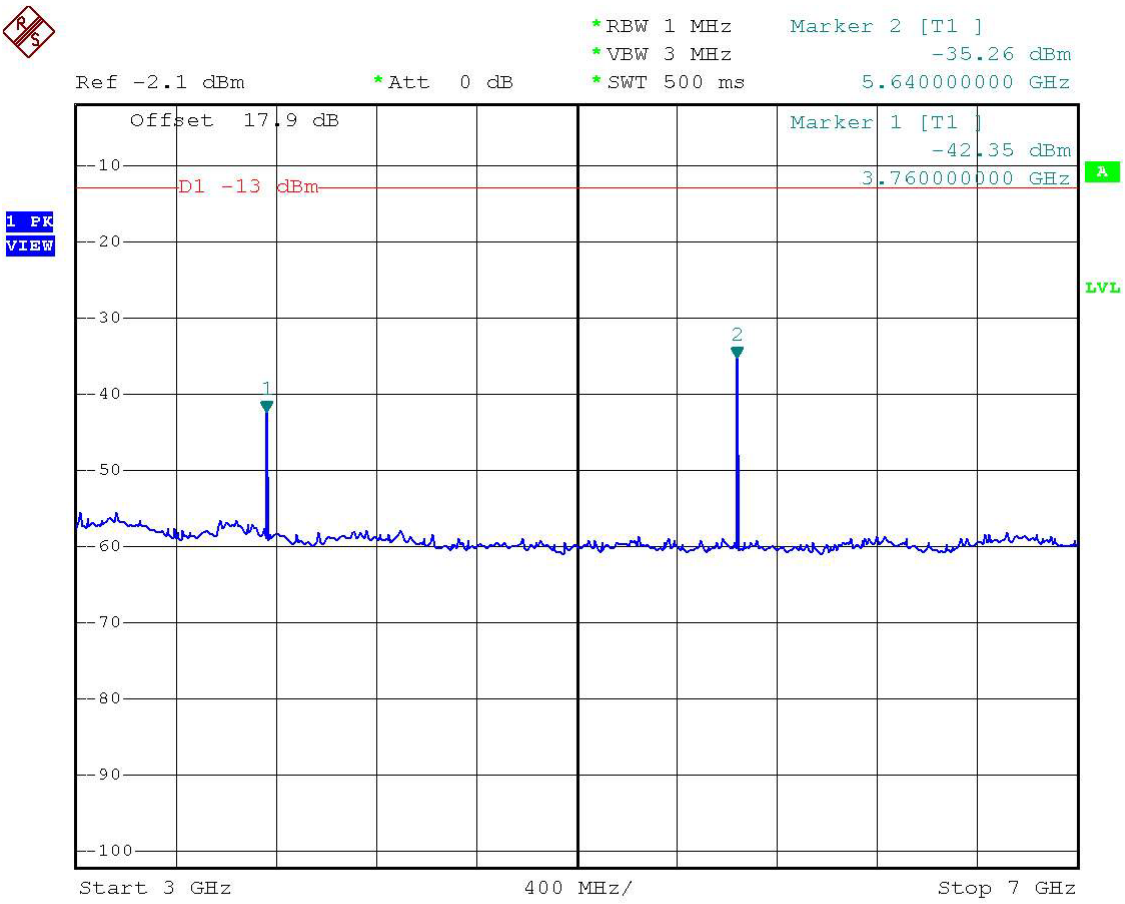
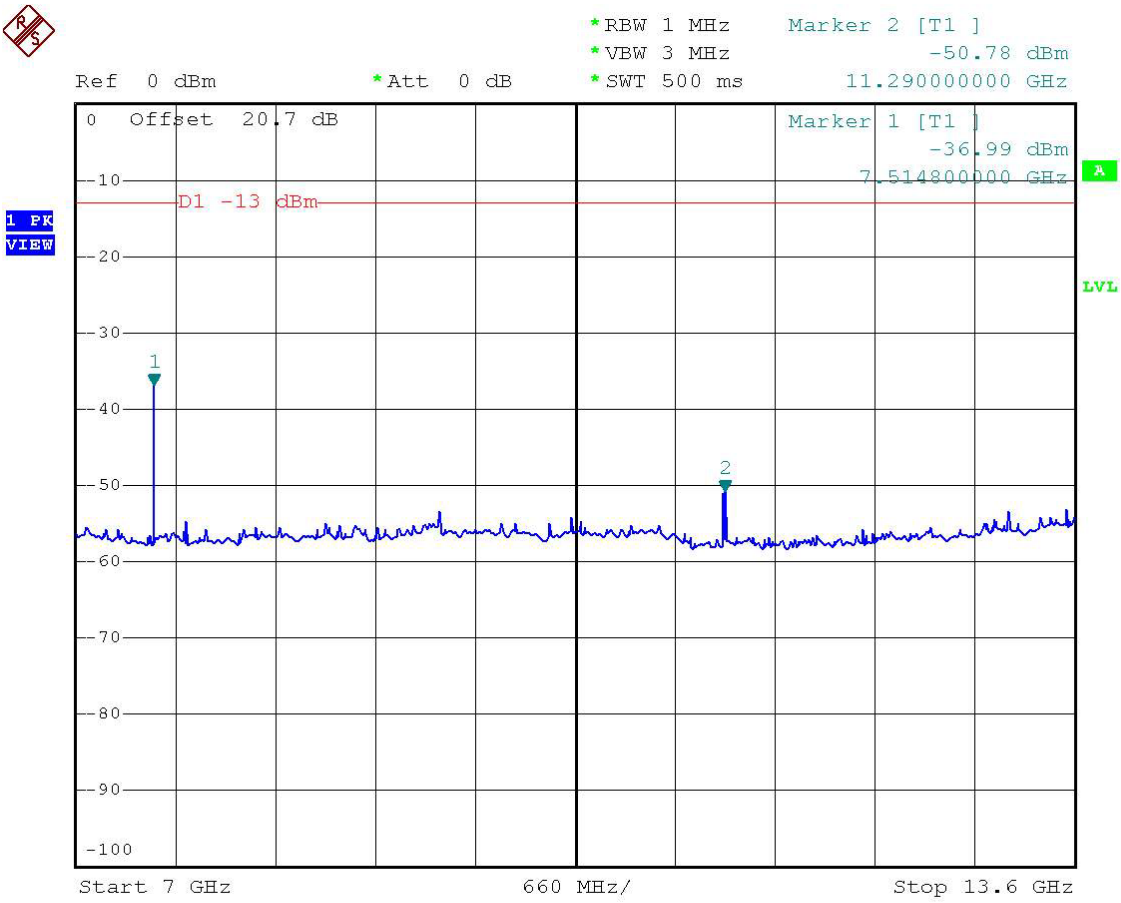
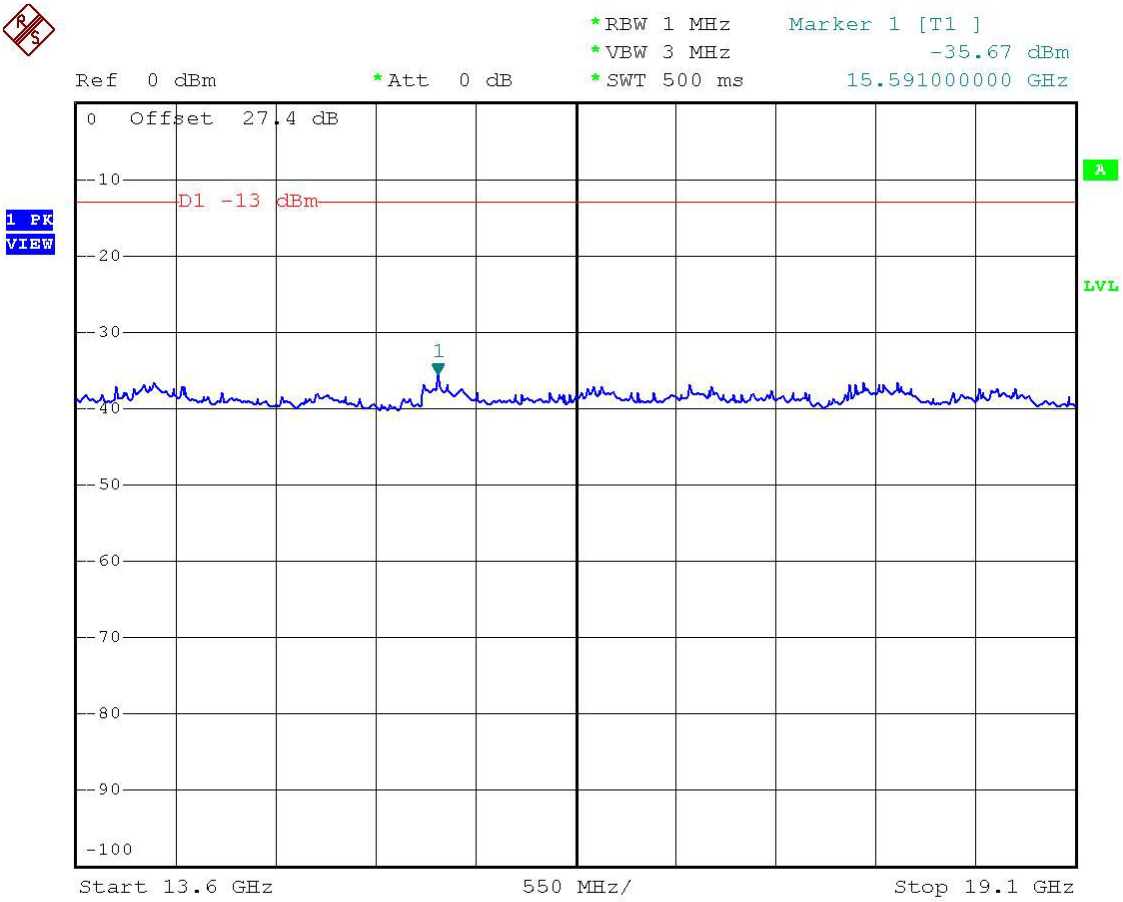
**Name of Test**: Conducted Spurious Emission
GSM 1900 CH661
3G-7G



