

No.: SEKWANG 2007

Date : 2007. 1. 26

PRODUCT SPECIFICATION

| | |
|--------------|---------------|
| Product Name | ANTENNA |
| Customer | TELIAN |
| Model Name | MGQ7180 |
| Provider | SEKWANG |
| Part No. | SKA701-0000AA |

| SEKWANG | Submitted | Checked | Checked | Approved |
|---------|-----------|---------|---------|----------|
| | | | | |

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1. Product History

| No. | Data | Changes | Remark |
|-----|---------|----------|--------|
| 1 | 07.1.26 | Approval | |
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2. Electrical Feature

2.1 Frequency Band

| BAND | GSM850 | | GSM900 | | DCS1800 | | PCS | |
|-----------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| FREQUENCY | Tx | Rx | Tx | Rx | Tx | Rx | Tx | Rx |
| | 824MHz ~ 849MHz | 869MHz ~ 894MHz | 880MHz ~ 915MHz | 925MHz ~ 960MHz | 1710MHz ~ 1785MHz | 1805MHz ~ 1880MHz | 1850MHz ~ 1910MHz | 1930MHz ~ 1990MHz |

2.2 Impedance

2.2.1 Input Impedance

– $R = 50\Omega$

2.2.2 Measuring Method

By using Network Analyzer, connect the antenna installed handset to the reflection point of Analyzer and measure the impedance value within the designated frequency band.

2.3 Matching circuit

Matching Circuit is composed in free space of 2.1 frequency band while satisfying customer's requirements.

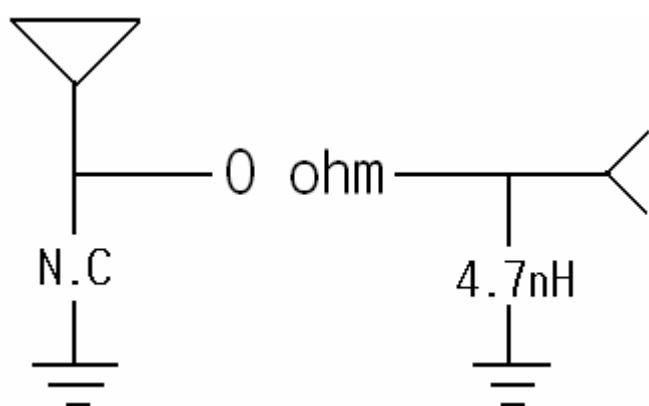


Figure 2.3.1 Matching circuit

2.4 VSWR

Impedance Matching optimization is performed under the below mentioned environment.

2.4.1. Free Space Environment

| BAND | GSM850 | | GSM900 | | DCS1800 | | PCS | |
|-------|--------|--------|--------|--------|---------|---------|---------|---------|
| | 824MHz | 894MHz | 880MHz | 960MHz | 1710MHz | 1880MHz | 1850MHz | 1990MHz |
| CLOSE | 3.0:1 | 4.5:1 | 4.0:1 | 9.5:1 | 3.0:1 | 3.0:1 | 3.0:1 | 3.0:1 |
| OPEN | 2.5:1 | 3.5:1 | 3.0:1 | 6.5:1 | 3.0:1 | 3.0:1 | 3.0:1 | 3.0:1 |

2.4.2 Measuring Method

Connect (soldering) 50Ω semi-rigid coaxial cable to the 50Ω spot in handset. To minimize the loss of transmission, semi-rigid coaxial cable is used. Including PCB, the handset shouldn't be different from the one, which will be used for mass production.

Specification should be the same for all frequency bands. Free Space means that Handset is put on the surface of no conducting plastic.

