

## ***Measurement of Maximum Permissible Exposure***

### **1. Foreword**

In adopt with the Human Exposure IEEE C95.1, and according to the FCC 1.1310. The *Maximum Permissible Exposure (MPE)* is obligated to measure in order to prove the safety of radiation harmfulness to the human body.

The *Gain* of the antenna used is measured in an *Anechoic chamber*. The *maximum total power to the antenna* is to be recorded. By adopting the ***Friis Transmission Formula*** and the *power gain of the antenna*, we can find the distance right away from the product, where the limit of the MPE is.

### **2. Description of EUT**

|                         |   |  |
|-------------------------|---|--|
| <b>FCC ID</b>           | : | YLEOG-GSM  |
| <b>Product Name</b>     | : | GSM emergency phone  |
| <b>Model Name</b>       | : | OG-GSM   |
| <b>Frequency Range</b>  | : | GSM850 MHz Band - 824.2MHz to 848.8MHz                       |
| <b>Channel Spacing</b>  | : | GSM850 MHz Band – 200 kHz                                    |
| <b>Support Channel</b>  | : | GSM850 MHz Band - 124 channels                               |
| <b>Modulation Skill</b> | : | GSM  |
| <b>Power Type</b>       | : | Battery/Solar/Power adaptor                                  |
| <b>Data Cable</b>       | : | Solar Plate – Non shielded, 288cm long, without ferrite core |

**3. Limits for Maximum Permissible Exposure (MPE)**

| Frequency Range (MHz)  | Electric Field Strength (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes) |
|--|-------------------------------|-----------------------------------|---|---|
| <b>(A) 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 <sup>2</sup>                      | 6   |
| 30-300   | 61.4                          | 0.163                             | 1.0                                     | 6   |
| 300-1500   | --                            | --                                | f/300                                   | 6   |
| 1500-100,000   | --                            | --                                | 5                                       | 6   |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                                   |   |   |
| 0.3-1.34   | 614                           | 1.63                              | 100                                     | 30  |
| 1.34-30  | 824/f                         | 2.19/f                            | 180/f <sup>2</sup>                      | 30  |
| 30-300   | 27.5                          | 0.073                             | 0.2                                     | 30  |
| 300-1500   | --                            | --                                | f/1500                                  | 30  |
| 1500-100,000   | --                            | --                                | 1.0                                     | 30  |

[The EUT is tested in transmit and receive modes and in the first, middle and the last channel separately.

The following shows only our observation have the greatest emissions.]

According to OET BULLETIN 56 Fourth Edition/August 1999, Equation for Predicting RF Fields:

$$\text{Friis Transmission Formula: } S = \frac{PG}{4\pi R^2} = \frac{1.524 \times 2.004}{4\pi(20)^2} = 0.000608 \text{ mW/cm}^2$$

$$\text{Estimated safe separation: } R = \sqrt{\frac{PG}{4\pi}} = \sqrt{\frac{1.524 \times 2.004}{4\pi}} = 0.493 \text{ cm}$$

**Note: "The safe estimated separation that the user must maintain from the antenna is at least 6.5cm"**

Where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

The Numeric gain G of antenna with a gain specified in dB is determined by:

$$G = \text{Log}^{-1} (\text{dB antenna gain} / 10)$$

$$G = \text{Log}^{-1} (3.02 / 10) = 2.004$$

## *Appendix*

### **Antenna Specification**



深圳市华士捷通讯器材有限公司

SHENZHENSHI HUASHI JIE COMMUNICATION DEVICE. CO. LTD

# 样品承认书

SPECIFICATION FOR APPROVAL

客户名称:

CUSTOMER NAME

产品名称: 四频小胶套手机天线

PAPT NAME

产品型号: TTM85901819-47A

PAPT MODEL

## 承认栏

供应商确认:

| 拟定 | 审核 | 批准 |
|----|----|----|
| 刘进 |    | 王刚 |

客户确认:

| 确认 | 审核 | 承认 |
|----|----|----|
|    |    |    |

厂址: 中国深圳龙岗区横岗镇窝肚村富肚工业区第八栋

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<http://www.wasge.com>

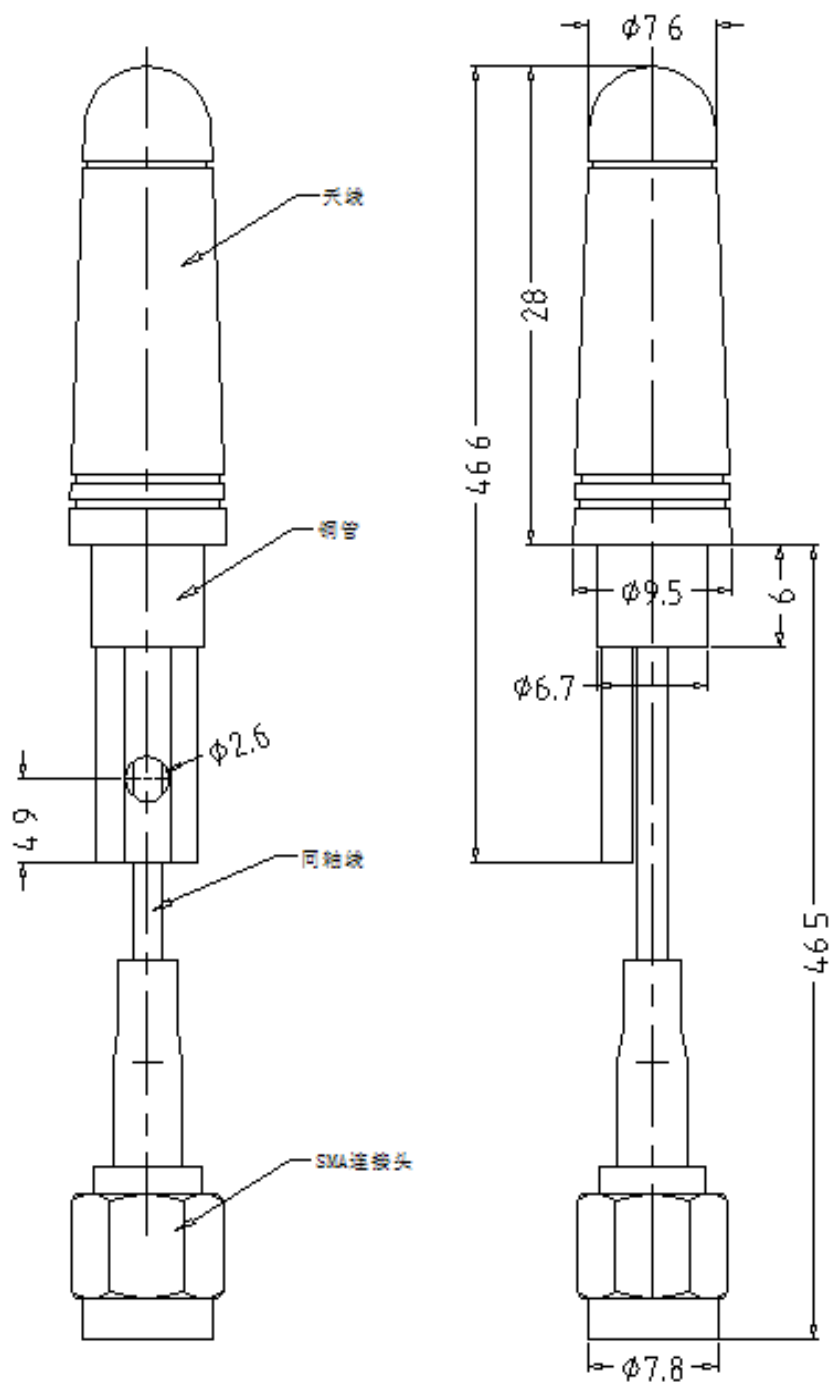
E-mail: [sales@wasge.com](mailto:sales@wasge.com)

## 一、 电气性能 Electrical factor

|                                  |                             |
|----------------------------------|-----------------------------|
| 1. 频率范围 Frenquency range         | 850 / 900 / 1800 / 1900 MHz |
| 2. 输入阻抗 Impedance                | 50 $\Omega$                 |
| 3. 驻波比 VSWR                      | $\leq 3$                    |
| 4. 增益 Gain                       | 3.02 dBi                    |
| 5.极化方式 Polarization              | 垂直                          |
| 6.辐射方向 Radiation                 | 全向                          |
| 7.功率容量 Maximun power Input-watts | 50W                         |