**Name of Test**: Conducted Spurious Emission
GSM 1900 CH661
7G-13.6G



**Name of Test**: Conducted Spurious Emission
GSM 1900 CH661
13.6G-19.1G



**Name of Test**: Field Strength of Spurious Radiation

**Specification**: 47 CFR 2.1053(a)

**Guide**: ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16

**Measurement Procedure**

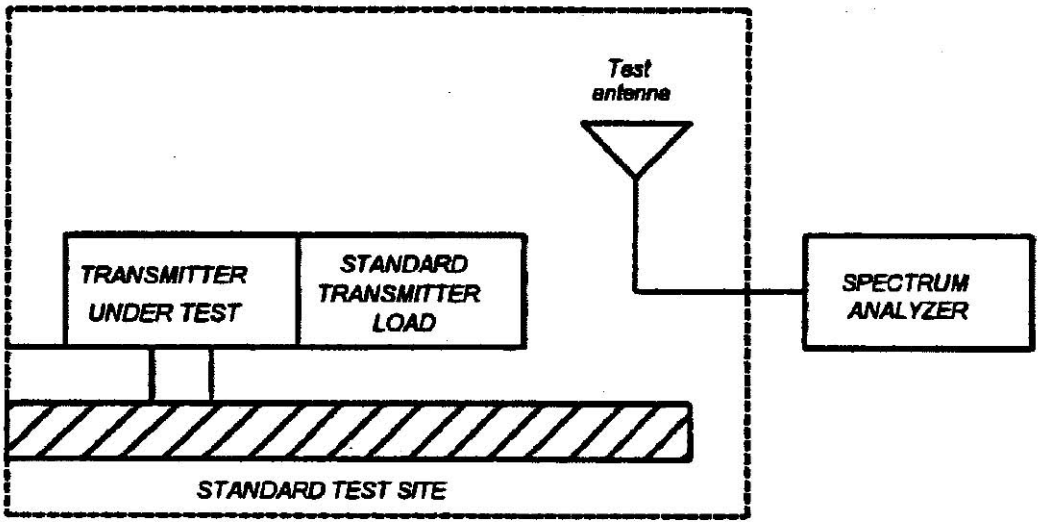
1.2.12.1 Definition: Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

