

# TEST REPORT

FCC ID: 2AGTFR550  
Product: MOBILE PHONE  
Model No.: R550  
Trade Mark: RINNO  
Report No.: TCT171211E019  
Issued Date: December 05, 2017

Issued for:

Distribuidora Sinn, S.A. de C.V.  
Lago Zurich No.219 Piso 12 Colonia Ampliacion Granada, Del.Miguel  
Hidalgo, Mexico City 11529

Issued By:

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**Appendix A: Photographs of Test Setup**

**Appendix B: Photographs of EUT**

**1. Test Certification**

|                              |                                                                                                                     |
|------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>Product:</b>              | MOBILE PHONE                                                                                                        |
| <b>Model No.:</b>            | R550                                                                                                                |
| <b>Additional Model No.:</b> | N/A                                                                                                                 |
| <b>Trade Mark:</b>           | RINNO                                                                                                               |
| <b>Applicant:</b>            | Distribuidora Sinn, S.A. de C.V.                                                                                    |
| <b>Address:</b>              | Lago Zurich No.219 Piso 12 Colonia Ampliacion Granada, Del.Miguel Hidalgo, Mexico City 11529                        |
| <b>Manufacturer/Factory:</b> | Z-TECH COMMUNICATION(SZ)CO.,LTD                                                                                     |
| <b>Address:</b>              | 7/F BLK D BAO'AN ZHI'GU YIN'TIAN RD. NO.4 XI'XIANG ST' BAO'AN Shenzhen China                                        |
| <b>Date of Test:</b>         | November 30, 2017-December 04, 2017                                                                                 |
| <b>Applicable Standards:</b> | FCC CFR Title 47 Part 2: 2017<br>FCC CFR Title 47 Part22 Subpart H: 2017<br>FCC CFR Title 47 Part24 Subpart E: 2017 |

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:

**Beryl Zhao**

Date: December 04, 2017

Reviewed By:

  
**Tomsin**

Date: December 05, 2017

Approved By:

Date: December 05, 2017

## 2. Test Result Summary

| Requirement                                   | CFR 47 Section                      | Result |
|-----------------------------------------------|-------------------------------------|--------|
| Conducted Output Power                        | §22.913; §2.1046<br>§24.232;        | PASS   |
| Peak-to-Average Ratio                         | §2.1046; §24.232(d)                 | PASS   |
| Effective Radiated Power                      | §2.1046; §22.913(a)<br>§24.232;     | PASS   |
| Equivalent Isotropic Radiated Power           | §2.1046; §22.913(a)<br>§24.232;     | PASS   |
| Occupied Bandwidth                            | §2.1049                             | PASS   |
| Band Edge                                     | §2.1051<br>§22.917(a)<br>§24.238(a) | PASS   |
| Conducted Spurious Emission                   | §2.1051; §22.917<br>§24.238;        | PASS   |
| Field Strength of Spurious Radiation          | §2.1053; §22.917(a)<br>§24.238;     | PASS   |
| Frequency Stability for Temperature & Voltage | §2.1055; §22.355<br>§24.235;        | PASS   |

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

### 3. EUT Description

|                                         |                                                                                                                                                                                                                                                   |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product:</b>                         | MOBILE PHONE                                                                                                                                                                                                                                      |
| <b>Model No.:</b>                       | R550                                                                                                                                                                                                                                              |
| <b>Trade Mark:</b>                      | RINNO                                                                                                                                                                                                                                             |
| <b>3G Version:</b>                      | WCDMA:R99<br>HSDPA: Release 5<br>HSUPA: Release 6                                                                                                                                                                                                 |
| <b>Tx Frequency:</b>                    | GSM/GPRS/EGPRS 850: 824.20MHz-848.80MHz<br>PCS/GPRS/EGPRS 1900: 1850.20MHz-1909.80MHz<br>WCDMA Band V: 826.40MHz -846.60MHz<br>WCDMA Band II: 1852.40MHz -1907.60MHz                                                                              |
| <b>Rx Frequency:</b>                    | GSM/GPRS/EGPRS 850: 869.2 MHz~893.8 MHz<br>GSM/GPRS/EGPRS 1900: 1930.2 MHz~1989.8 MHz<br>WCDMA Band II: 1932.4MHz ~1987.6MHz<br>WCDMA Band V: 871.4MHz ~891.6MHz                                                                                  |
| <b>Maximum Output Power to Antenna:</b> | GSM850: 32.59 dBm<br>PCS1900: 29.36 dBm<br>GPRS 850: 32.58 dBm<br>GPRS 1900: 29.19 dBm<br>EGPRS 850: 30.05 dBm<br>EGPRS 1900: 27.28 dBm<br>WCDMA Band V: 22.88 dBm<br>WCDMA Band II: 20.47 dBm                                                    |
| <b>99% Occupied Bandwidth:</b>          | GSM850: 244KGXW<br>PCS1900: 246KGXW<br>GPRS 850 Class 8: 247KGXW<br>GPRS 1900 Class 8: 249KGXW<br>EGPRS 850 Class 8: 271KG7W<br>EGPRS 1900 Class 8: 252KG7W<br>WCDMA Band V RMC 12.2Kbps link: 4M21F9W<br>WCDMA Band II RMC 12.2Kbps link:4M20F9W |
| <b>Type of Modulation:</b>              | GSM/GPRS: GMSK<br>EGPRS: GMSK/8PSK<br>WCDMA Band II/V: QPSK                                                                                                                                                                                       |
| <b>Antenna Type:</b>                    | PIFA antenna                                                                                                                                                                                                                                      |
| <b>Antenna Gain:</b>                    | GSM/GPRS/EGPRS 850: -4.2dBi<br>GSM/GPRS/EGPRS 1900: 1.3dBi<br>WCDMA Band V: -4.2dBi<br>WCDMA Band II: 1.3dBi                                                                                                                                      |

|                      |                                                                                                 |
|----------------------|-------------------------------------------------------------------------------------------------|
| <b>Power Supply:</b> | DC 3.7V, 2500mAh, 9.25Watt Ion de Litio                                                         |
| <b>Adapter:</b>      | Adaptador ca/cc<br>Modelo: R550-A<br>Entrada: AC 100-260V , 50/60Hz, 200mA<br>Salida: DC 5V, 1A |

## 4. Genera Information

### 4.1. Test environment and mode

**Operating Environment:**

|                       |           |
|-----------------------|-----------|
| Temperature:          | 25.0 °C   |
| Humidity:             | 56 % RH   |
| Atmospheric Pressure: | 1010 mbar |

**Test Mode:**

|                 |                                                                              |
|-----------------|------------------------------------------------------------------------------|
| Operation mode: | Keep the EUT in communication with CMU200 and select channel with modulation |
|-----------------|------------------------------------------------------------------------------|

Remark: This product has a built-in rechargeable battery, so in an independent test, the EUT battery was fully-charged.

The sample was placed (0.8m below 1GHz, 0.8m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

## Description Operation Frequency

| GSM 850  |                 | PCS1900  |                 |
|----------|-----------------|----------|-----------------|
| Channel: | Frequency (MHz) | Channel: | Frequency (MHz) |
| 128      | 824.20          | 512      | 1850.20         |
| 129      | 824.40          | 513      | 1850.40         |
| ....     | ....            | ....     | ....            |
| 189      | 836.40          | 660      | 1879.80         |
| 190      | 836.60          | 661      | 1880.00         |
| 191      | 836.80          | 662      | 1880.20         |
| ...      | ...             | ...      | ...             |
| 250      | 848.60          | 809      | 1909.60         |
| 251      | 848.80          | 810      | 1909.80         |

| WCDMA Band V |                 | WCDMA Band II |                 |
|--------------|-----------------|---------------|-----------------|
| Channel:     | Frequency (MHz) | Channel:      | Frequency (MHz) |
| 4132         | 826.40          | 9262          | 1852.40         |
| 4133         | 826.60          | 9263          | 1852.60         |
| ....         | ....            | ....          | ....            |
| 4182         | 836.40          | 9399          | 1879.80         |
| 4183         | 836.60          | 9400          | 1880.00         |
| 4184         | 836.80          | 9401          | 1880.20         |
| ...          | ...             | ...           | ...             |
| 4233         | 846.60          | 9538          | 1907.60         |

## Final test channel:

| GSM 850 |                 | PCS1900 |                 | WCDMA Band V |                 | WCDMA Band II |                 |
|---------|-----------------|---------|-----------------|--------------|-----------------|---------------|-----------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel      | Frequency (MHz) | Channel       | Frequency (MHz) |
| 128     | 824.20          | 512     | 1850.20         | 4132         | 826.40          | 9262          | 1852.40         |
| 190     | 836.60          | 661     | 1880.00         | 4183         | 836.60          | 9400          | 1880.00         |
| 251     | 848.80          | 810     | 1909.80         | 4233         | 846.60          | 9538          | 1907.60         |

## 4.2. Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01v03 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 10000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 20000 MHz for PCS1900, WCDMA Band II and WCDMA Band IV.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

| Test Mode    |                                                       |                                                       |
|--------------|-------------------------------------------------------|-------------------------------------------------------|
| Band         | Radiated TCs                                          | Conducted TCs                                         |
| GSM 850      | GSM Link<br>GPRS class 12 Link<br>EGPRS class 12 Link | GSM Link<br>GPRS class 12 Link<br>EGPRS class 12 Link |
| PCS 1900     | GSM Link<br>GPRS class 12 Link<br>EGPRS class 12 Link | GSM Link<br>GPRS class 12 Link<br>EGPRS class 12 Link |
| WCDMA Band V | RMC 12.2Kbps Link                                     | RMC 12.2Kbps Link                                     |
| WCDM Band II | RMC 12.2Kbps Link                                     | RMC 12.2Kbps Link                                     |

**Note:** The maximum power levels are chosen to test as the worst case configuration as follows:

GPRS multi-slot class 12 mode for GMSK modulation, EDGE multi-slot class 10 mode for 8PSK modulation. RMC 12.2Kbps mode for WCDMA band V and WCDMA band II, only these modes were used for all tests. In addition to above worst-case test, below investigating on all data rates and all modes are compliance with each FCC test case which has specific test limits. For spurious emissions at antenna port, the EUT was investigated the band edges on low and high channels, and the unwanted spurious emissions on middle channel for all modes, the results are PASS, then only the worst-results were reported in the test report. The Radiated Spurious emissions for GPRS and EDGE modes were investigated on the middle channel and the PASS results were not worst than those data tested from the highest power channels.

### 4.3. Description of Support Units

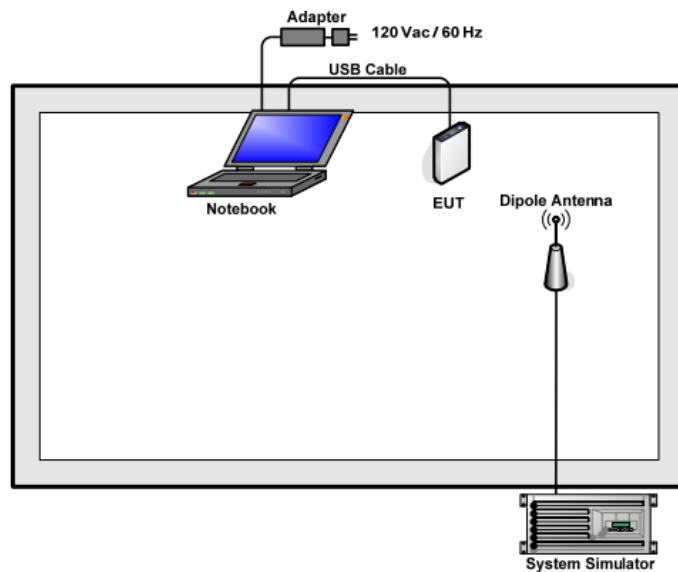
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Equipment | Model No. | Serial No. | FCC ID | Trade Name |
|-----------|-----------|------------|--------|------------|
| /         | /         | /          | /      | /          |

**Note:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

#### 4.4. Configuration of Tested System



#### 4.5. Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level. The spectrum analyzer offset is derived from RF cable loss and attenuator factor.  
*Offset = RF cable loss + attenuator factor.*

The following shows an offset computation example with RF cable loss 3 dB and a 5dB attenuator.