## 二、 机械特性 Mechani cal performance

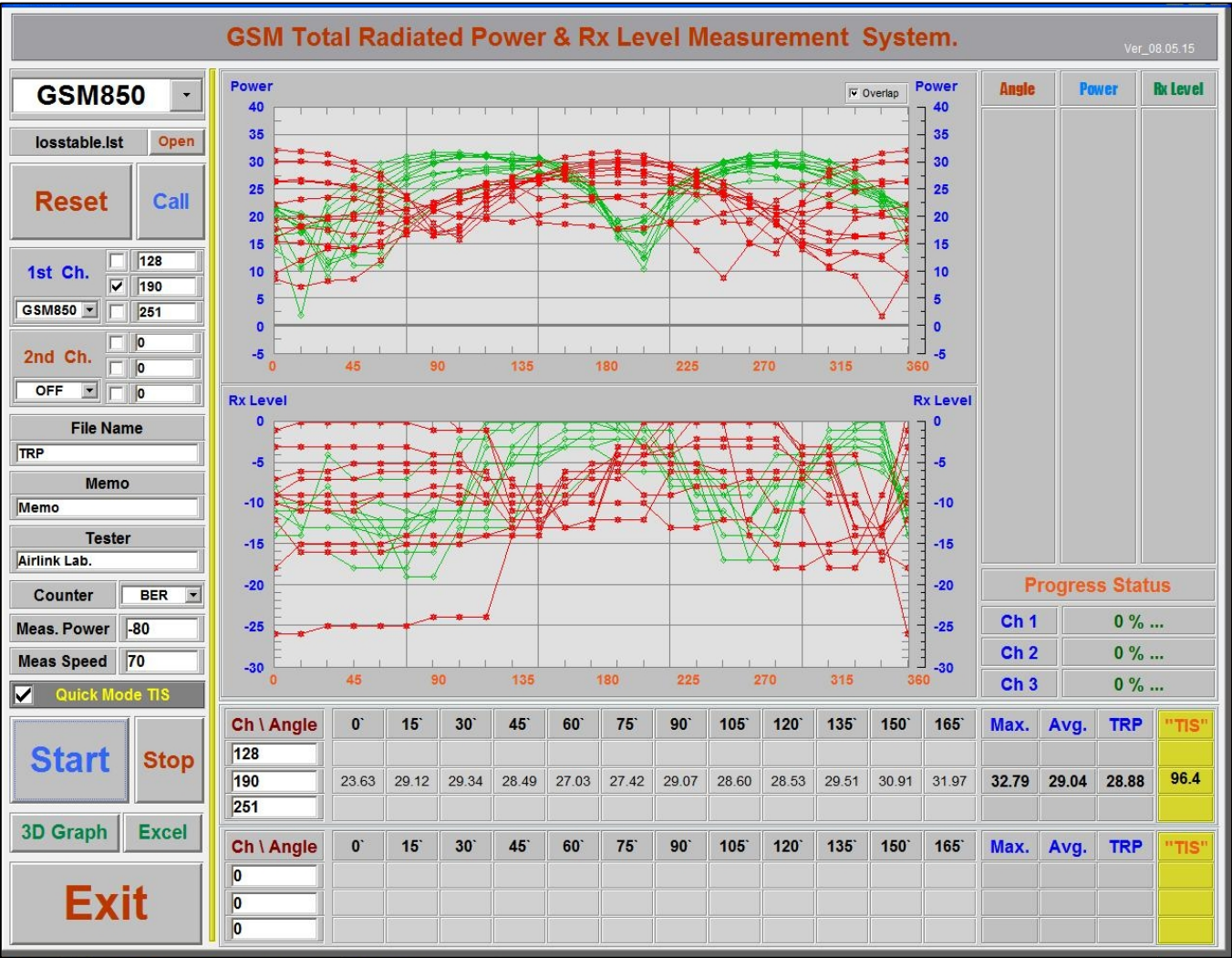
|                                    |   |
|------------------------------------|---|
| 1. 天线尺寸 Di mensi on                | $\Phi 9.5 \times 46.6\text{mm}$                     |
| 2. 连接方式                            | SMA公头公针   |
| 3. 线缆&长度 Cable & length            | RG178 $\times 47\text{mm}$                          |
| 4. 辐射材料 Radiating Element Material | 磷铜  |
| 5. 外罩材料 Radome materi al           | TPE   |
| 6. 外罩颜色 Radome color               | 黑色/白色   |
| 7. 工作温度 Working temperature        | -20 $^{\circ}\text{C}$ $\sim$ 85 $^{\circ}\text{C}$ |
| 8. 存放温度 Storage temperature        | -40 $^{\circ}\text{C}$ $\sim$ 90 $^{\circ}\text{C}$ |