1.2.12.2 Method of Measurement

98. Connect the equipment as illustrated

B) Adjust the spectrum analyzer for the following settings:
98. Resolution Bandwidth 100 kHz (<1 GHZ), 1 MHZ (> 1GHz).
2) Video Bandwidth ≥ 3 times Resolution Bandwidth
3) Sweep Speed ≤2000 Hz/second
4) Detector Mode = Mean or Average Power

C) Place the transmitter to be tested on the turntable in the standard test site. If the antenna is detatchable, The transmitter is transmitting into a non-radiating load which is placed on the turntable. The RF cable to this load should be of minimum length.

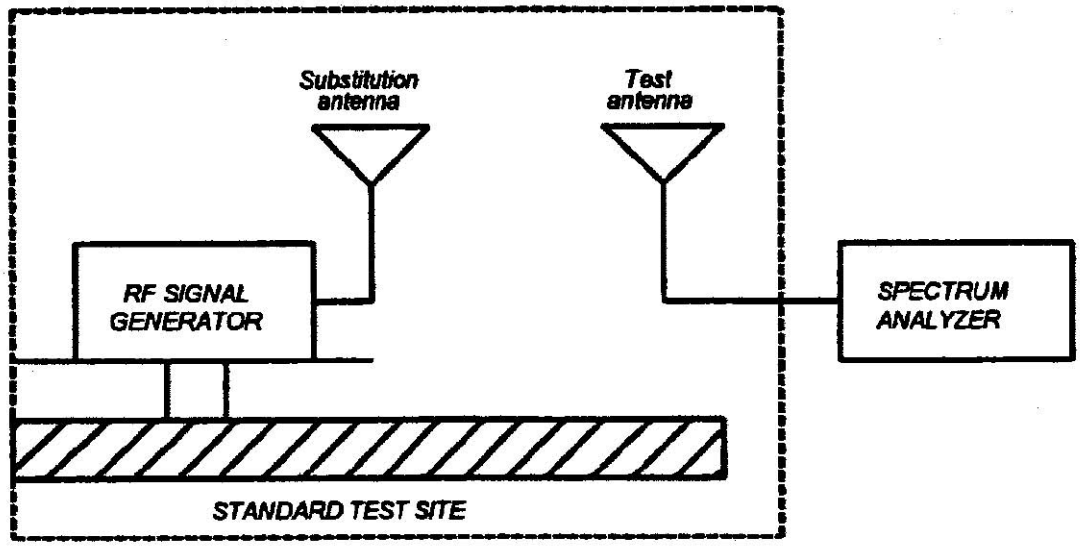


**Name of Test**: Field Strength of Spurious Radiation (Cont.)

98. For each spurious measurement the test antenna should cover the measured frequency. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to ± the test bandwidth (see section 1.3.4.4).

98. For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.

98. Repeat step E) for each spurious frequency with the test antenna polarized vertically.




98. Reconnect the equipment as illustrated.

98. Keep the spectrum analyzer adjusted as in step B).

98. Remove the transmitter and replace it with a substitution antenna. The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

**Name of Test**: Field Strength of Spurious Radiation (Cont.)

98. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

98. Repeat step J) with both antennas vertically polarized for each spurious frequency.

98. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.

NOTE: It is permissible that other antennas provided can be referenced to a dipole.