Example: *Offset (dB) = RF cable loss (dB) + attenuator factor (dB).*  
*= 8(dB)*

## 5. Facilities and Accreditations

### 5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098

Shenzhen Tongce Testing Lab

The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

### 5.2. Location

Shenzhen Tongce Testing Lab

Address: 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

TEL: +86-755-27673339

### 5.3. Measurement Uncertainty

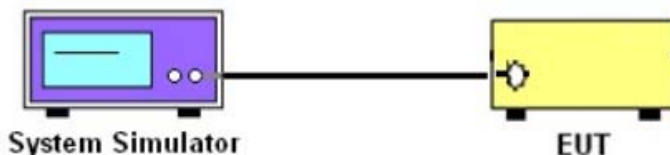
The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

| No. | Item                          | MU                        |
|-----|-------------------------------|---------------------------|
| 1   | Conducted Emission            | $\pm 2.56\text{dB}$       |
| 2   | RF power, conducted           | $\pm 0.12\text{dB}$       |
| 3   | Spurious emissions, conducted | $\pm 0.11\text{dB}$       |
| 4   | All emissions, radiated(<1G)  | $\pm 3.92\text{dB}$       |
| 5   | All emissions, radiated(>1G)  | $\pm 4.28\text{dB}$       |
| 6   | Temperature                   | $\pm 0.1^{\circ}\text{C}$ |
| 7   | Humidity                      | $\pm 1.0\%$               |

## 6. Test Results and Measurement Data

### 6.1. Conducted Output Power Measurement

#### 6.1.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC part 22.913(a) and FCC part 24.232(b)<br>FCC part 27.50(d);                                                                                                                                                                                                                                                                                                                                           |
| <b>Test Method:</b>      | FCC part 2.1046                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Operation mode:</b>   | Refer to item 4.1                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Limits:</b>           | GSM 850 7W<br>PCS 1900 2W<br>WCDMA Band V:7W<br>WCDMA Band II: 2W                                                                                                                                                                                                                                                                                                                                         |
| <b>Test Setup:</b>       |  <p>The diagram illustrates the test setup. On the left is a purple box labeled 'System Simulator' with a screen and two buttons. A black cable connects it to a yellow box on the right labeled 'EUT' (Equipment Under Test) which has a single port on its side.</p>                                                  |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>1. The transmitter output port was connected to the system simulator.</li> <li>2. Set EUT at maximum power through system simulator.</li> <li>3. Select lowest, middle, and highest channels for each band and different modulation.</li> <li>4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.</li> </ol> |
| <b>Test Result:</b>      | PASS                                                                                                                                                                                                                                                                                                                                                                                                      |

#### 6.1.2. Test Instruments

| Equipment                | Manufacturer | Model  | Serial Number | Calibration Due |
|--------------------------|--------------|--------|---------------|-----------------|
| System simulator         | R&S          | CMU200 | 111382        | Sep. 27, 2018   |
| RF cable<br>(9kHz-40GHz) | TCT          | RE-05  | N/A           | Sep. 27, 2018   |
| Antenna Connector        | TCT          | RFC-02 | N/A           | Sep. 27, 2018   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI)

### 6.1.3. Test data

#### Conducted Power Measurement Results:

| Average Conducted Power (*Unit: dBm) |        |        |        |         |         |         |
|--------------------------------------|--------|--------|--------|---------|---------|---------|
| Band                                 | GSM850 |        |        | PCS1900 |         |         |
| Channel                              | 128    | 190    | 251    | 512     | 661     | 810     |
| Frequency                            | 824.20 | 836.60 | 848.80 | 1850.20 | 1880.00 | 1909.80 |
| GSM (GMSK, 1 TX slot)                | 32.50  | 32.57  | 32.59  | 29.17   | 28.16   | 29.36   |
| GPRS (GMSK, 1 TX slot)               | 32.51  | 32.58  | 32.55  | 29.19   | 29.18   | 28.38   |
| GPRS (GMSK, 2 TX slot)               | 31.78  | 31.82  | 31.88  | 29.12   | 28.13   | 28.81   |
| GPRS (GMSK, 3 TX slot)               | 29.75  | 29.93  | 30.05  | 27.23   | 26.40   | 26.20   |
| GPRS (GMSK, 4 TX slot)               | 28.42  | 28.65  | 28.83  | 26.05   | 25.32   | 25.24   |
| EGPRS (8PSK, 1 TX slot)              | 30.05  | 29.96  | 29.79  | 27.28   | 26.80   | 26.35   |
| EGPRS (8PSK, 2 TX slot)              | 29.42  | 29.37  | 29.21  | 26.30   | 25.92   | 25.30   |
| EGPRS (8PSK, 3 TX slot)              | 27.92  | 27.80  | 27.52  | 23.93   | 23.49   | 22.91   |
| EGPRS (8PSK, 4 TX slot)              | 26.93  | 26.75  | 26.55  | 22.81   | 22.47   | 21.81   |

| Average Conducted Power (*Unit: dBm) |               |        |        |              |       |       |
|--------------------------------------|---------------|--------|--------|--------------|-------|-------|
| Band                                 | WCDMA Band II |        |        | WCDMA Band V |       |       |
| Channel                              | 9262          | 9400   | 9538   | 4132         | 4183  | 4233  |
| Frequency                            | 1852.4        | 1880.0 | 1907.6 | 826.4        | 836.6 | 846.6 |
| RMC 12.2Kbps                         | 20.40         | 20.40  | 20.02  | 22.78        | 22.70 | 22.88 |
| HSDPA Subtest-1                      | 20.36         | 20.36  | 19.92  | 21.83        | 21.68 | 21.87 |
| HSDPA Subtest-2                      | 20.41         | 20.36  | 20.02  | 21.78        | 21.39 | 21.79 |
| HSDPA Subtest-3                      | 20.11         | 20.24  | 19.64  | 21.69        | 21.64 | 21.83 |
| HSDPA Subtest-4                      | 20.28         | 20.34  | 19.89  | 21.82        | 21.71 | 21.85 |
| HSUPA Subtest-1                      | 20.36         | 20.33  | 19.84  | 21.82        | 21.66 | 21.87 |
| HSUPA Subtest-2                      | 20.47         | 20.41  | 19.64  | 21.83        | 21.56 | 21.76 |
| HSUPA Subtest-3                      | 20.33         | 20.35  | 19.85  | 21.82        | 21.68 | 21.58 |
| HSUPA Subtest-4                      | 20.12         | 20.28  | 19.98  | 21.80        | 21.71 | 21.63 |
| HSUPA Subtest-5                      | 20.38         | 20.33  | 20.01  | 21.82        | 21.68 | 21.81 |

## 6.2. Peak to Average Ratio

### 6.2.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC part 24.232(d) ; FCC part 22.913;<br>FCC part 27.50(d);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Test Method:</b>      | FCC KDB 971168 D01v03 Section 5.7.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Operation mode:</b>   | Refer to item 4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Limit:</b>            | The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Test Setup:</b>       | <p>The diagram shows a System Simulator (purple box) and a Spectrum Analyzer (green box) connected to a Power Divider (black box). The Power Divider is also connected to the EUT (yellow box). The System Simulator and Spectrum Analyzer are connected to the Power Divider via cables.</p>                                                                                                                                                                                                                                                                                                                 |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB FCC KDB 971168 D01v03 Section 5.7.1.</li> <li>2. The EUT was connected to spectrum analyzer and system simulator via a power divider.</li> <li>3. Set EUT to transmit at maximum output power.</li> <li>4. For GSM/EGPRS operating modes, signal gating is implemented on the spectrum analyzer by triggering from the system simulator.</li> <li>5. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer.<br/>Record the maximum PAPR level associated with a probability of 0.1%.</li> </ol> |
| <b>Test Result:</b>      | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### 6.2.2. Test Instruments

| Equipment                | Manufacturer | Model  | Serial Number | Calibration Due |
|--------------------------|--------------|--------|---------------|-----------------|
| System simulator         | R&S          | CMU200 | 111382        | Sep. 27, 2018   |
| Spectrum Analyzer        | Agilent      | N9020A | MY49100060    | Sep. 27, 2018   |
| RF cable<br>(9kHz-40GHz) | TCT          | RE-05  | N/A           | Sep. 27, 2018   |
| Antenna Connector        | TCT          | RFC-02 | N/A           | Sep. 27, 2018   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.2.3. Test Data

| Test mode     | Peak to Average Ratio<br>(dB) |            |          | Limit<br>(dB) | Result |
|---------------|-------------------------------|------------|----------|---------------|--------|
|               | Low Ch.                       | Middle Ch. | High Ch. |               |        |
| WCDMA Band II | 3.18                          | 2.83       | 2.58     | 13            | PASS   |
| WCDMA Band V  | 3.15                          | 2.72       | 3.02     |               |        |

### 6.3. 99% Occupied Bandwidth and 26dB Bandwidth Measurement

#### 6.3.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC part 2.1049                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Test Method:</b>      | FCC part 2.1049                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Operation mode:</b>   | Refer to item 4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Limit:</b>            | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Test Setup:</b>       | <pre> graph LR     SS[System Simulator] --- PD[Power Divider]     SA[Spectrum Analyzer] --- PD     PD --- EUT[EUT]         </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB FCC KDB 971168 D01v03 Section 4.2.</li> <li>2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.</li> <li>3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>4. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold.</li> <li>5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.</li> </ol> |
| <b>Test Result:</b>      | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