| 尺寸范围<br>DIMENSION | 公差<br>TOLERANCE | 品名<br>PARTNAME | 四频小款手机天线        |                 |      |                | 华士捷<br>HUA SHI JIE |                        |
|-------------------|-----------------|----------------|-----------------|-----------------|------|----------------|--------------------|------------------------|
| 0-10              | ±0.03           | 型号<br>MODEL    |                 | 材质<br>MATERIAL  |      | 单位<br>UNIT     | mm                 |                        |
| 10-25             | ±0.05           | 路径<br>PATH     | F.VHSJ\5_手机内置天线 | 比例<br>SCALE     | 1:1  | 版/次<br>EDITION | 1/1                | 投影方式<br>PROJECTION WAY |
| 25-50             | ±0.15           | 日期<br>DATE     | 2010 07 10      | 制图<br>DRAFTSMAN | CHEN | 审核<br>AUDITOR  |                    |                        |
| 50-150            | ±0.3            |                |                 |                 |      |                |                    |                        |
| 150-350           | ±0.8            |                |                 |                 |      |                |                    |                        |
| 350-∞             | ±1.0            |                |                 |                 |      |                |                    |                        |

四、TRP & TIS TEST DATA

1. GSM850 TRP & TIS




T R P Measurement Report

Airlink 3D

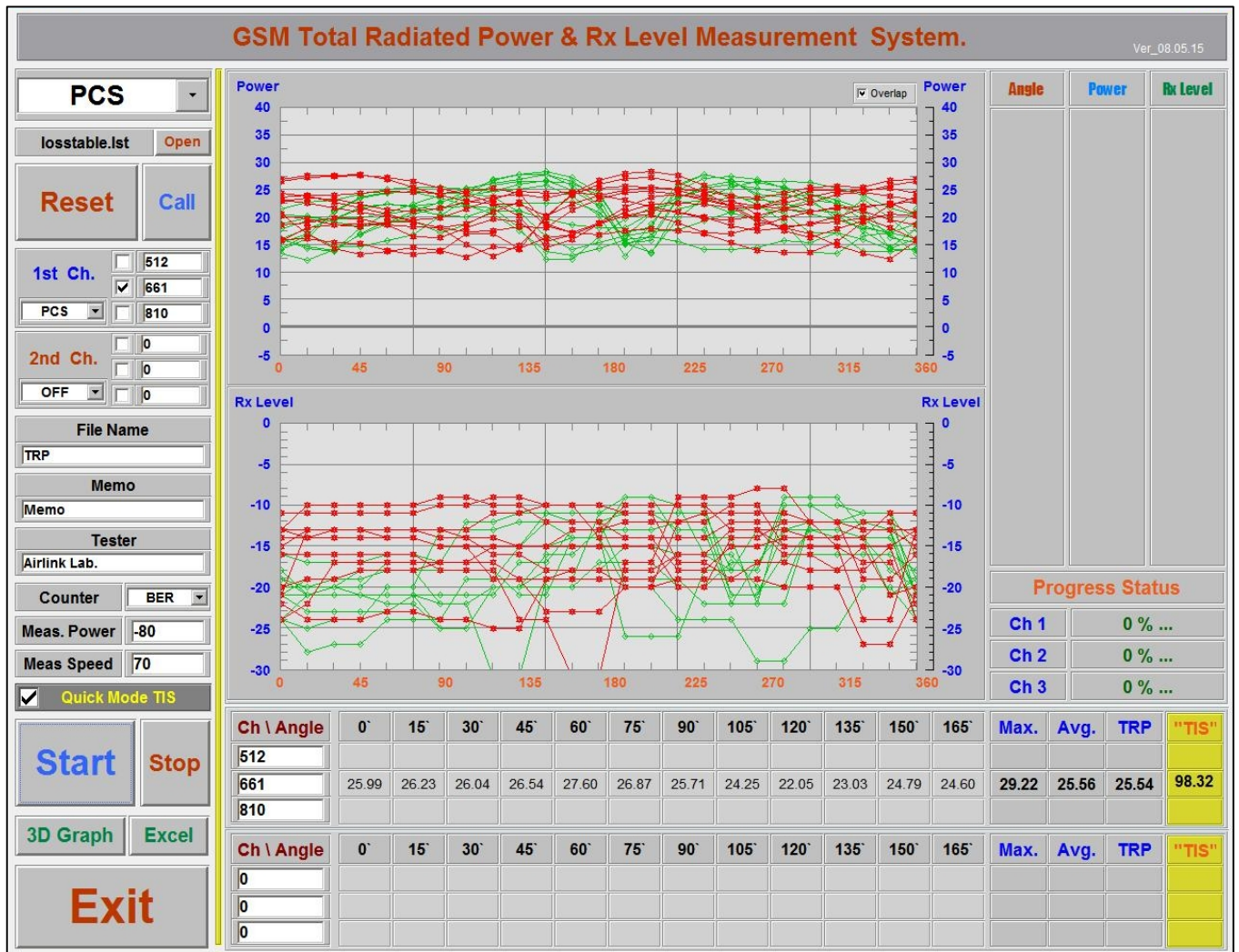
|                |               |
|----------------|---------------|
| Model Name     | TRP           |
| ESN            | -----         |
| Version        |               |
| Serial         |               |
| Test Band      | GSM850        |
| Test Condition |               |
| Memo           | Memo          |
| Losstable      | losstable.lst |