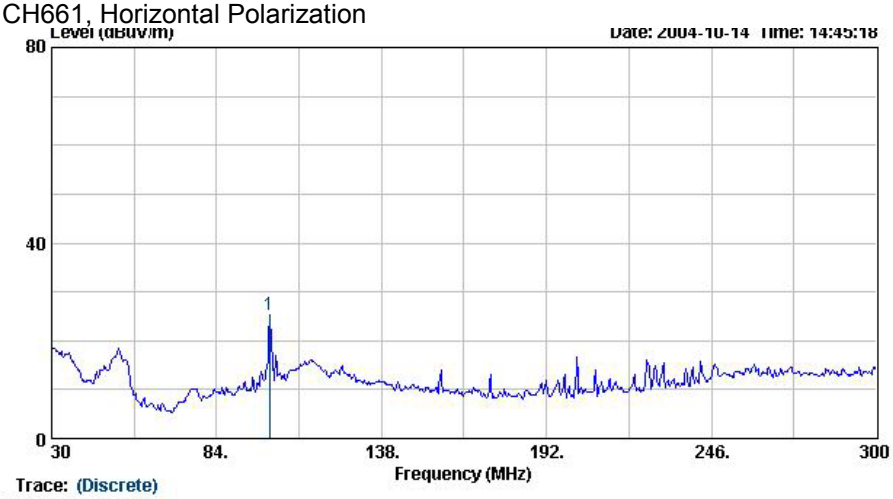
Tested By: Tim Kao

**Name of Test**: Field Strength of Spurious Radiation
GSM 1900 (Channel 661)

| Freq MHz | Pol | Substitution Antenna Input Power (dBm) | Substitution Antenna Gain (dBi) | Et (dBuV/m) | Es (dBuV/m) | Et – Es (dB) | EIRP (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| 101.28 | H | -1.07 | 2.31 | 25.22 | 92.61 | -67.39 | -66.15 | -13.0 | -53.15 |
| 894.30 | H | -2.63 | 0.96 | 23.90 | 93.24 | -69.34 | -71.00 | -13.0 | -58.00 |
| 3758.00 | H | -5.25 | 7.45 | 63.71 | 99.07 | -35.36 | -33.16 | -13.0 | -20.16 |
| 5638.00 | H | -6.67 | 8.44 | 56.51 | 98.79 | -42.28 | -40.51 | -13.0 | -27.51 |
| | | | | | | | | | |
| 52.68 | V | -0.73 | 0.31 | 36.68 | 80.97 | -44.29 | -44.70 | -13.0 | -31.70 |
| 901.30 | V | -2.67 | 0.99 | 24.82 | 92.95 | -68.13 | -69.81 | -13.0 | -56.81 |
| 3758.00 | V | -5.25 | 7.45 | 59.03 | 99.07 | -40.04 | -37.84 | -13.0 | -24.84 |
| 5638.00 | V | -6.67 | 8.44 | 55.29 | 98.79 | -43.50 | -41.73 | -13.0 | -28.73 |

Radiated Scanned Data

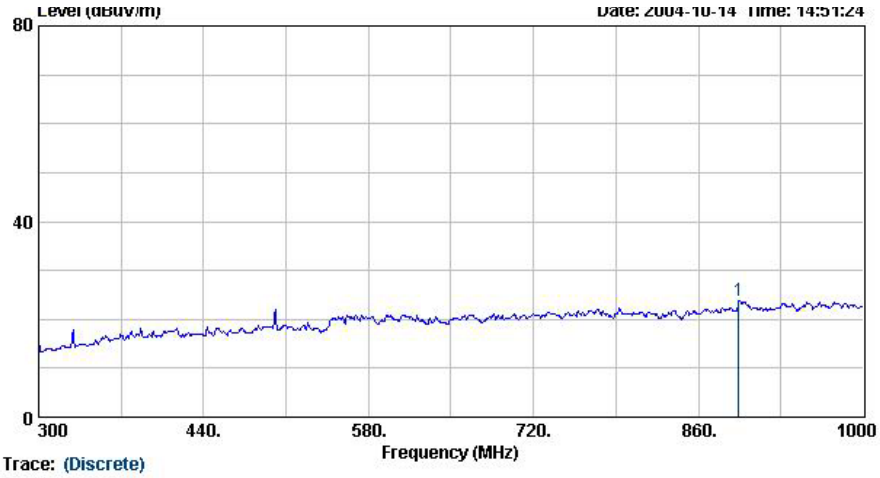
GSM1900 CH661, Horizontal Polarization




Trace: (Discrete)

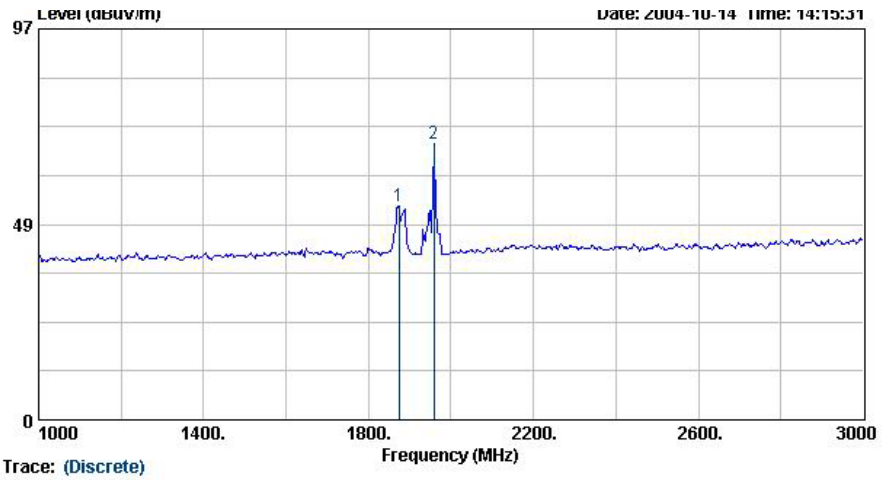
Site : 03CH06-HY
Condition : 3m BI LOG 2004 0629 HORIZONTAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 101.28 | 25.22 | ------ | ------ | 45.67 | 10.51 | 32.29 | 1.33 | Peak | --- | --- |




Site : 03CH06-HY
Condition : 3m BI LOG 2004 0629 HORIZONTAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

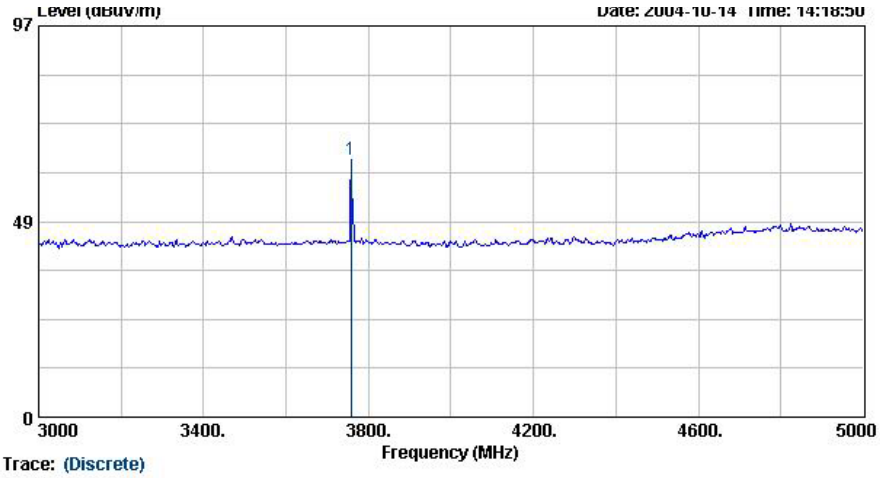
| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 894.30 | 23.90 | ------ | ------ | 29.92 | 20.58 | 30.84 | 4.25 | Peak | --- | --- |