2.5 Directive ness

Omni-directional (Horizontal)

| BAND | | GSM850 | GSM900 | DCS1800 | PCS |
|-----------|------|-----------|-----------|-----------|-----------|
| C L O S E | Avg. | -5.98 dBi | -7.47 dBi | -4.14 dBi | -4.45 dBi |
| | Peak | -2.01 dBi | -3.56 dBi | 0 dBi | 0.37 dBi |
| O P E N | Avg. | -4.31 dBi | -5.37 dBi | -3.42 dBi | -3.86 dBi |
| | Peak | -0.49 dBi | -1.59 dBi | 1.11 dBi | 0.78 dBi |

2.6 Maximum Power

- P=2W under

3. Environment Test

3.1 Operating Temperature Test

3.1.1 Test Condition

Temperature = -30°C , $+80^{\circ}\text{C}$

Duration time = 1 hour

3.1.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.1.3 Measuring Method

Antenna is kept at -30°C for 1 hour and $+80^{\circ}\text{C}$ for 1 hour and then passed test of 2.4

3.2 Temperature Cycling Test

3.2.1 Test Condition

- Low cycling Temperature TLC = -40°C
- High cycling Temperature THC = $+80^{\circ}\text{C}$
- 1Cycle = 4 hours
- Test number = 10Cycle

3.2.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.2.3 Measuring Method

Antenna is kept at low temperature -40°C for 2 hours and increase the temperature up to $+80^{\circ}\text{C}$ within 2 hour and kept for another 2 hours at the same temperature will be 1 cycle. As shown in Figure 3.2.1 repeat 10 cycle and kept for 2 hour in normal temperature.