#### 6.3.2. Test Instruments

| Equipment                | Manufacturer | Model  | Serial Number | Calibration Due |
|--------------------------|--------------|--------|---------------|-----------------|
| System simulator         | R&S          | CMU200 | 111382        | Sep. 27, 2018   |
| Spectrum Analyzer        | Agilent      | N9020A | MY49100060    | Sep. 27, 2018   |
| RF cable<br>(9kHz-40GHz) | TCT          | RE-05  | N/A           | Sep. 27, 2018   |
| Antenna Connector        | TCT          | RFC-02 | N/A           | Sep. 27, 2018   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.3.3. Test Data

| EUT Mode                             | Channel | Frequency (MHz) | 99% Occupy bandwidth (KHz) | -26dB bandwidth (KHz) |
|--------------------------------------|---------|-----------------|----------------------------|-----------------------|
| GSM 850<br>(GSM link)                | 128     | 824.20          | 242.834                    | 322.692               |
|                                      | 190     | 836.60          | 243.859                    | 326.361               |
|                                      | 251     | 848.80          | 241.438                    | 320.227               |
| GSM 850<br>(GPRS 1 link)             | 128     | 824.20          | 246.837                    | 317.687               |
|                                      | 190     | 836.60          | 247.290                    | 316.150               |
|                                      | 251     | 848.80          | 251.249                    | 324.405               |
| GSM 850<br>(EGPRS 1 link)            | 128     | 824.20          | 265.581                    | 342.364               |
|                                      | 190     | 836.60          | 270.559                    | 348.365               |
|                                      | 251     | 848.80          | 268.165                    | 351.085               |
| PCS 1900<br>(GSM link)               | 512     | 1850.20         | 246.309                    | 322.957               |
|                                      | 661     | 1880.00         | 244.257                    | 315.405               |
|                                      | 810     | 1909.80         | 244.747                    | 318.008               |
| PCS 1900<br>(GPRS 1 link)            | 512     | 1850.20         | 249.209                    | 323.896               |
|                                      | 661     | 1880.00         | 246.889                    | 320.331               |
|                                      | 810     | 1909.80         | 247.927                    | 317.860               |
| PCS 1900<br>(EGPRS 1 link)           | 512     | 1850.20         | 245.7582                   | 319.336               |
|                                      | 661     | 1880.00         | 249.796                    | 318.555               |
|                                      | 810     | 1909.80         | 249.970                    | 310.214               |
| WCDMA Band V<br>(RMC 12.2Kbps link)  | 4132    | 826.40          | 4213.20                    | 4907.00               |
|                                      | 4183    | 836.60          | 4214.70                    | 4930.00               |
|                                      | 4233    | 846.60          | 4205.00                    | 4887.00               |
| WCDMA Band II<br>(RMC 12.2Kbps link) | 9262    | 1852.4          | 4168.60                    | 4723.00               |
|                                      | 9400    | 1880.0          | 4180.30                    | 4722.00               |
|                                      | 9538    | 1907.6          | 4197.60                    | 4776.00               |

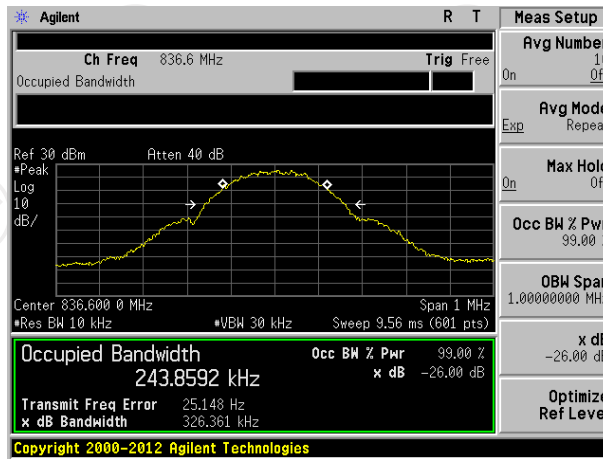
Test plots as follows:

Test band:

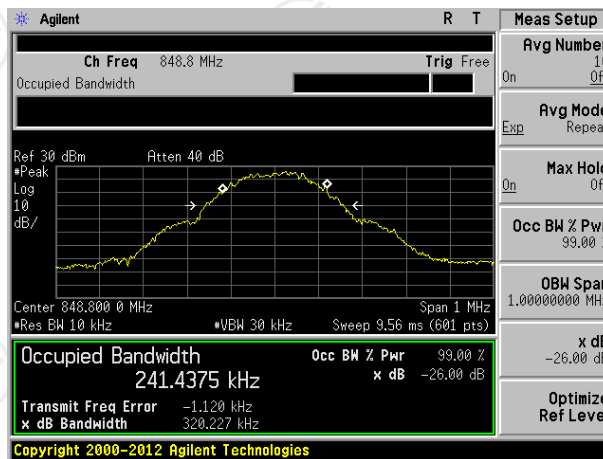
GSM 850 (GSM link)



Lowest channel



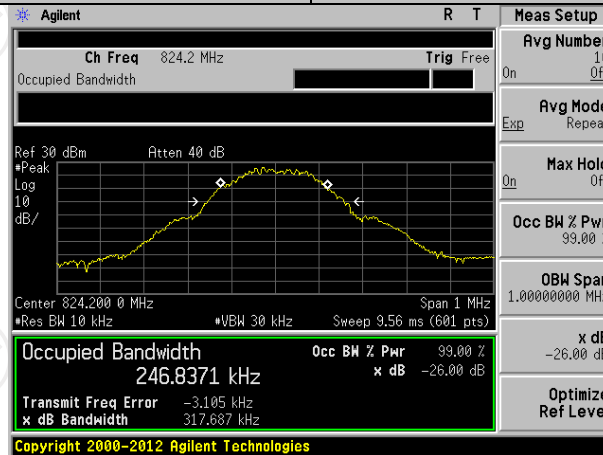
Middle channel



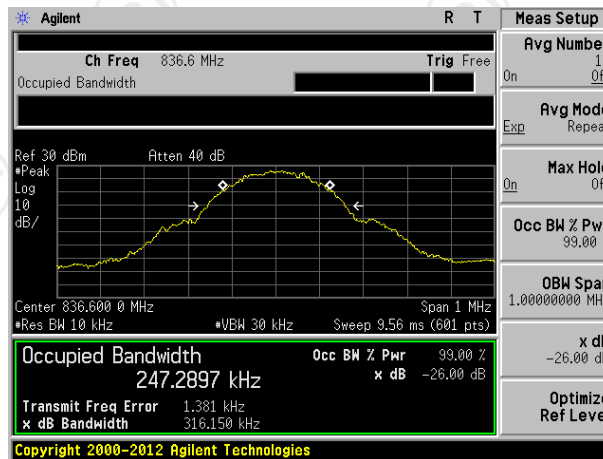
Highest channel

Test band:

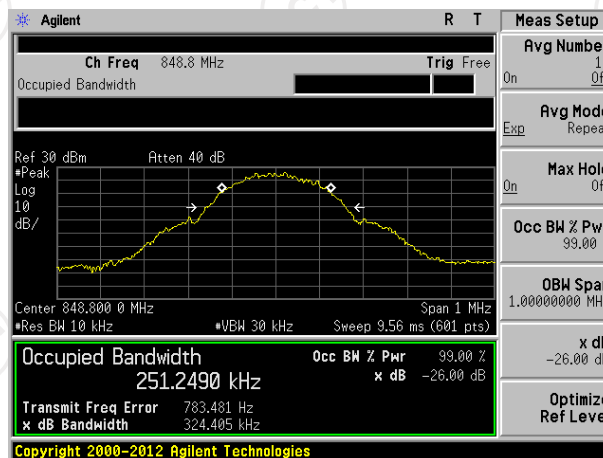
GSM 850 (GPRS 1 link)



Lowest channel



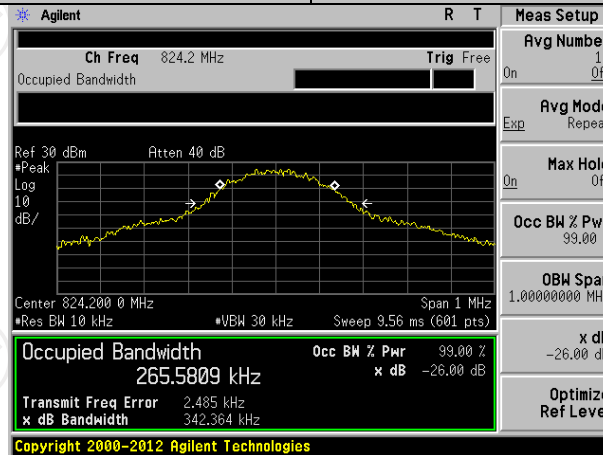
Middle channel



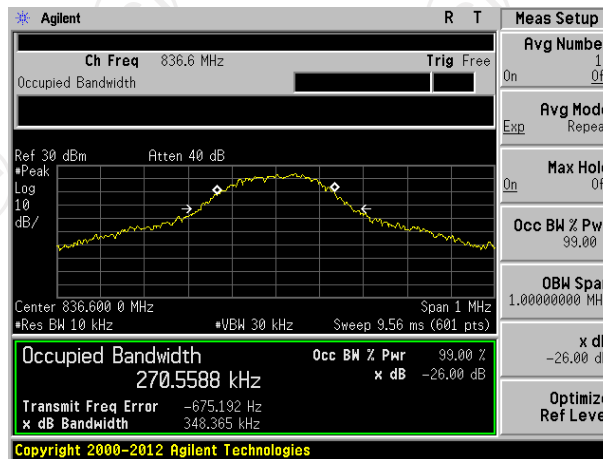
Highest channel

Test band:

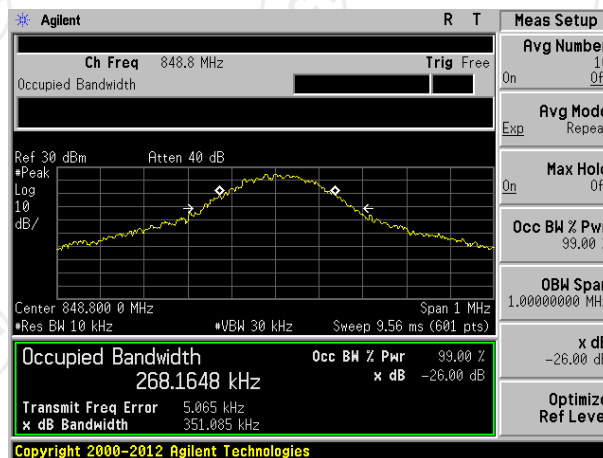
GSM 850 (EGPRS 1 link)



Lowest channel



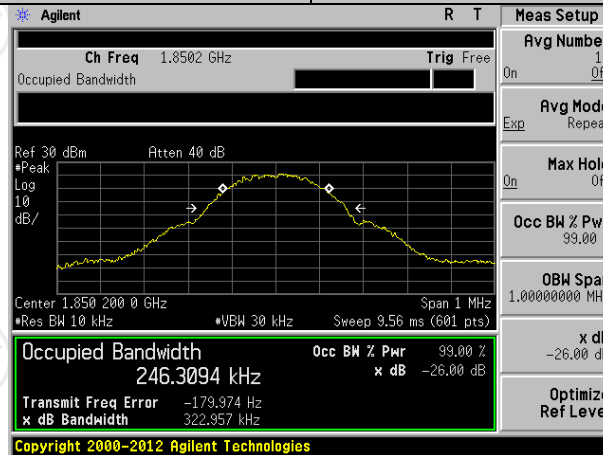
Middle channel



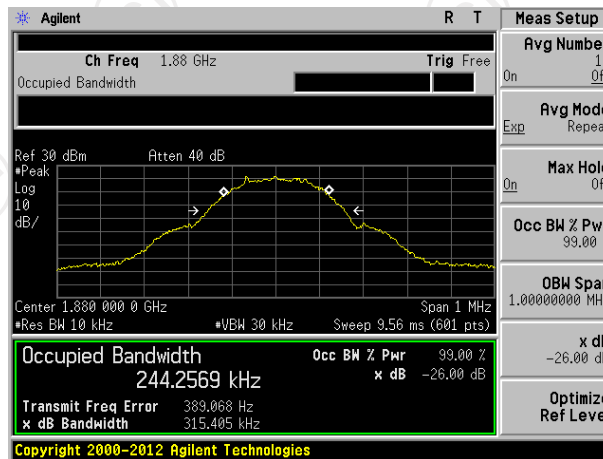
Highest channel

Test band:

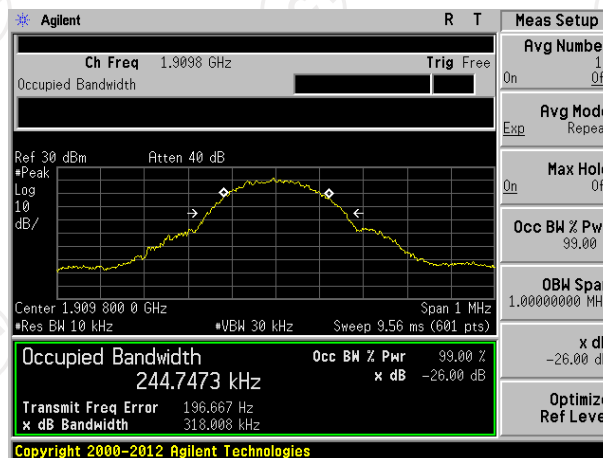
PCS 1900 (GSM link)



Lowest channel



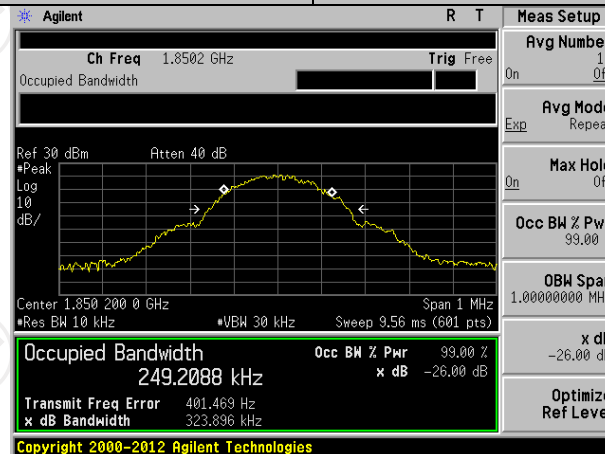
Middle channel



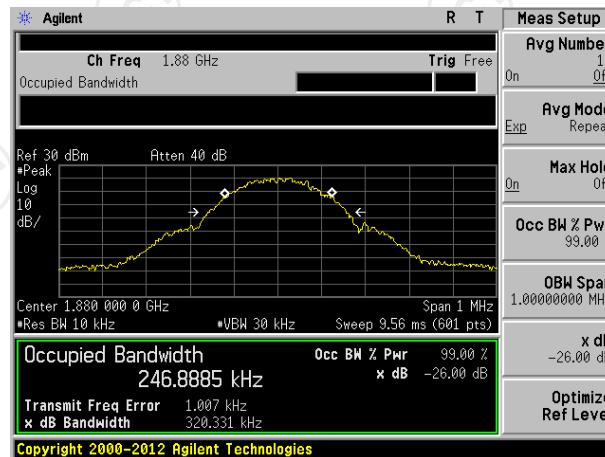
Highest channel

Test band:

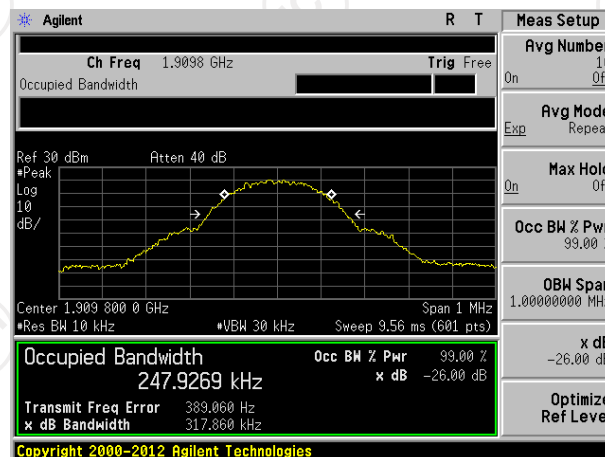
PCS 1900 (GPRS 1 link)



Lowest channel



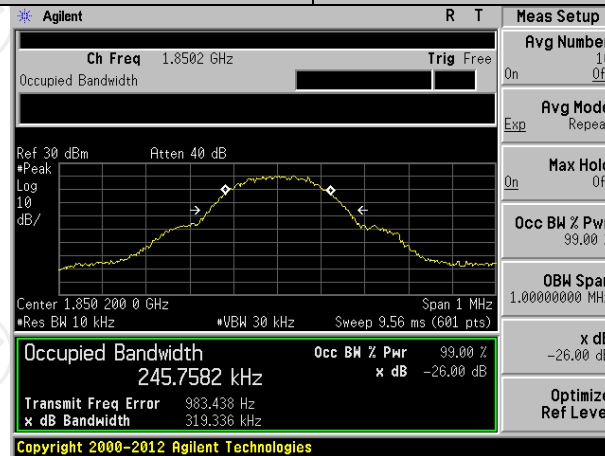
Middle channel



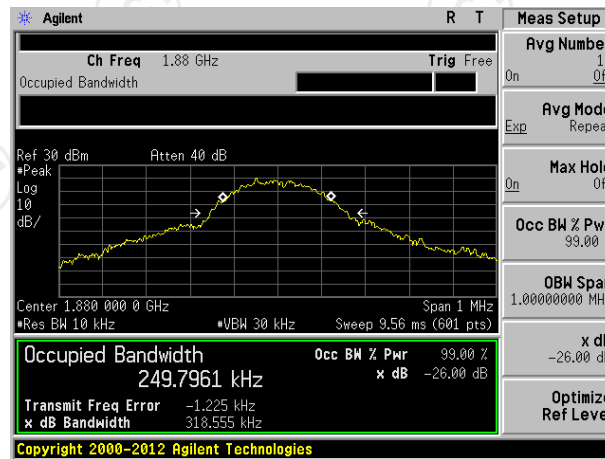
Highest channel

Test band:

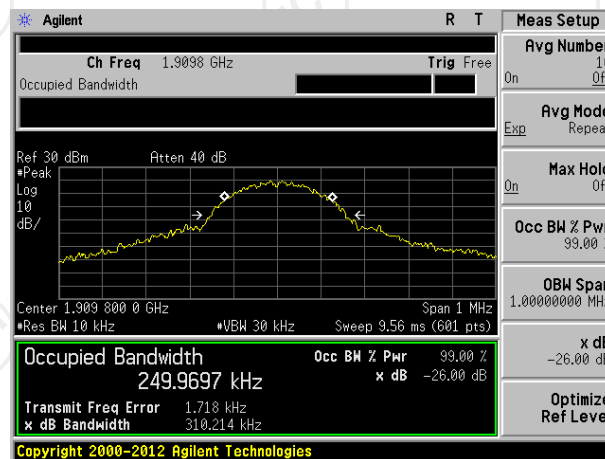
PCS 1900 (EGPRS 1 link)



Lowest channel



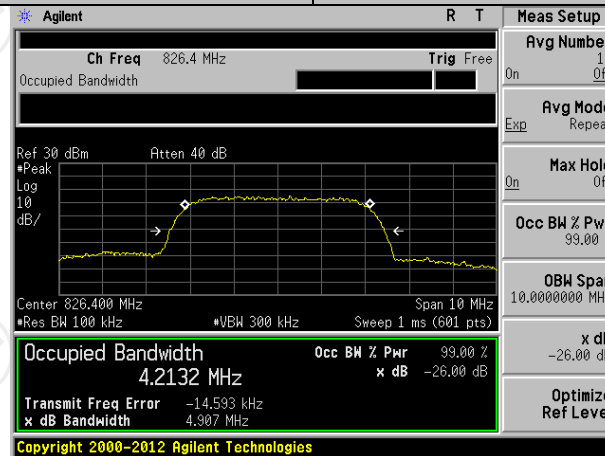
Middle channel



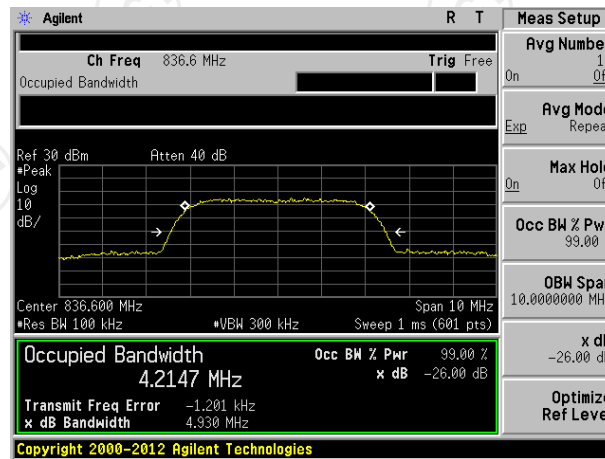
Highest channel

Test band:

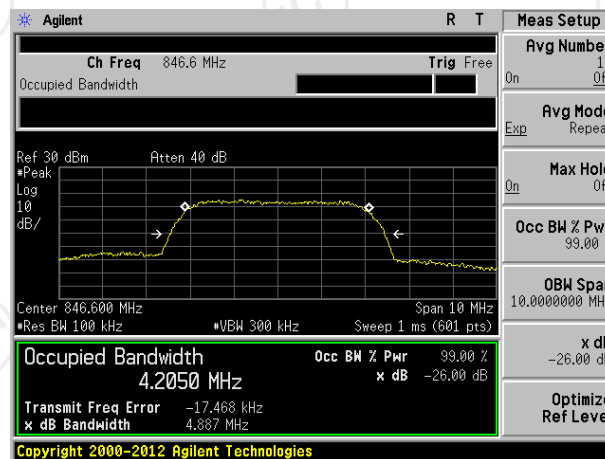
WCDMA Band V (RMC 12.2Kbps link)



Lowest channel



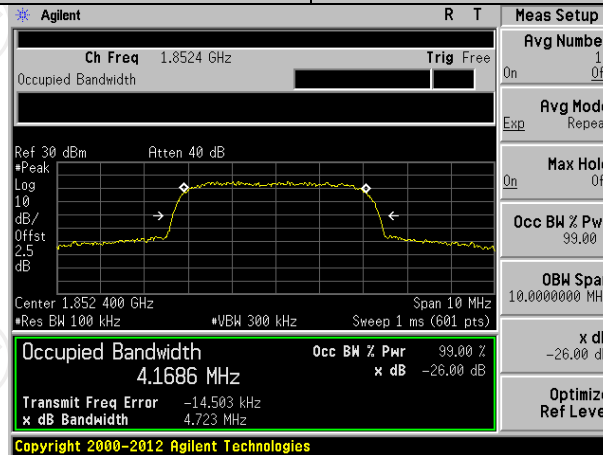
Middle channel



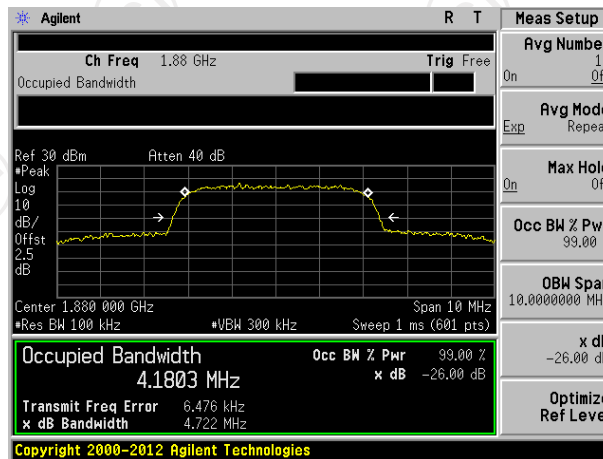
Highest channel

Test band:

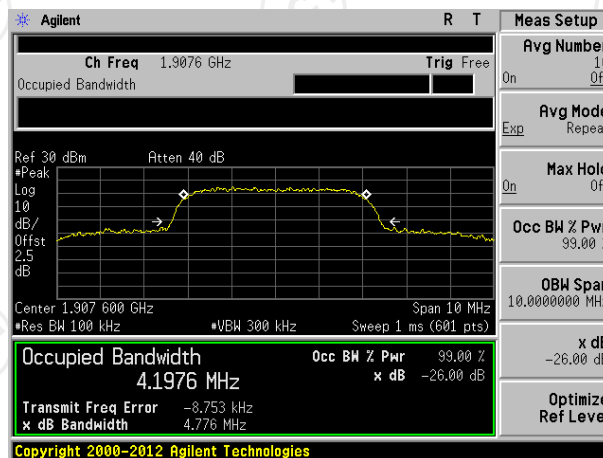
WCDMA Band II (RMC 12.2Kbps link)



Lowest channel



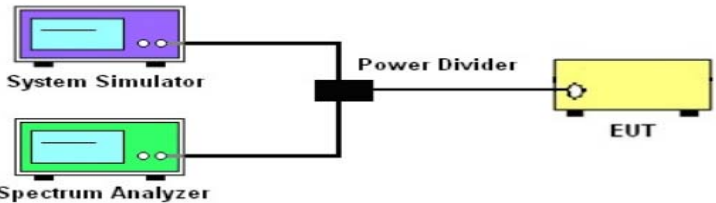
Middle channel



Highest channel

## 6.4. Band Edge and Conducted Spurious Emission Measurement

### 6.4.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC part22.917(a) and FCC part24.238(a)<br>FCC part27.53(g)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Test Method:</b>      | FCC part2.1051                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Operation mode:</b>   | Refer to item 4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Limit:</b>            | -13dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Test Setup:</b>       |  <p>The diagram shows a System Simulator (purple box) and a Spectrum Analyzer (green box) connected to a Power Divider (black box). The Power Divider is connected to the EUT (yellow box).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB FCC KDB 971168 D01v03 Section 6.</li> <li>2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.</li> <li>3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>4. The band edges of low and high channels for the highest RF powers were measured.</li> <li>5. The conducted spurious emission for the whole frequency range was taken.</li> <li>6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> <li>7. The limit line is derived from <math>43 + 10\log(P)</math> dB below the transmitter power<br/> <math>P(\text{Watts}) = P(\text{W}) - [43 + 10\log(P)] (\text{dB}) = [30 + 10\log(P)] (\text{dBm}) - [43 + 10\log(P)] (\text{dB}) = -13\text{dBm}.</math> </li> </ol> |
| <b>Test Result:</b>      | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

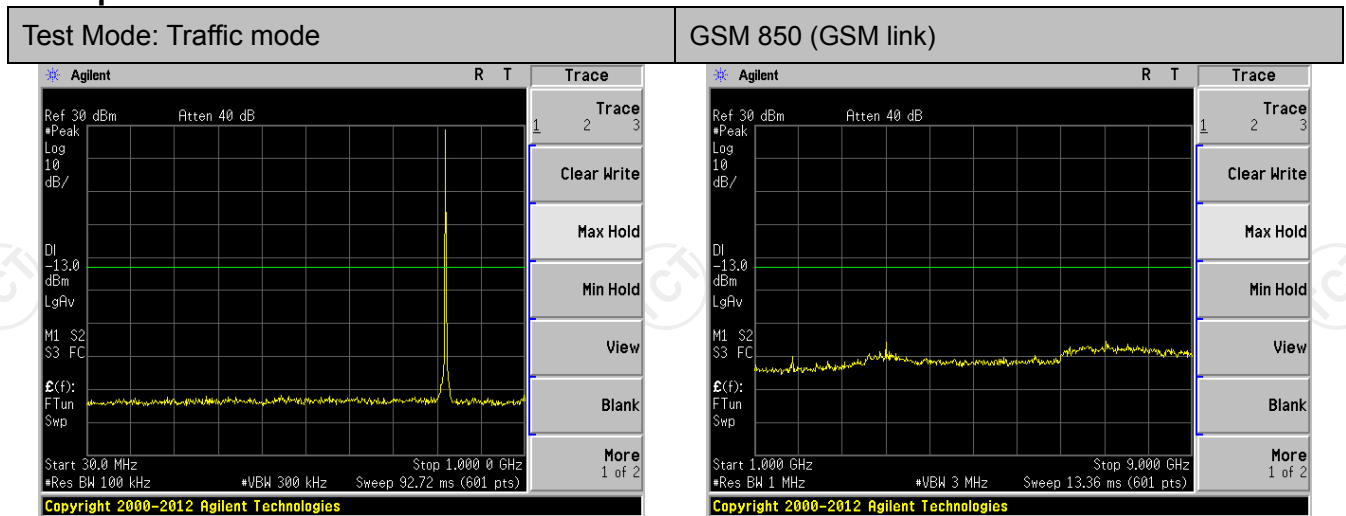
### 6.4.2. Test Instruments

| Equipment                | Manufacturer | Model  | Serial Number | Calibration Due |
|--------------------------|--------------|--------|---------------|-----------------|
| System simulator         | R&S          | CMU200 | 111382        | Sep. 27, 2018   |
| Spectrum Analyzer        | Agilent      | N9020A | MY49100060    | Sep. 27, 2018   |
| RF cable<br>(9kHz-40GHz) | TCT          | RE-05  | N/A           | Sep. 27, 2018   |
| Antenna Connector        | TCT          | RFC-02 | N/A           | Sep. 27, 2018   |

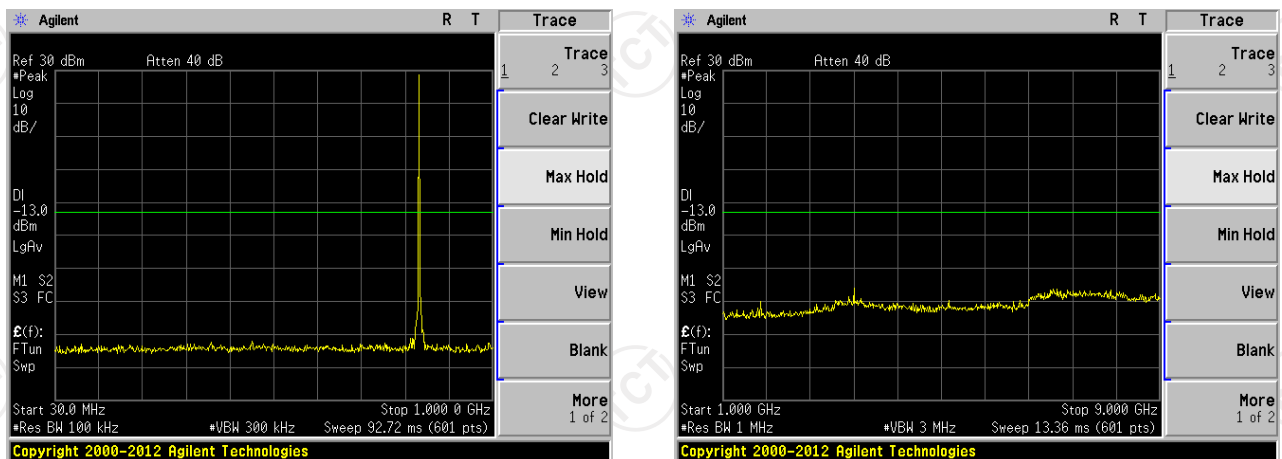
**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to

### 6.4.3. Test Data

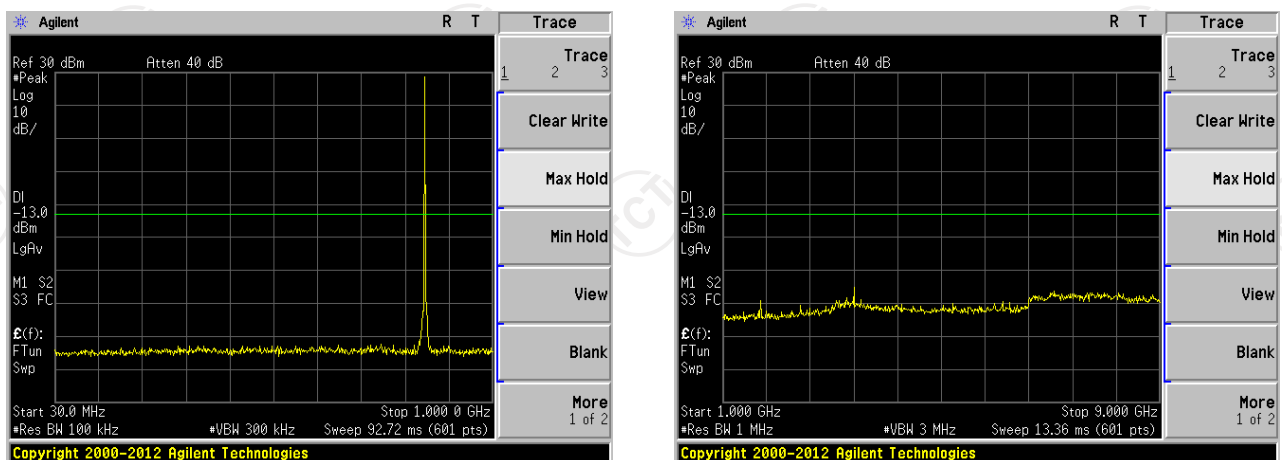
Test plots as follows:



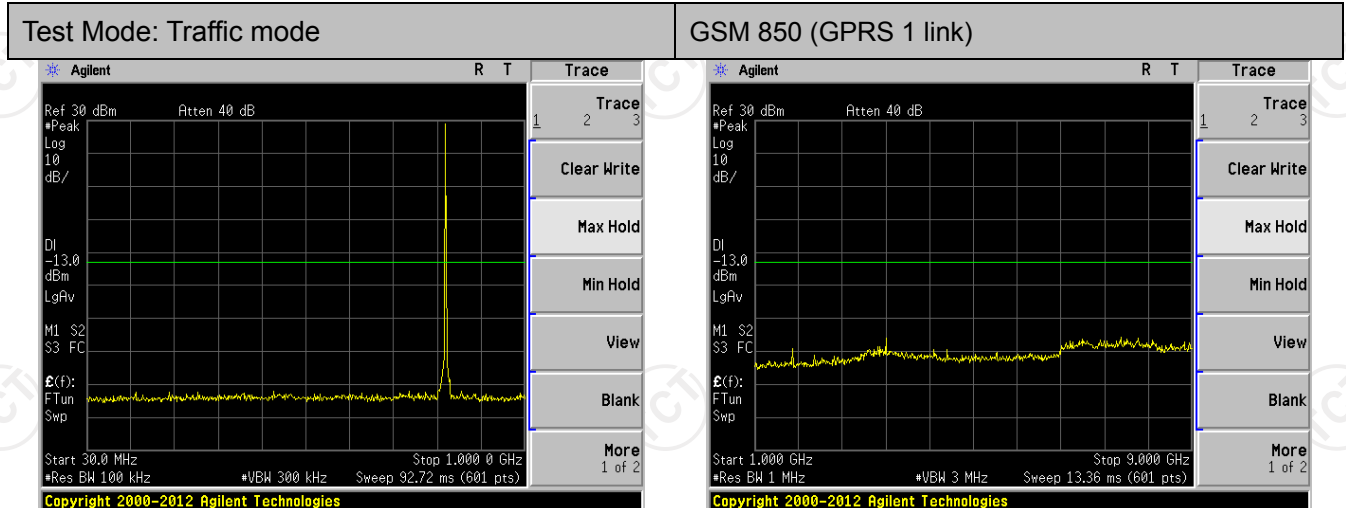
Lowest channel



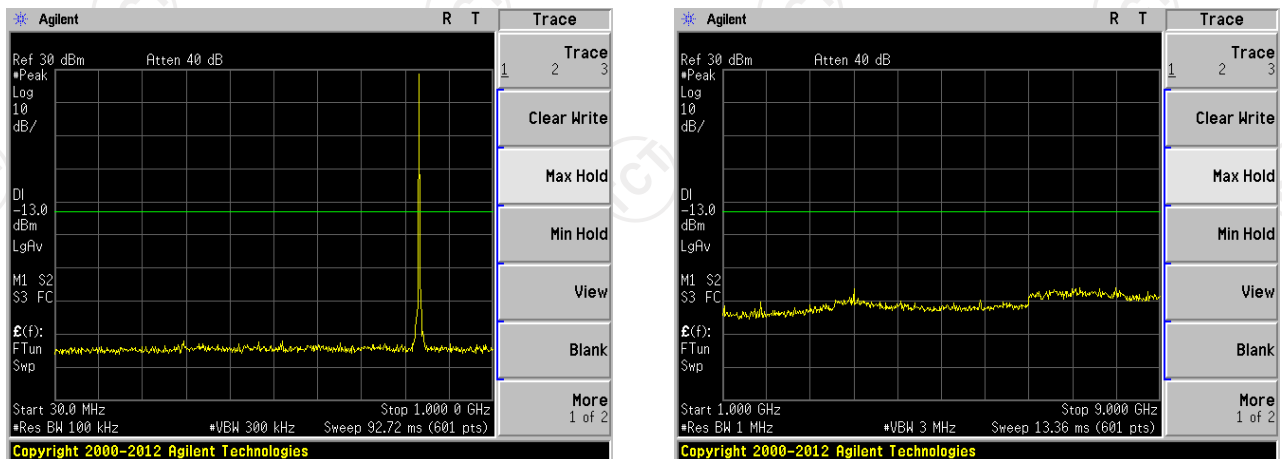
Middle channel



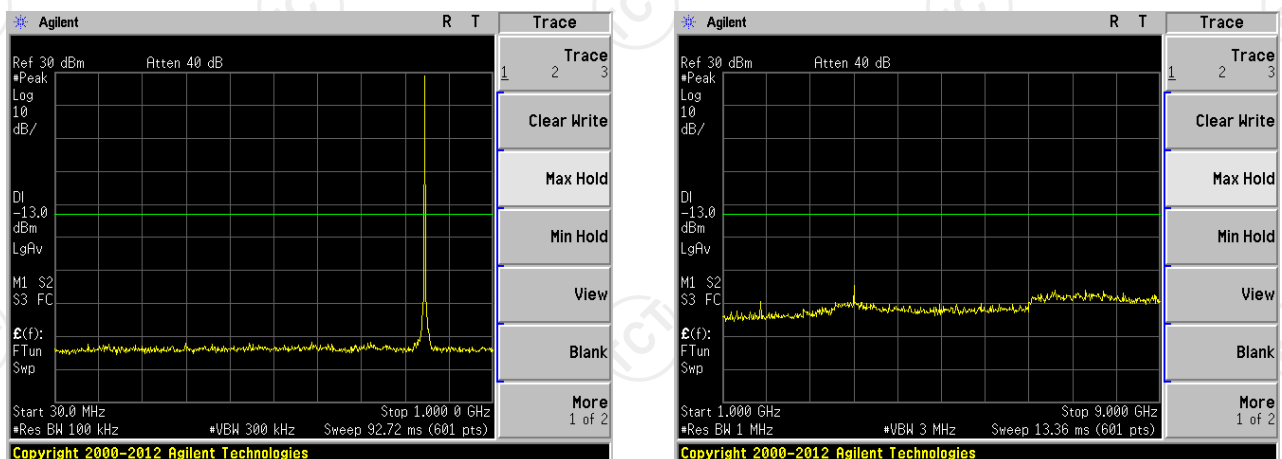
Highest channel



Lowest channel



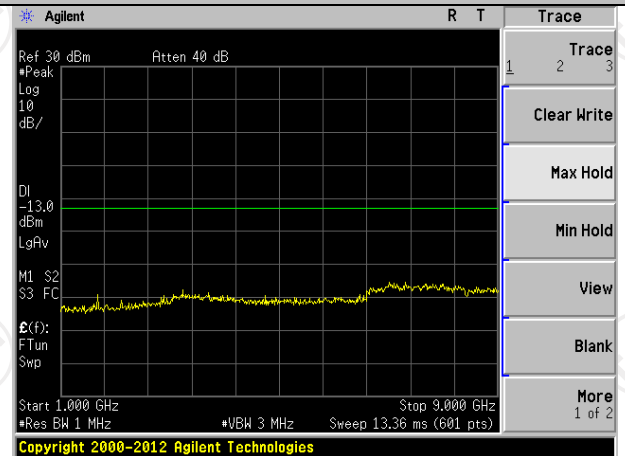
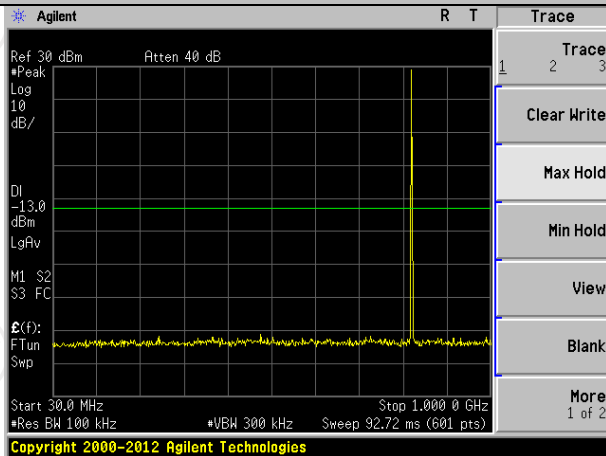
Middle channel



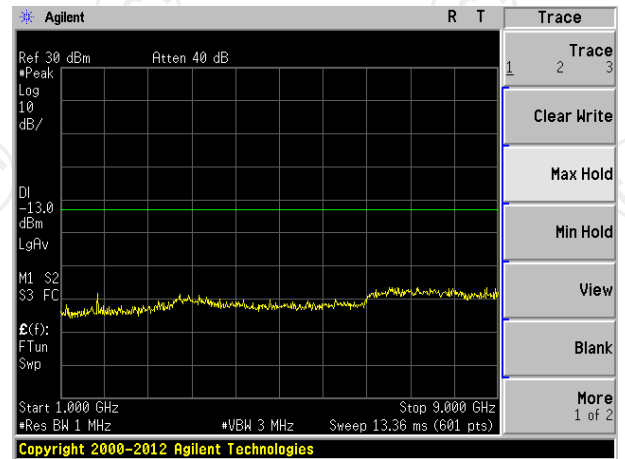
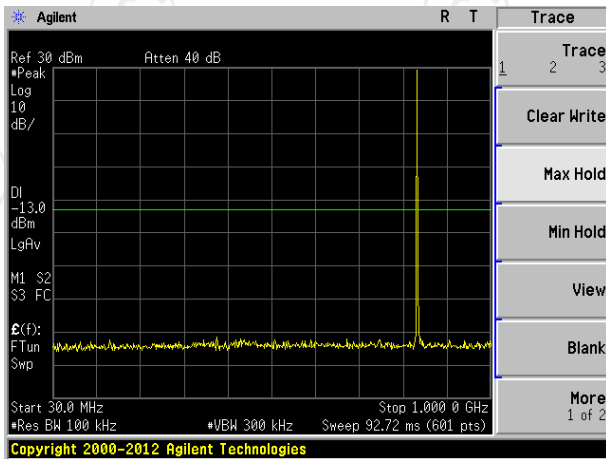
Highest channel

Test Mode: Traffic mode

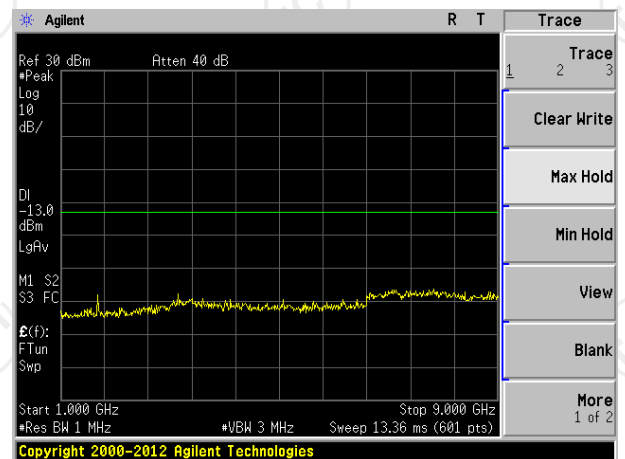
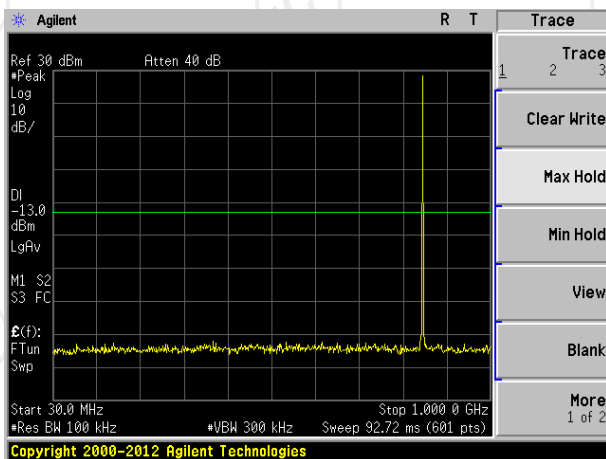
GSM 850 (EGPRS 1 link)