Site : 03CH06-HY
Condition : 3m HF-HORN AH-118 HORIZONTAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

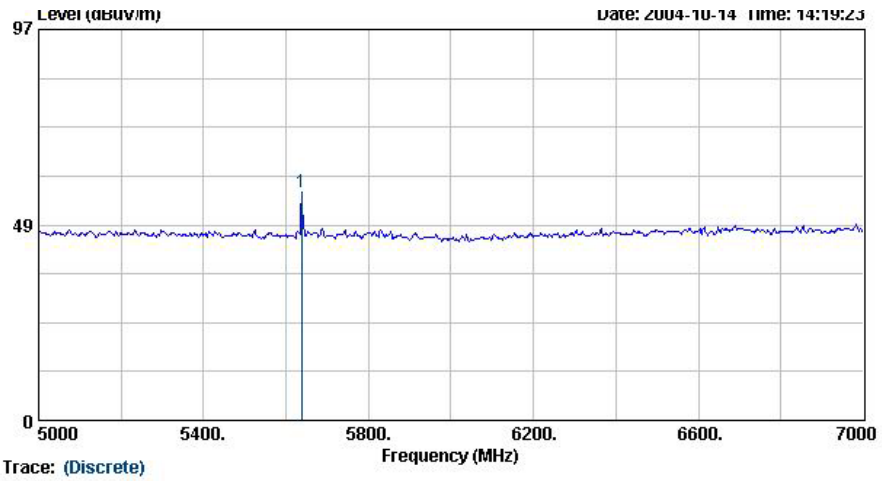
| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 1874.00 | 52.95 | ------ | ------ | 58.10 | 27.33 | 35.41 | 2.93 | Peak | --- | --- |
| 2 @ | 1958.00 | 68.34 | ------ | ------ | 73.71 | 27.75 | 36.14 | 3.02 | Peak | --- | --- |

Remark:
1. #1: MS TCH Signal
2. #2: BS TCH Signal




Site : 03CH06-HY
Condition : 3m HF-HORN AH-118 HORIZONTAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 3758.00 | 63.71 | ------ | ------ | 65.96 | 30.26 | 36.73 | 4.22 | Peak | --- | --- |

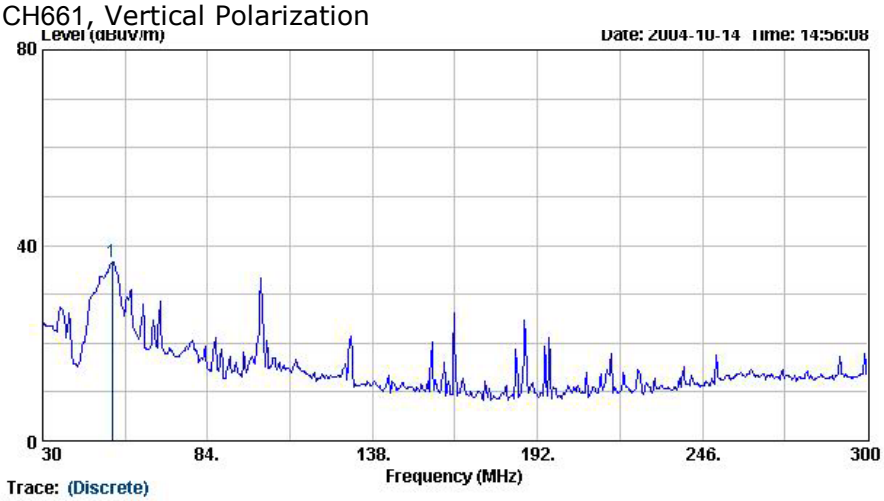



Site : 03CH06-HY
Condition : 3m HF-HORN AH-118 HORIZONTAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 5638.00 | 56.51 | ------ | ------ | 56.01 | 34.01 | 38.85 | 5.35 | Peak | --- | --- |

- Mark:
  Frequency from 7000MHz to 19000MHz, the emission emitted by the EUT is too low to be measured.

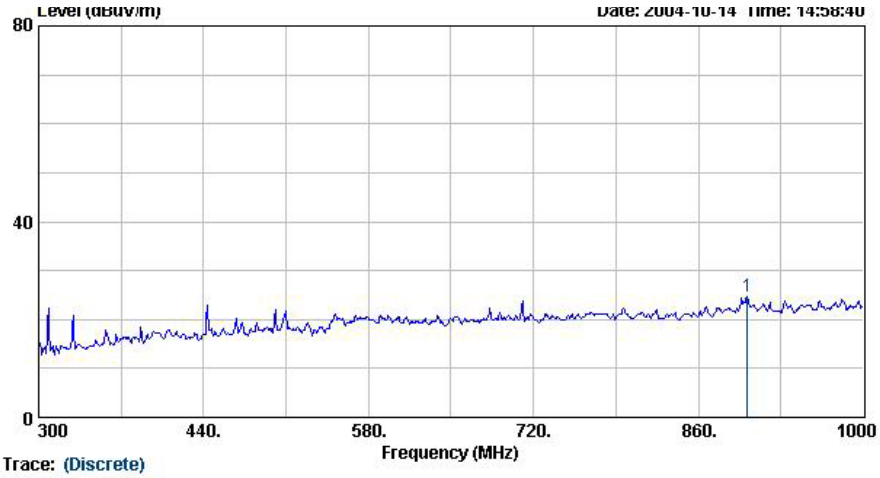
GSM1900 CH661, Vertical Polarization




Trace: (Discrete)