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|                |         |         |         |
|----------------|---------|---------|---------|
| Channel        | 128 Ch. | 190 Ch. | 251 Ch. |
| TRP            |         | 28.869  |         |
| Calculated TIS |         | 96.397  |         |
| ERP/EIRP       |         | 32.786  |         |
| NHPRP 30°      |         | 14.631  |         |
| NHPRP 45°      |         | 32.091  |         |
| NHPRP 60°      |         | 34.406  |         |
| UHRP           |         | 38.72%  |         |

## 2. GSM1900 TRP&TIS



T R P Measurement Report

Airlink 3D

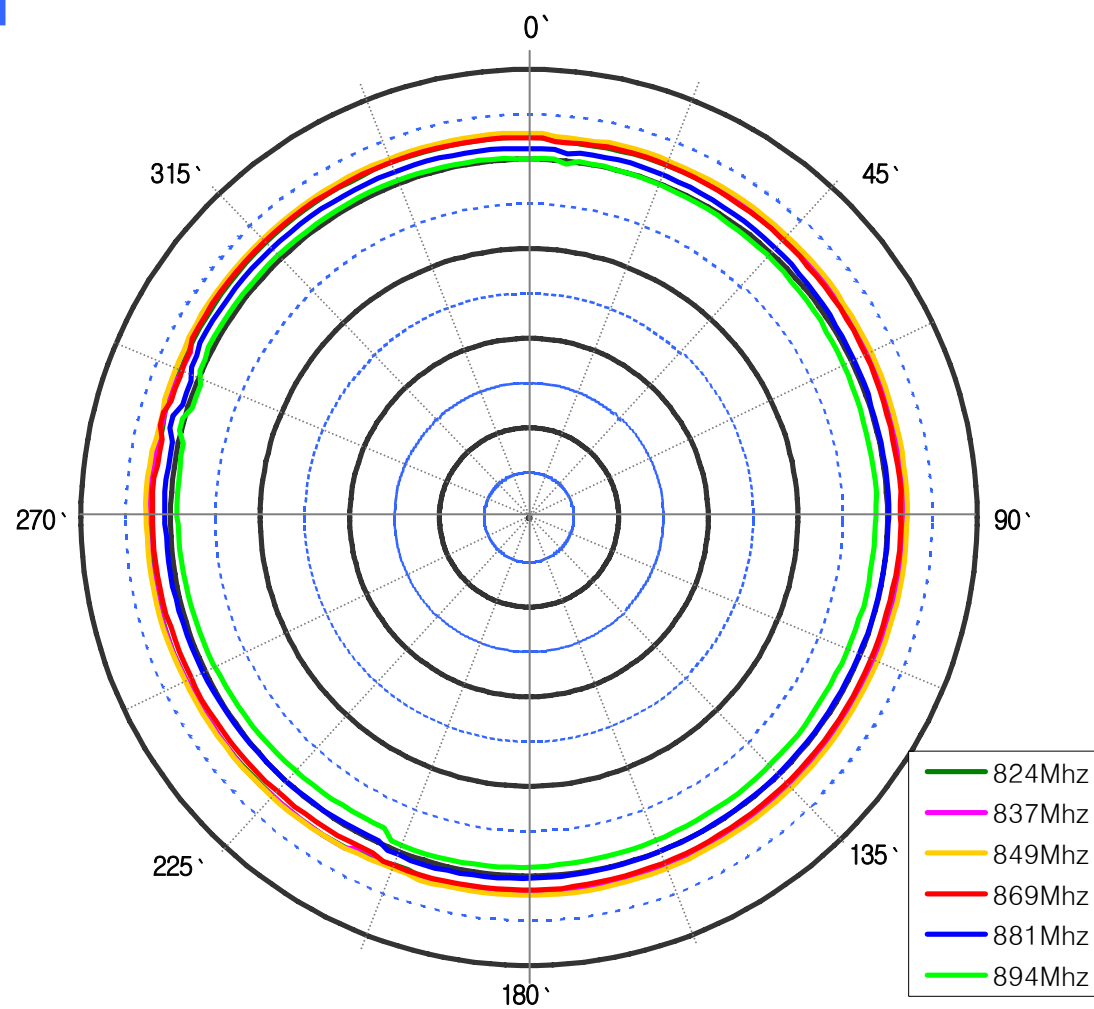
|                |               |                       |   |
|----------------|---------------|-----------------------|---|
| Model Name     | TRP           | P<br>h<br>o<br>t<br>o |  |
| ESN            | -----         |                       |   |
| Version        |               |                       |   |
| Serial         |               |                       |   |
| Test Band      | PCS           |                       |   |
| Test Condition |               |                       |   |
| Memo           | Memo          |                       |   |
| Losstable      | losstable.lst |                       |   |
| Channel        | 512 Ch.       | 661 Ch.               | 810 Ch.   |
| TRP            |               | 25.532                |   |
| Calculated TIS |               | 98.321                |   |
| ERP/EIRP       |               | 29.217                |   |
| NHPRP 30°      |               | 17.660                |   |
| NHPRP 45°      |               | 29.596                |   |
| NHPRP 60°      |               | 31.253                |   |
| UHRP           |               | 64.27%                |   |



## Gain & Radiation Pattern

|              |          |
|--------------|----------|
| Model Name:  | FileName |
| Test Band :  | CDMA     |
| Test Date :  |          |
| Tester Name: |          |
| User Name :  |          |
| Memo :       |          |