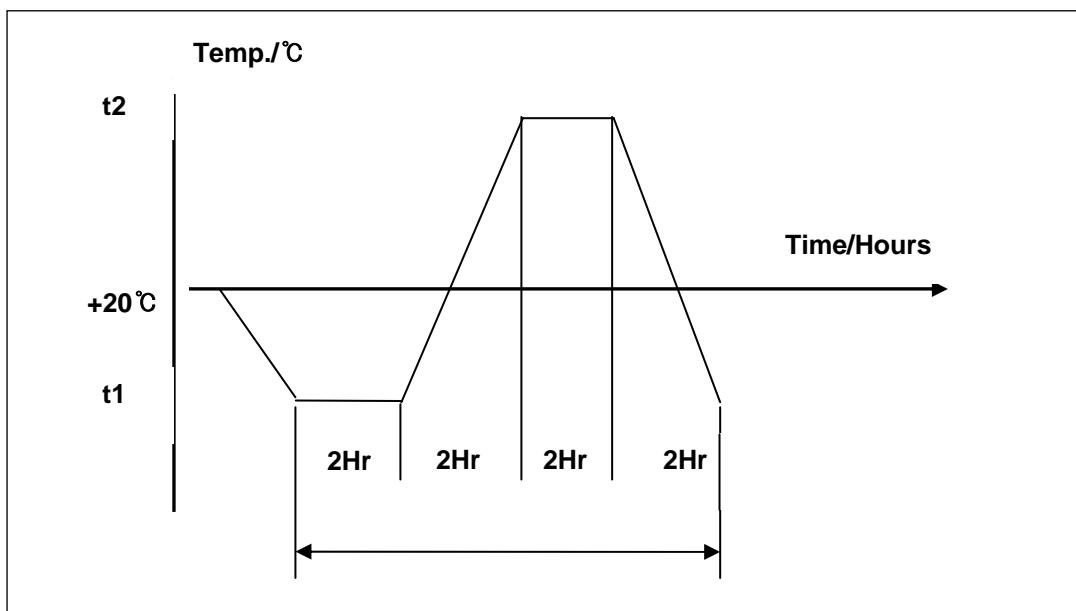


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

- NaCl = 90%
- Water Temperature = 60 °C
- Duration Time = 96 hours

3.3.2 Requirements

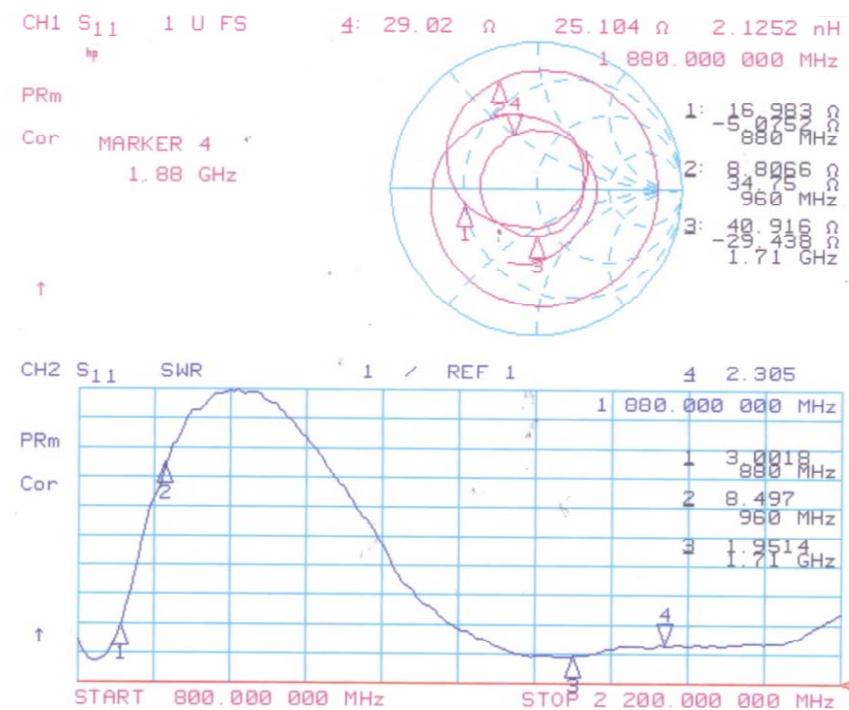
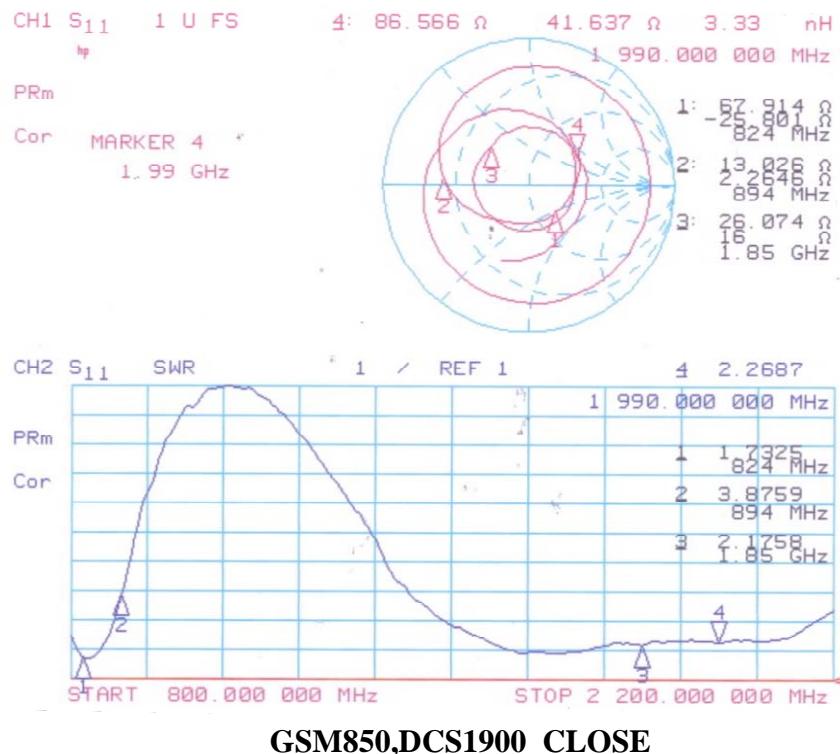
After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.3.3 Measuring Method