Site : 03CH06-HY
Condition : 3m BI LOG 2004 0629 VERTICAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

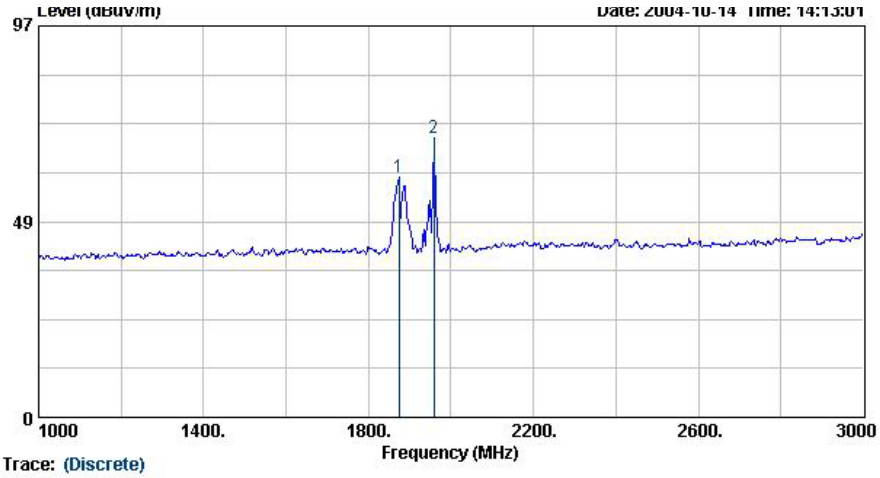
| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 52.68 | 36.68 | ------ | ------ | 60.04 | 8.03 | 32.44 | 1.04 | Peak | --- | --- |




Trace: (Discrete)

Site : 03CH06-HY
Condition : 3m BI LOG 2004 0629 VERTICAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

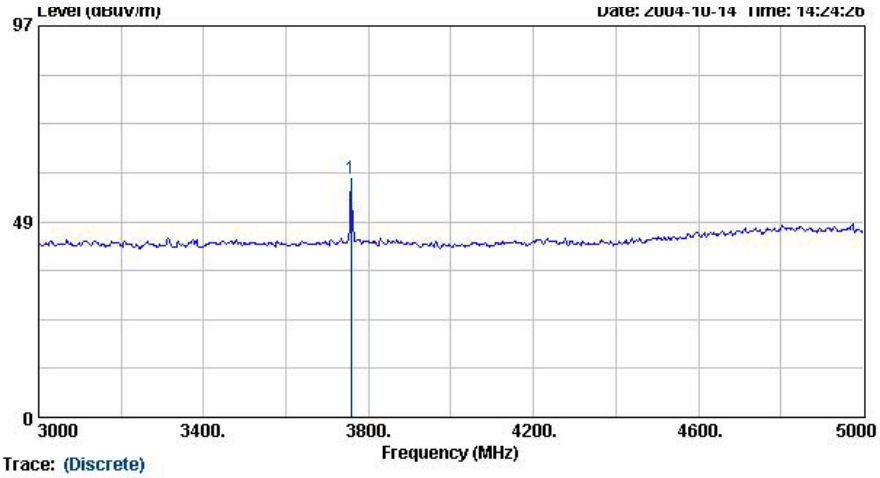
| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 901.30 | 24.82 | ------ | ------ | 30.63 | 20.60 | 30.76 | 4.34 | Peak | --- | --- |




Site : 03CH06-HY
Condition : 3m HF-HORN AH-118 VERTICAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

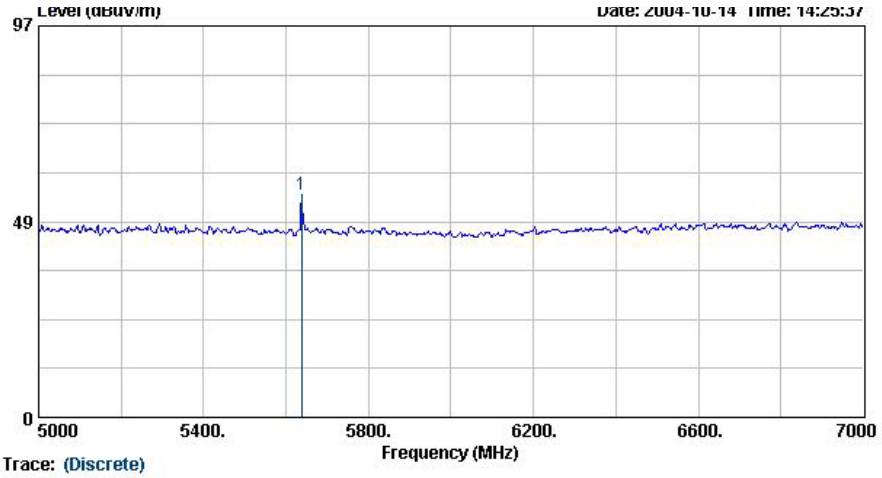
| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 1874.00 | 59.35 | ------ | ------ | 64.50 | 27.33 | 35.41 | 2.93 | Peak | --- | --- |
| 2 @ | 1958.00 | 69.25 | ------ | ------ | 74.62 | 27.75 | 36.14 | 3.02 | Peak | --- | --- |

Remark:
1. #1: MS TCH Signal
2. #2: BS TCH Signal




Site : 03CH06-HY
Condition : 3m HF-HORN AH-118 VERTICAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 3758.00 | 59.03 | ------ | ------ | 61.28 | 30.26 | 36.73 | 4.22 | Peak | --- | --- |




Site : 03CH06-HY
Condition : 3m HF-HORN AH-118 VERTICAL
EUT : Tri-band Mobile Phone
Power : 120Vac/60Hz
Model : Tucana
Memo : PCS1900 Link Mode:Ch661

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Preamp Factor | Cable Loss | Remark | Ant Pos | Table Pos |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 @ | 5638.00 | 55.29 | ------ | ------ | 54.78 | 34.01 | 38.85 | 5.35 | Peak | --- | --- |

- Mark:
  Frequency from 7000MHz to 19000MHz, the emission emitted by the EUT is too low to be measured.

