
Humidity: 52.5% RH  
Atmospheric Pressure: 101.5kPa

### 9.2 Test Setup

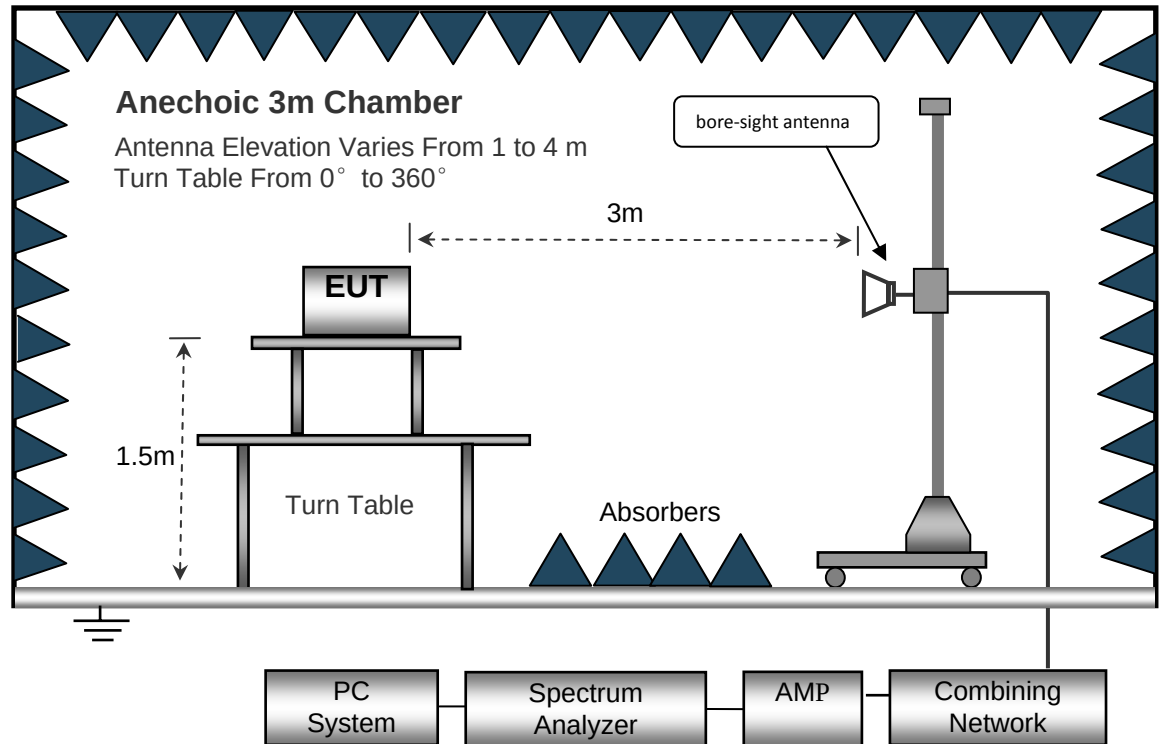
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site.  
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



9.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

- Sweep Speed ..... Auto
- Detector ..... PK
- Resolution Bandwidth..... 100kHz
- Video Bandwidth..... 300kHz
- Detector ..... QP.
- Resolution Bandwidth..... 100kHz
- Video Bandwidth..... 300kHz

Above 1GHz

- Sweep Speed ..... Auto
- Detector ..... PK
- Resolution Bandwidth..... 1MHz
- Video Bandwidth..... 3MHz
- Detector ..... Ave.
- Resolution Bandwidth..... 1MHz
- Video Bandwidth..... 3MHz

## 9.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m for below 1GHz and 1.5m for above 1GHz above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from 30MHz up to the tenth harmonic of the highest fundamental frequency.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown was the Z position only.
7. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.  
  
Spurious emissions in dB =  $10 \lg (\text{TXpwr in Watts}/0.001)$  – the absolute level  
Spurious attenuation limit in dB =  $43 + 10 \lg (\text{power out in Watts})$
8. Repeat above procedures until the measurements for all frequencies are completed.

## 9.5 Summary of Test Results

For 26MHz~30MHz,

The measurements were more than 20 dB below the limit and not reported.