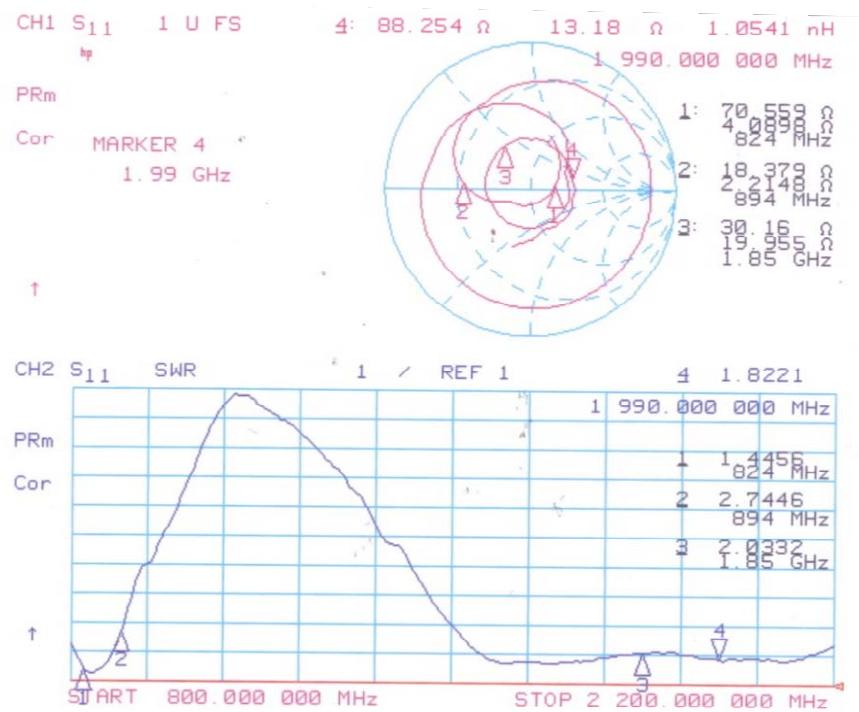
Antenna is soaked in sodium chloride solution at temperature +60 °C and 90%(NaCl) for 96 hours and dry out.