**Name of Test**: Frequency Stability (Temperature Variation)

**Specification**: 47 CFR 2.1055(a)(1)

**Test Conditions**: As Indicated

**Test Equipment**: As per previous page

**Measurement Procedure**

1. The EUT and test equipment were set up as shown on the following page.

2. With all power removed, the temperature was decreased to –30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.

3. With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.

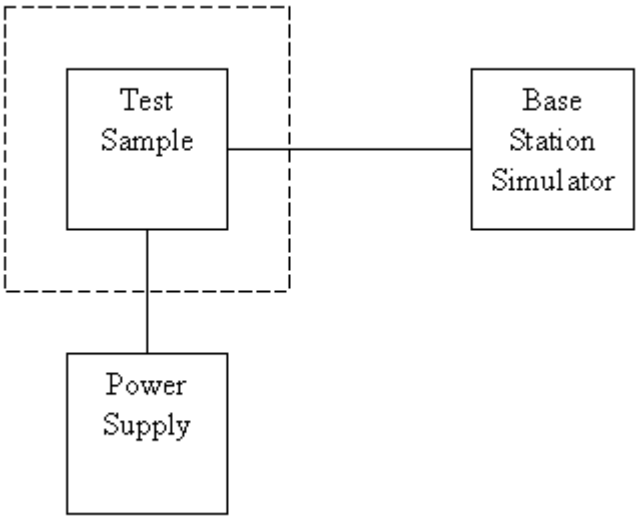
4. The temperature tests were performed for the worst case.

5. Measurement Results: Attached

Tested By: Tim Kao

**Transmitter Test Set-Up**

Frequency Stability: Temperature Variation
Frequency Stability: Voltage Variation




| Asset | Model Name | S/N |
|---|---|---|
| Temperature & Humidity Controller | P-9000 | 612 |
| AC/DC Power Source | HPA-500W | HPA0100024 |
| Base Station Simulator | CMU200 | 102278 |
| Base Station Simulator | E5515C | GB43460754 |

**Name of Test**: Frequency Stability (Temperature Variation)

GSM 1900 (Channel 661)

| Temperature(°C) | Change, Hz | Change, ppm |
|---|---|---|
| -30 | -12 | -0.01 |
| -20 | 28 | 0.01 |
| -10 | 18 | 0.01 |
| 0 | 15 | 0.01 |
| 10 | 28 | 0.01 |
| 20 | -29 | -0.02 |
| 30 | 29 | 0.02 |
| 40 | 20 | 0.01 |
| 50 | 19 | 0.01 |

**Name of Test**: Frequency Stability (Voltage Variation)

**Specification**: 47 CFR 2.1055 (b)(1)

**Test Equipment**: As per previous page

**Measurement Procedure**

1. The EUT was placed in a temperature chamber at 25±5°C and connected as for "Frequency Stability - Temperature Variation" test.

2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.

3. The variation in frequency was measured for the worst case.

**Results**: Frequency Stability (Voltage Variation)

GSM1900 (Channel 661)

Nominal Value (Voltage) = 3.7

Battery End Point (Voltage) = 3.145

| Voltage(Volt) | Change, Hz | Change, ppm |
|---|---|---|
| 3.7 | -29 | -0.02 |
| BEP | -24 | -0.01 |
| 4.255 | -20 | -0.01 |

Limit: Must remain within authorized frequency block.

Tested By: Tim Kao

**Antenna Factor & Cable Loss**

| Frequency (MHz) | Antenna Factor (dB) | Cable Loss (dB) | Frequency (MHz) | Antenna Factor (dB) | Cable Loss (dB) |
|---|---|---|---|---|---|
| 30 | 15.35 | 4.50 | 1000 | 24.10 | 3.92 |
| 35 | 13.63 | 1.13 | 2000 | 27.40 | 5.66 |
| 40 | 11.11 | 1.18 | 3000 | 30.00 | 7.20 |
| 45 | 10.59 | 1.26 | 4000 | 32.60 | 9.36 |
| 50 | 6.47 | 1.31 | 5000 | 33.40 | 9.16 |
| 55 | 5.83 | 1.34 | 6000 | 34.20 | 10.70 |
| 60 | 5.18 | 1.43 | 7000 | 35.30 | 12.16 |
| 65 | 4.81 | 1.52 | 8000 | 36.90 | 13.12 |
| 70 | 4.43 | 1.56 | 9000 | 38.10 | 13.81 |
| 75 | 5.10 | 1.57 | 10000 | 39.00 | 14.83 |
| 80 | 5.91 | 1.60 | 11000 | 38.60 | 15.83 |
| 85 | 7.33 | 1.66 | 12000 | 39.50 | 17.11 |
| 90 | 8.74 | 1.75 | 13000 | 39.30 | 17.62 |
| 95 | 9.05 | 1.76 | 14000 | 41.60 | 18.37 |
| 100 | 9.36 | 1.83 | 15000 | 40.60 | 19.10 |
| 110 | 9.65 | 1.86 | 16000 | 37.20 | 19.72 |
| 120 | 9.97 | 1.92 | 17000 | 40.20 | 21.98 |
| 130 | 10.51 | 2.00 | 18000 | 48.90 | 21.22 |
| 140 | 10.32 | 2.11 | 19000 | 37.60 | 23.90 |
| 150 | 9.42 | 2.18 | 20000 | 37.30 | 24.07 |
| 160 | 8.09 | 2.22 | 21000 | 37.00 | 25.49 |
| 170 | 7.43 | 2.26 | 22000 | 38.00 | 24.92 |
| 180 | 7.60 | 2.31 | 23000 | 38.70 | 25.60 |
| 190 | 7.43 | 2.37 | 24000 | 38.60 | 25.70 |
| 200 | 7.26 | 2.43 | 25000 | 24.10 | 3.92 |
| 220 | 9.11 | 2.56 | 14000 | 27.40 | 5.66 |
| 240 | 10.88 | 2.70 | 15000 | 30.00 | 7.20 |
| 260 | 11.75 | 2.83 | 16000 | 32.60 | 9.36 |
| 280 | 11.55 | 2.93 | 17000 | 33.40 | 9.16 |
| 300 | 11.36 | 3.03 | 18000 | 34.20 | 10.70 |
| 320 | 12.03 | 3.13 | 19000 | 35.30 | 12.16 |
| 340 | 12.69 | 3.23 | 20000 | 36.90 | 13.12 |
| 360 | 13.33 | 3.32 | 21000 | 38.10 | 13.81 |
| 380 | 14.00 | 3.41 | 22000 | 39.00 | 14.83 |
| 400 | 14.63 | 3.48 | 23000 | 38.60 | 15.83 |
| 450 | 15.33 | 3.71 | 24000 | 39.50 | 17.11 |
| 500 | 16.03 | 3.85 | 25000 | 39.30 | 17.62 |
| 550 | 16.65 | 4.03 | | | |
| 600 | 17.29 | 4.32 | | | |
| 650 | 17.64 | 4.51 | | | |
| 700 | 18.00 | 4.54 | | | |
| 750 | 18.39 | 4.90 | | | |
| 800 | 18.79 | 5.04 | | | |
| 850 | 19.10 | 5.04 | | | |
| 900 | 19.42 | 5.20 | | | |
| 950 | 19.58 | 5.28 | | | |
| 1000 | 19.75 | 5.58 | | | |