Remark: Test performed from 30MHz to 10<sup>th</sup> harmonics with low/middle/high channels, only the worst data were recorded.

**Middle channel(1399.5MHz WB)**

| Freq<br>(MHz) | Reading<br>(dBuv/m) | Factor<br>(dB) | Polar<br>(V/H) | Result<br>(dBuv/m) | Limit<br>(dBuv/m) | Margin<br>(dB) | Detector |
|---------------|---------------------|----------------|----------------|--------------------|-------------------|----------------|----------|
| 152.2200      | 39.20               | -16.85         | V              | 22.35              | 46.00             | -21.15         | QP       |
| 810.8500      | 33.28               | 0.01           | V              | 33.29              | 46.00             | -12.71         | QP       |
| 211.3900      | 44.49               | -12.63         | H              | 31.86              | 46.00             | -11.64         | QP       |
| 810.8500      | 35.61               | 0.01           | H              | 35.62              | 46.00             | -10.38         | QP       |
| 3240.000      | 32.32               | -9.28          | V              | 23.04              | 54.00             | -30.96         | AV       |
| 5830.000      | 30.27               | -1.09          | V              | 29.18              | 54.00             | -24.82         | AV       |
| 2799.000      | 32.73               | -7.20          | H              | 25.53              | 54.00             | -28.47         | AV       |
| 4198.500      | 37.30               | -4.60          | H              | 32.70              | 54.00             | -21.30         | AV       |

**Middle channel(1399.6MHz NB)**

| Freq<br>(MHz) | Reading<br>(dBuv/m) | Factor<br>(dB) | Polar<br>(V/H) | Result<br>(dBuv/m) | Limit<br>(dBuv/m) | Margin<br>(dB) | Detector |
|---------------|---------------------|----------------|----------------|--------------------|-------------------|----------------|----------|
| 211.5265      | 32.80               | -17.59         | V              | 20.09              | 46.00             | -28.29         | QP       |
| 631.6884      | 35.23               | -7.33          | V              | 27.90              | 46.00             | -18.10         | QP       |
| 197.8100      | 44.47               | -13.27         | H              | 31.20              | 46.00             | -12.30         | QP       |
| 651.7700      | 33.41               | -2.67          | H              | 30.74              | 46.00             | -15.26         | QP       |
| 5158.000      | 30.17               | -0.26          | V              | 29.91              | 54.00             | -24.09         | AV       |
| 8336.000      | 32.23               | 2.48           | V              | 34.71              | 54.00             | -19.29         | AV       |
| 4486.000      | 31.24               | -4.04          | H              | 27.20              | 54.00             | -26.80         | AV       |
| 6978.000      | 30.35               | 2.06           | H              | 32.41              | 54.00             | -21.59         | AV       |

**Low channel(608.66MHz)**

| Freq<br>(MHz) | Reading<br>(dBuv/m) | Factor<br>(dB) | Polar<br>(V/H) | Result<br>(dBuv/m) | Limit<br>(dBuv/m) | Margin<br>(dB) | Detector |
|---------------|---------------------|----------------|----------------|--------------------|-------------------|----------------|----------|
| 159.9800      | 49.25               | -16.11         | V              | 33.14              | 46.00             | -10.36         | QP       |
| 450.0100      | 38.45               | -7.45          | V              | 31.00              | 46.00             | -15.00         | QP       |
| 159.9800      | 46.82               | -16.11         | H              | 30.71              | 46.00             | -12.79         | QP       |
| 450.0100      | 43.04               | -7.45          | H              | 35.59              | 46.00             | -10.41         | QP       |
| 5176.000      | 30.94               | -0.33          | V              | 30.61              | 54.00             | -23.39         | AV       |
| 6574.000      | 28.99               | 1.17           | V              | 30.16              | 54.00             | -23.84         | AV       |
| 3082.000      | 29.23               | -6.78          | H              | 22.45              | 54.00             | -31.55         | AV       |
| 4972.000      | 32.88               | -2.45          | H              | 30.43              | 54.00             | -23.57         | AV       |

Note: Margin = Limit-Result

## **10 RF Exposure**

Remark: refer to MPE test report: WTS20S05028697W002

## **11 Photographs of test setup and EUT.**

Note: Please refer to appendix TM70-Photo.

===== End of Report =====