4. Electric Performance Data

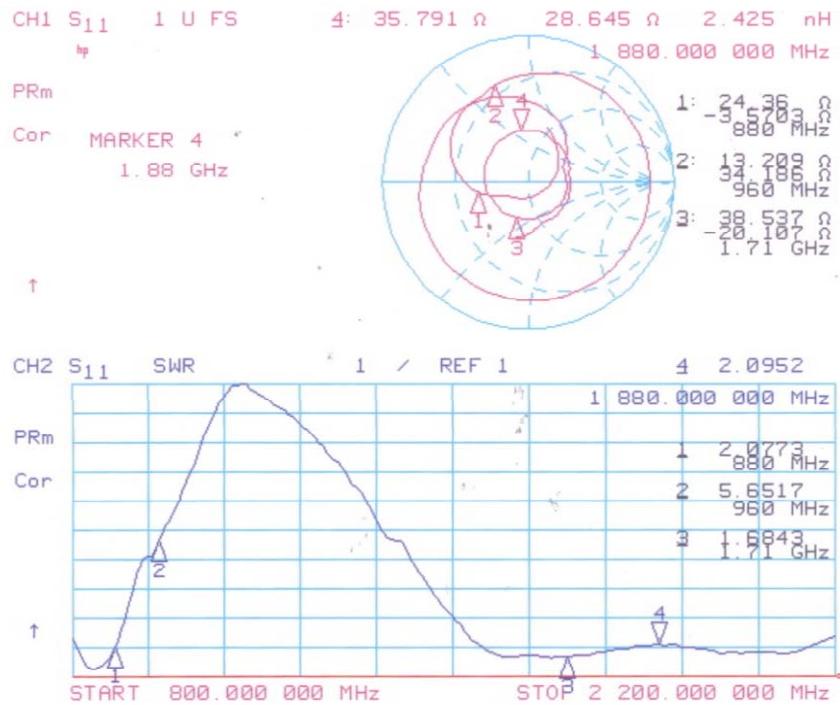
4.1 Smith-Chart & VSWR



GSM900,DCS1800_CLOSE



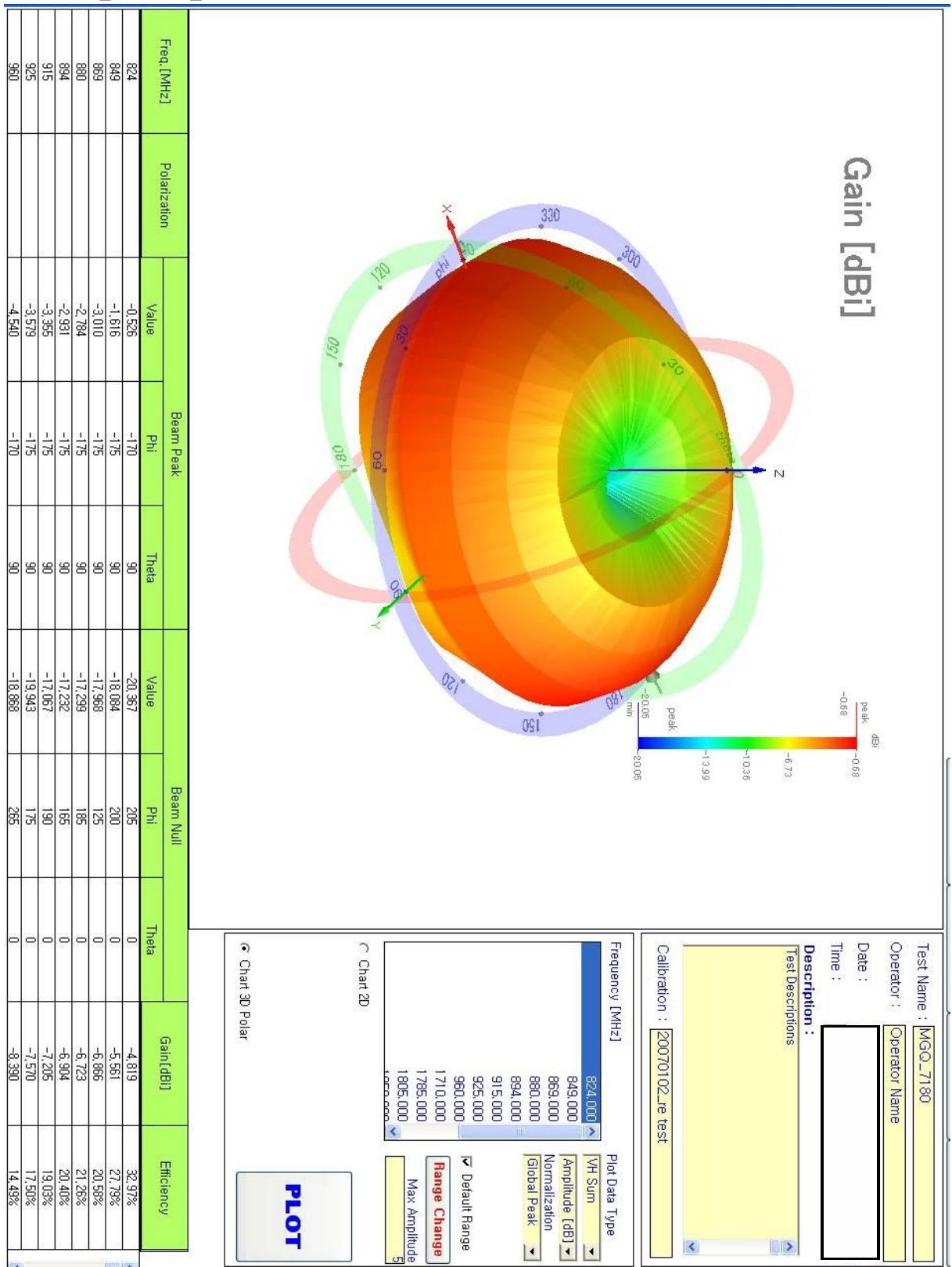
GSM850,DCS1900_OPEN