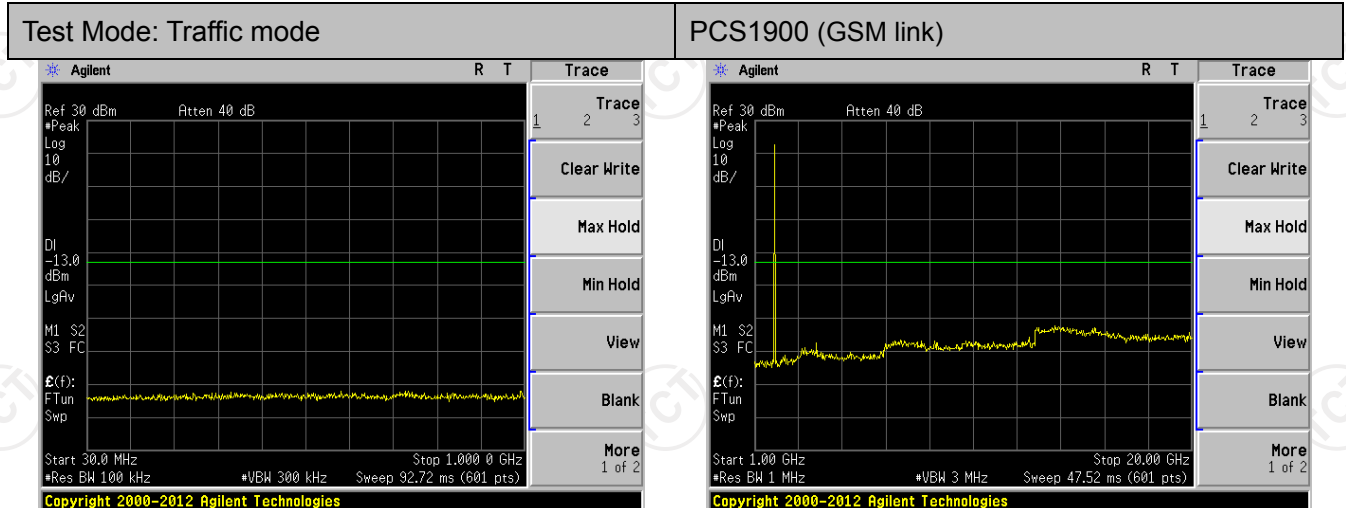
Lowest channel



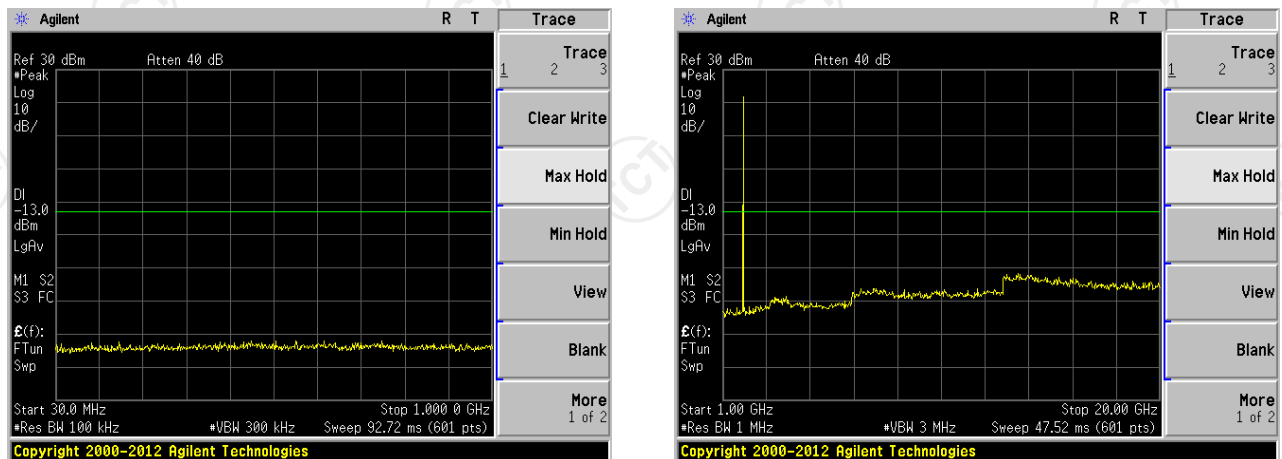
Middle channel



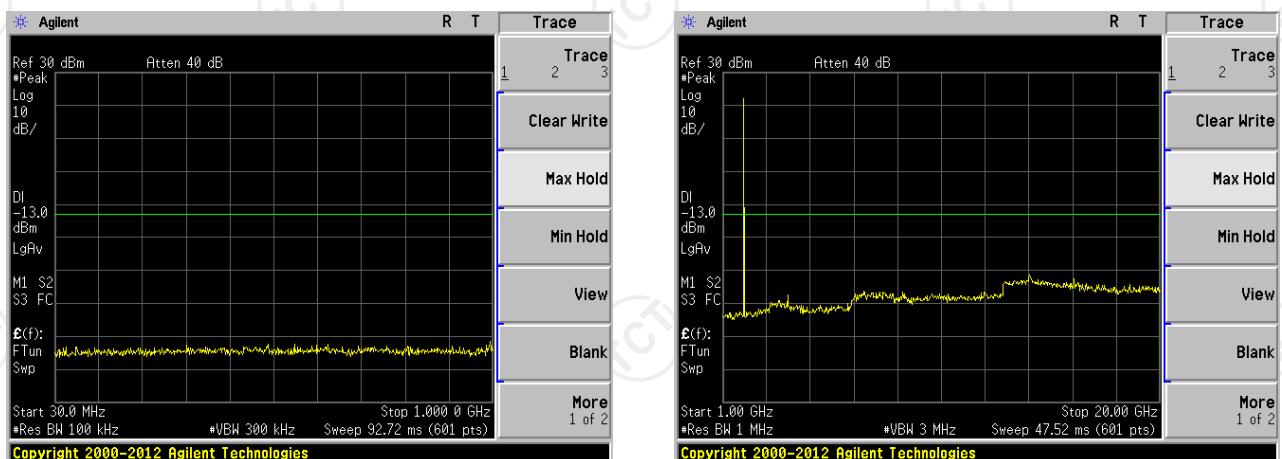
Highest channel



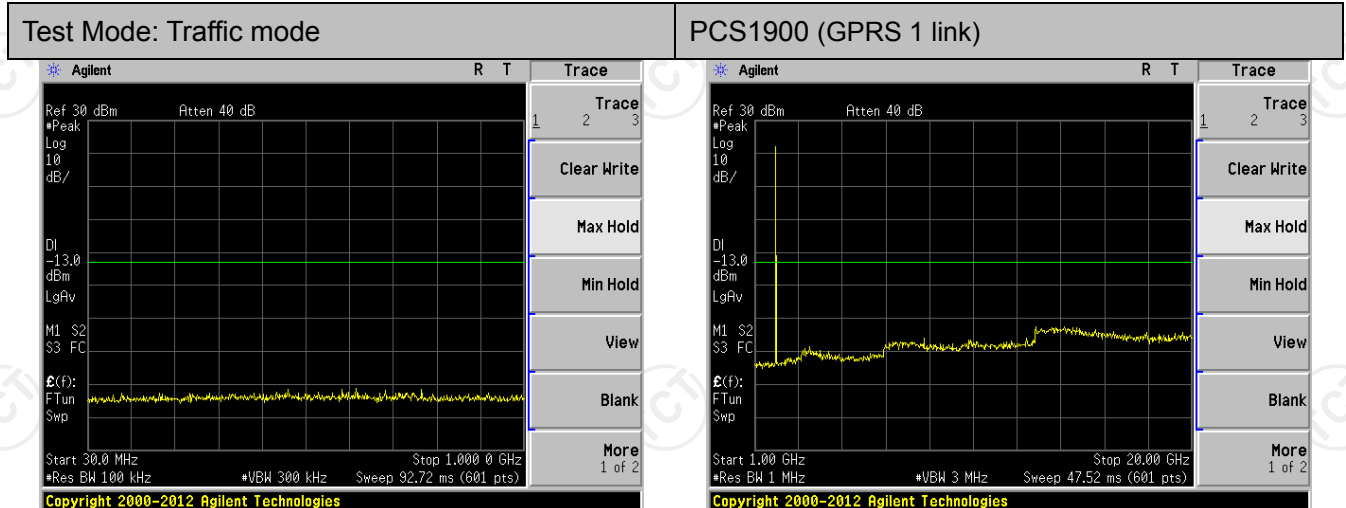
Lowest channel



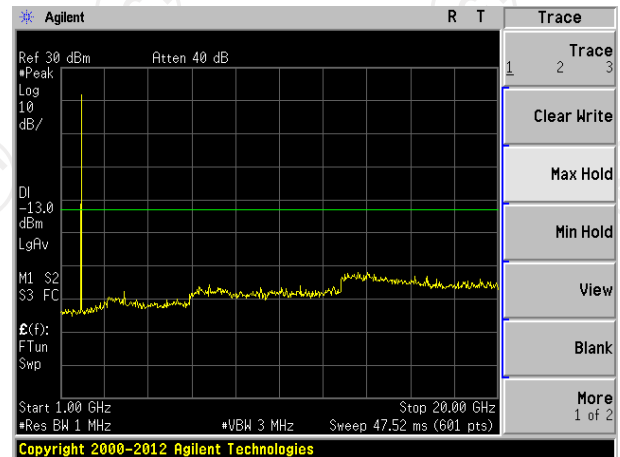
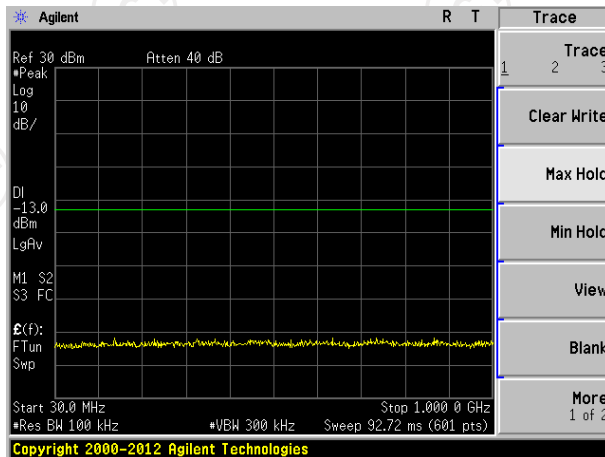
Middle channel



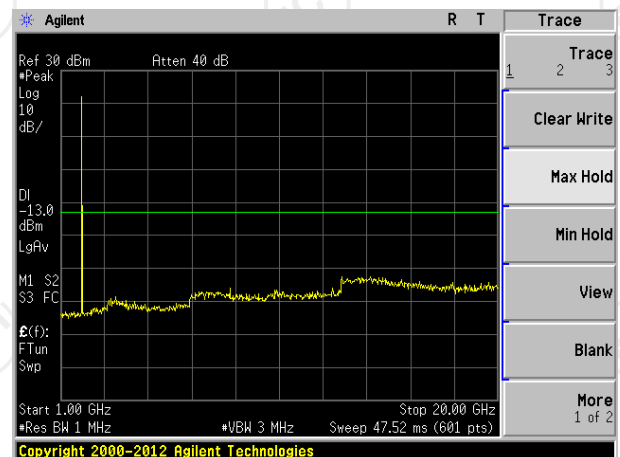
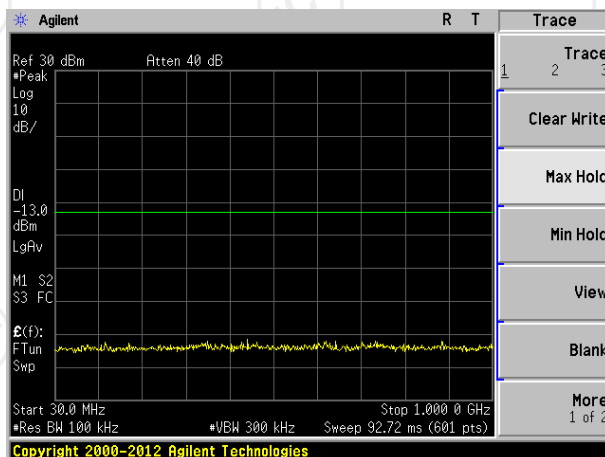
Highest channel