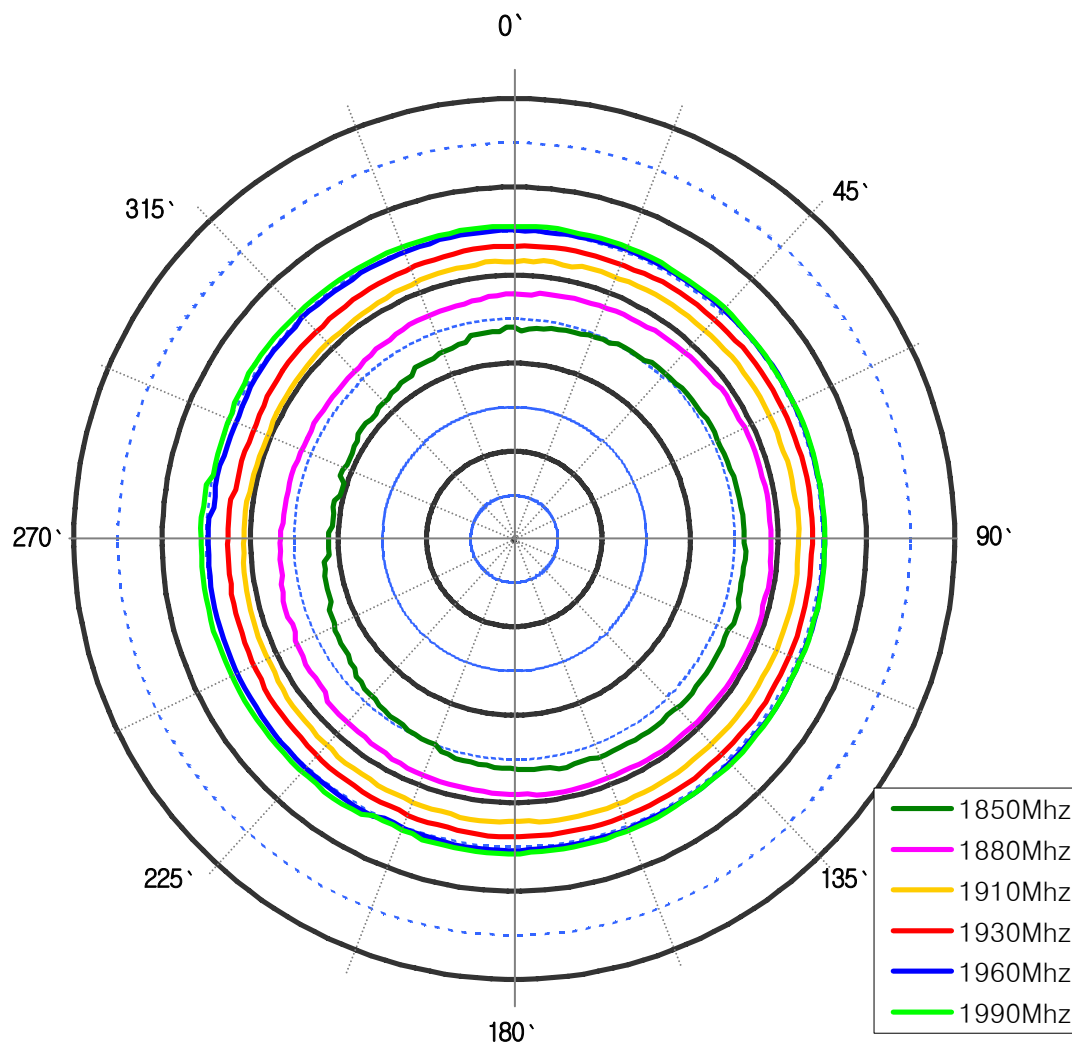
| Frequency | Max. | Min.  | Avg.  | Beam Peak |
|-----------|------|-------|-------|-----------|
| 824Mhz    | 2.50 | 1.60  | 2.10  | 274`      |
| 837Mhz    | 2.70 | 1.44  | 2.23  | 320`      |
| 849Mhz    | 3.02 | 1.99  | 2.47  | 314`      |
| 869Mhz    | 2.66 | 1.26  | 1.86  | 324`      |
| 881Mhz    | 1.56 | -0.23 | 0.55  | 310`      |
| 894Mhz    | 0.52 | -1.78 | -0.69 | 300`      |



## Gain & Radiation Pattern

|              |          |
|--------------|----------|
| Model Name:  | FileName |
| Test Band :  | DCS1900  |
| Test Date :  |          |
| Tester Name: |          |
| User Name :  |          |
| Memo :       |          |

| Frequency | Max.   | Min.   | Avg.   | Beam Peak |
|-----------|--------|--------|--------|-----------|
| 1850Mhz   | -13.26 | -19.68 | -15.20 | 132`      |
| 1880Mhz   | -10.59 | -13.90 | -11.70 | 108`      |
| 1910Mhz   | -7.65  | -9.66  | -8.27  | 114`      |
| 1930Mhz   | -6.01  | -7.98  | -6.61  | 144`      |
| 1960Mhz   | -4.62  | -5.77  | -4.92  | 160`      |
| 1990Mhz   | -4.12  | -5.04  | -4.52  | 214`      |



## Gain & Radiation Pattern

|              |          |
|--------------|----------|
| Model Name:  | FileName |
| Test Band :  | Off Meas |
| Test Date :  |          |
| Tester Name: |          |
| User Name :  |          |
| Memo :       |          |

| Frequency | Max. | Min. | Avg. | Beam Peak |
|-----------|------|------|------|-----------|
| 0Mhz      | 0.00 | 0.00 | 0.00 | 0°        |
| 0Mhz      | 0.00 | 0.00 | 0.00 | 0°        |
| 0Mhz      | 0.00 | 0.00 | 0.00 | 0°        |
| 0Mhz      | 0.00 | 0.00 | 0.00 | 0°        |
| 0Mhz      | 0.00 | 0.00 | 0.00 | 0°        |
| 0Mhz      | 0.00 | 0.00 | 0.00 | 0°        |