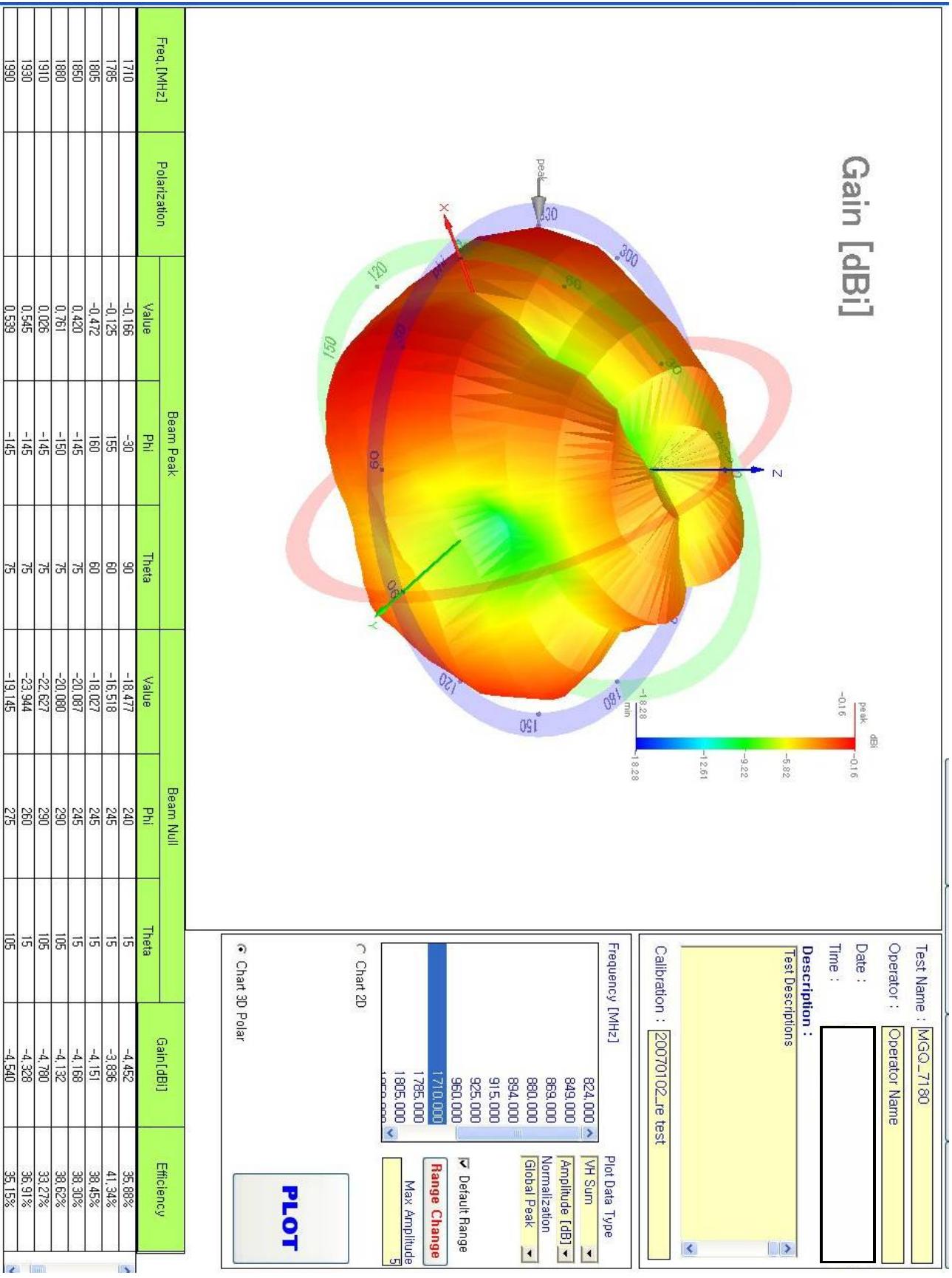
GSM900,DCS1800_OPEN

4.2 3D Gain Data

GSM850_GSM900_CLOSE

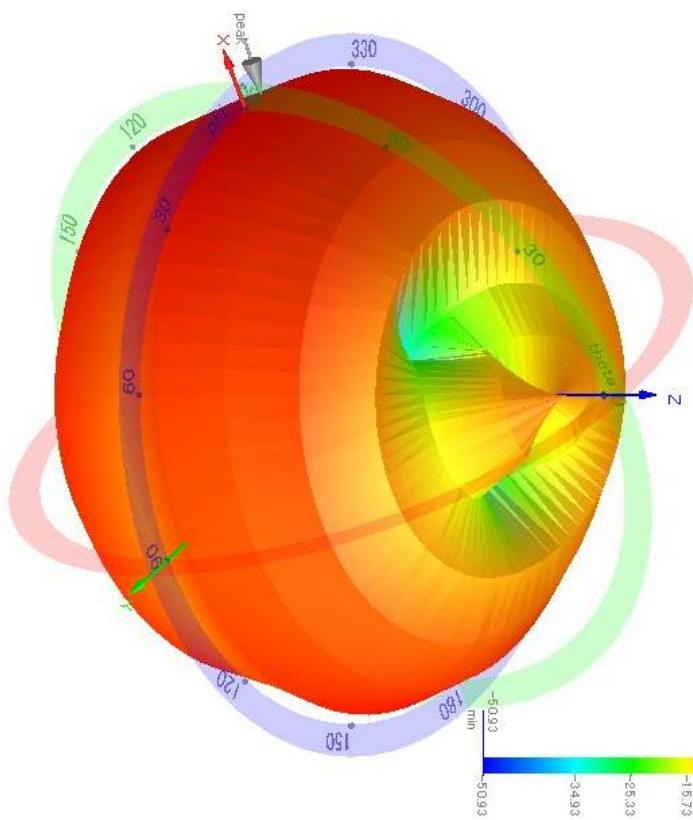


DCS1800_PCS_CLOSE



GSM850_GSM900_OPEN

Gain [dBi]



peak
0.27
-34.93
-25.33
-5.93
min

Calibration : 20070102_re test

Frequency [MHz] 824.000

H-Pol

Normalization

Global Peak

Default Range

Range Change

Max Amplitude

5

Test Description :
Test Descriptions

Date :

Time :