**List of Measuring Equipments**

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|
| Spectrum analyzer | R&S | FSP40 | 100057 | 9KHz-40GHz | Feb. 26, 2004 | Feb. 26, 2005 | Radiation (03CH06-HY) |
| Bilog Antenna | SCHAFFNER | CBL6112B | 2885 | 30MHz -2GHz | Dec. 18, 2003 | Dec. 18, 2004 | Radiation (03CH06-HY) |
| Horn Antenna | Com-Power | AH118 | 071025 | 1G-18G | Feb. 11, 2004 | Feb. 11, 2005 | Radiation (03CH06-HY) |
| PreAmplifier | Com-Power | PA-103 | 161055 | 1MHz - 1000MHz | Apr. 26, 2004 | Apr. 26, 2005 | Radiation (03CH06-HY) |
| HF Amplifier | MITEQ | AFS44 | 973248 | 0.1G - 26.5G | May. 20, 2004 | May. 20, 2005 | Radiation (03CH06-HY) |

**Uncertainty of Test Site**

Uncertainty of Radiated Emission Measurement (30MHz ~ 1000MHz) (03CH03)

| Contribution | Uncertainty of $x_i$ | | $u(x_i)$ |
|---|---|---|---|
| | dB | Probability Distribution | |
| Receiver reading | 0.41 | Normal(k=2) | 0.21 |
| Antenna factor calibration | 0.83 | Normal(k=2) | 0.42 |
| Cable loss calibration | 0.25 | Normal(k=2) | 0.13 |
| Pre Amplifier Gain calibration | 0.27 | Normal(k=2) | 0.14 |
| RCV/SPA specification | 2.50 | Rectangular | 0.72 |
| Antenna Factor Interpolation for Frequency | 1.00 | Rectangular | 0.29 |
| Site imperfection | 1.43 | Rectangular | 0.83 |
| Mismatch<br>Receiver VSWR Γ1= 0.20<br>Antenna VSWR Γ2= 0.23<br>Uncertainty=20log(1-Γ1*Γ2) | +0.39/-0.41 | U-shaped | 0.28 |
| **combined standard uncertainty Uc(y)** | **1.27** | | |
| **Measuring uncertainty for a level of confidence of 95% U=2Uc(y)** | **2.54** | | |

Uncertainty of Radiated Emission Measurement (1GHz ~ 40GHz)

| Contribution | Uncertainty of $x_i$ | | $u(x_i)$ | $Ci$ | $Ci*u(x_i)$ |
|---|---|---|---|---|---|
| | dB | Probability Distribution | | | |
| Receiver reading | ±0.10 | Normal(k=1) | 0.10 | 1 | 0.10 |
| Antenna factor calibration | ±1.70 | Normal(k=2) | 0.85 | 1 | 0.85 |
| Cable loss calibration | ±0.50 | Normal(k=2) | 0.25 | 1 | 0.25 |
| Receiver Correction | ±2.00 | Rectangular | 1.15 | 1 | 1.15 |
| Antenna Factor Directional | ±1.50 | Rectangular | 0.87 | 1 | 0.87 |
| Site imperfection | ±2.80 | Triangular | 1.14 | 1 | 1.14 |
| Mismatch<br>Receiver VSWR Γ1= 0.197<br>Antenna VSWR Γ2= 0.194<br>Uncertainty=20log(1-Γ1*Γ2*Γ3) | +0.34/-0.35 | U-shaped | 0.244 | 1 | 0.244 |
| **Combined standard uncertainty Uc(y)** | **2.36** | | | | |
| **Measuring uncertainty for a level of confidence of 95% U=2Ue(y)** | **4.72** | | | | |

U=$\sqrt{}${(1/2)²+(0.3/2)²+(2²+0.5²+2²+0.25²+2²)/3+(0.54)²/2}=2.2 for 10m test distance

U=$\sqrt{}${(1/2)²+(0.3/2)²+(2²+3²+2²+0.25²+2²)/3+(0.54)²/2}=2.7 for 3m test distance

END OF TEST REPORT