Test Name : MGQ_7180
Operator : Operator Name

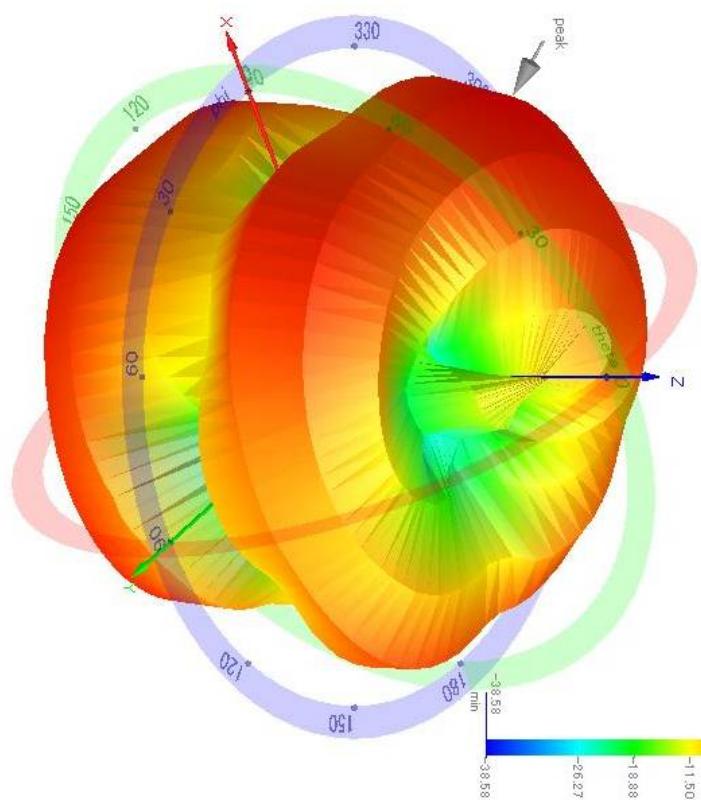
Chart 3D Polar

PLOT

| Freq. [MHz] | Polarization | Beam Peak | | | | Beam Null | | | | Gain [dBi] | Efficiency |
|-------------|--------------|-----------|------|---------|---------|-----------|--------|--------|--------|------------|------------|
| | | Value | Phi | Theta | Value | Phi | Theta | | | | |
| 824 | | -0.032 | 5 | 90 | -51.233 | 10 | 0 | -3.756 | 42.10% | | |
| 849 | | -0.266 | -180 | 120 | -33.790 | 180 | 0 | -4.082 | 39.06% | | |
| 869 | | -0.900 | -180 | 105 | -44.891 | 180 | 0 | -4.779 | 33.27% | | |
| 880 | | -0.621 | 180 | 105 | -39.738 | 0 | 0 | -4.556 | 35.19% | | |
| 894 | | -0.773 | 180 | 105 | -37.449 | 0 | 15 | -4.642 | 34.30% | | |
| 915 | | -0.838 | 180 | 105 | -32.392 | 0 | 15 | -4.566 | 34.95% | | |
| 925 | | -1.577 | -180 | 105 | -34.887 | 5 | 15 | -5.202 | 30.19% | | |
| 960 | | -3.342 | 120 | -38.108 | 0 | 15 | -7.194 | 19.08% | | | |
| 85 | | | | | | | | | | | |

DCS1800_PCS_OPEN

Gain [dBi]



peak
0.81
-38.58
-38.58
-38.58
-38.58

| | |
|---------------|-------------------|
| Test Name : | MGQ_7180 |
| Operator : | Operator Name |
| Date : | |
| Time : | |
| Description : | Test Descriptions |

Calibration : 20070102_re test

| | |
|-----------------|----------|
| Frequency [MHz] | 824.000 |
| | 849.000 |
| | 869.000 |
| | 880.000 |
| | 894.000 |
| | 915.000 |
| | 925.000 |
| | 960.000 |
| | 971.000 |
| | 1285.000 |
| | 1805.000 |
| | 1600.000 |

Default Range
 Range Change
 Global Peak
 Max Amplitude 5

Chart 20

Chart 3D Polar

PLOT

| Freq. [MHz] | Polarization | Beam Peak | | | | Beam Null | | | | Gain[dBi] | Efficiency |
|-------------|--------------|-----------|-----|-------|---------|-----------|-------|--------|--------|-----------|------------|
| | | Value | Phi | Theta | Value | Phi | Theta | | | | |
| 1710 | | 0.822 | 40 | 60 | -38.571 | 165 | 0 | -3.523 | 44.43% | | |
| 1785 | | 1.409 | 35 | 60 | -40.715 | 170 | 0 | -3.068 | 49.34% | | |
| 1805 | | 1.158 | 40 | 60 | -38.865 | -30 | 30 | -3.366 | 46.07% | | |
| 1850 | | 1.062 | 35 | 60 | -34.513 | -10 | 15 | -3.671 | 42.94% | | |
| 1880 | | 1.102 | 40 | 60 | -39.524 | -10 | 15 | -3.764 | 42.03% | | |
| 1910 | | 0.443 | 40 | 60 | -42.252 | -15 | 30 | -4.294 | 37.20% | | |
| 1930 | | 0.966 | 40 | 60 | -41.357 | -15 | 30 | -3.727 | 42.40% | | |
| 1990 | | 0.662 | 40 | 60 | -49.236 | -10 | 15 | -3.781 | 41.87% | | |