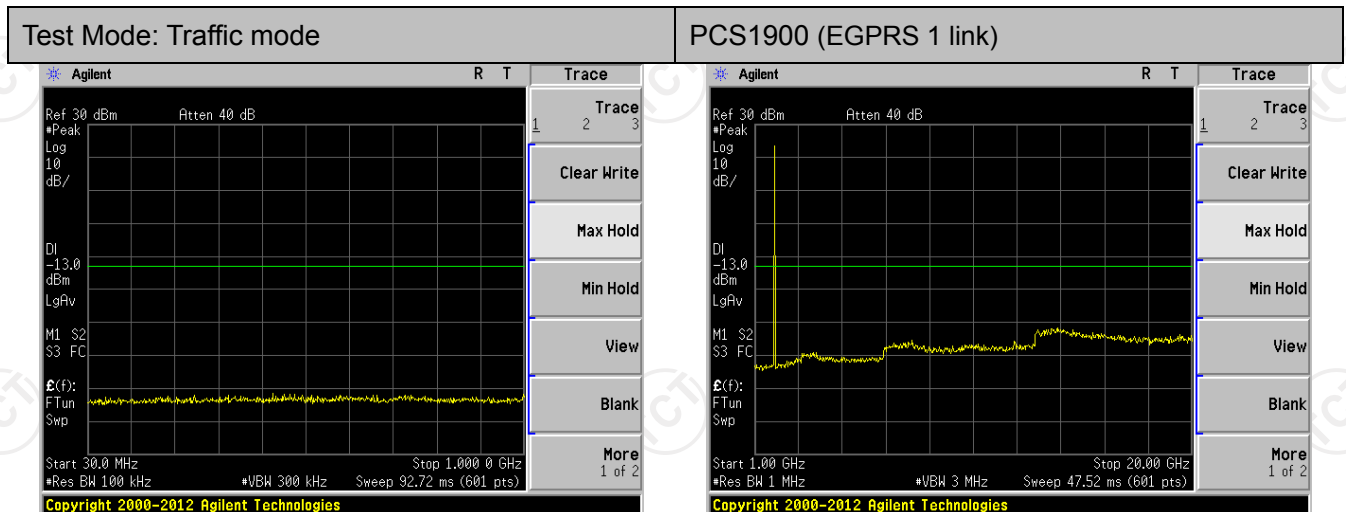
Lowest channel



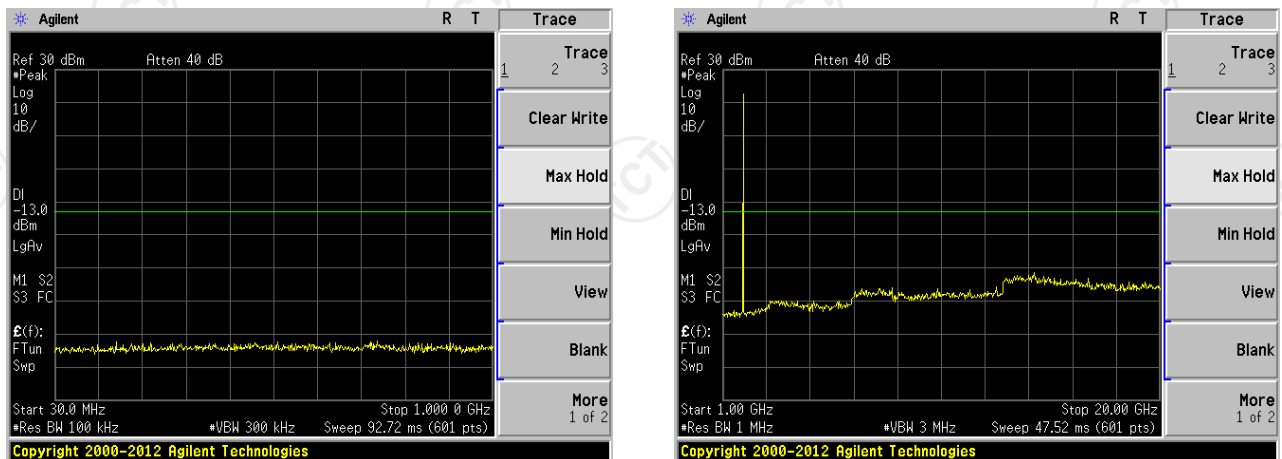
Middle channel



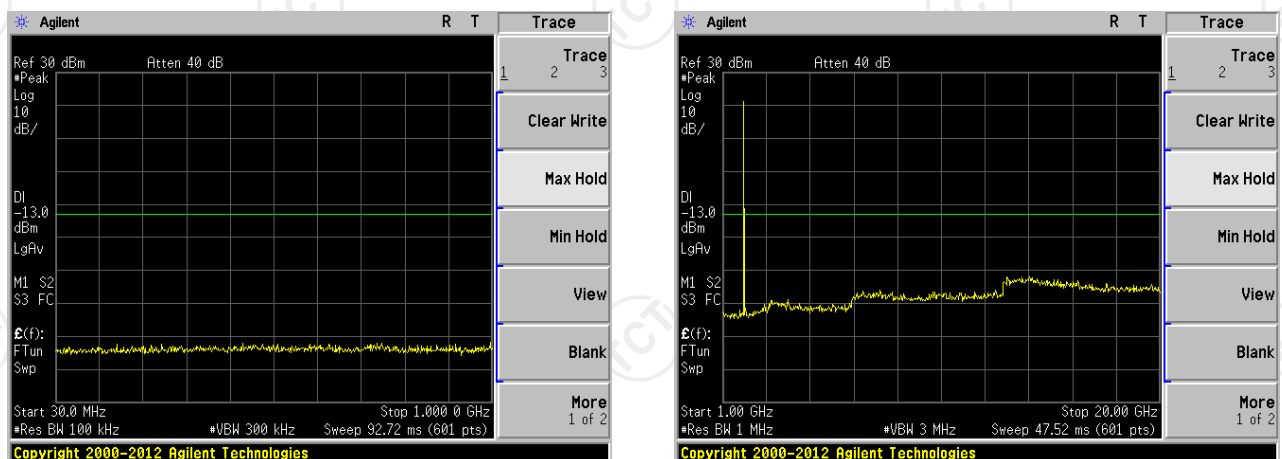
Highest channel



Lowest channel



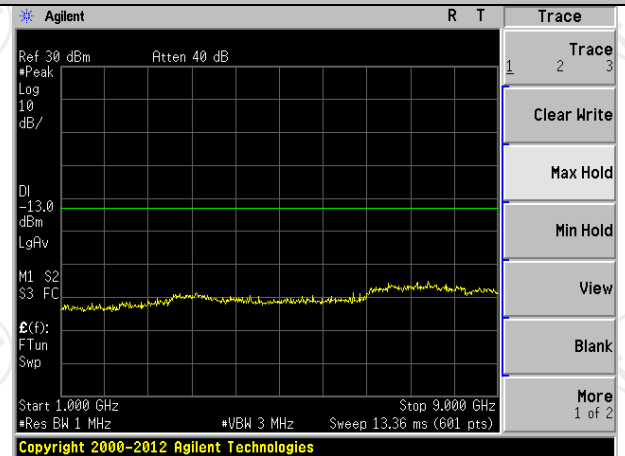
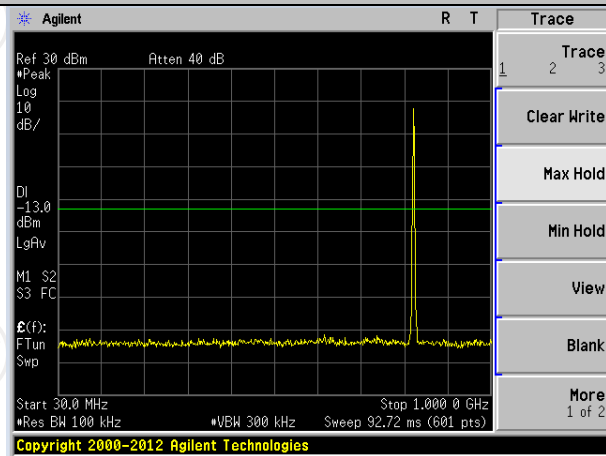
Middle channel



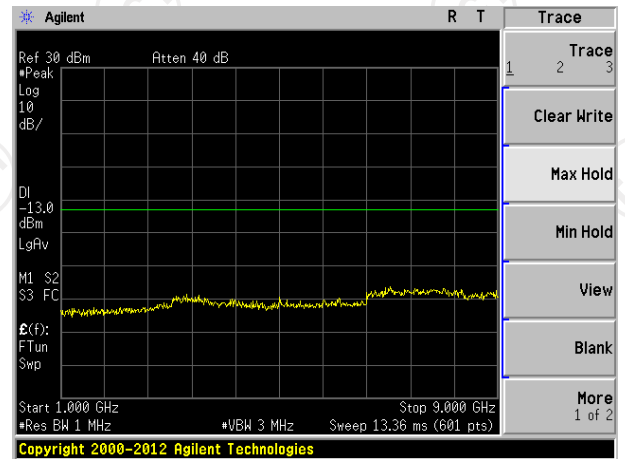
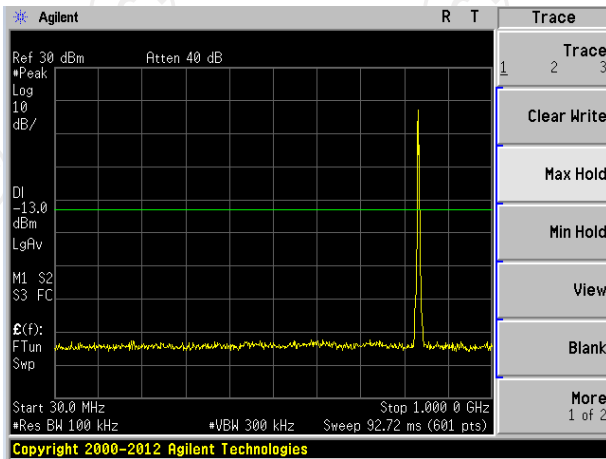
Highest channel

Test Mode: Traffic mode

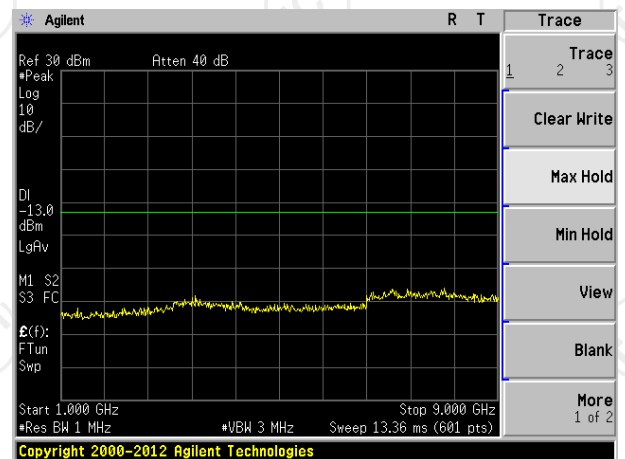
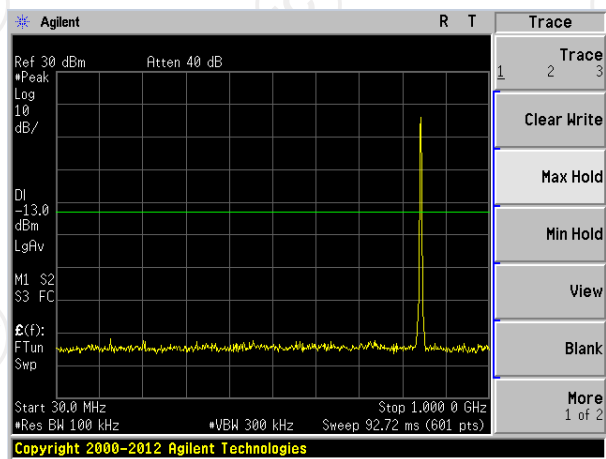
WCDMA Band V (RMC 12.2Kbps link)



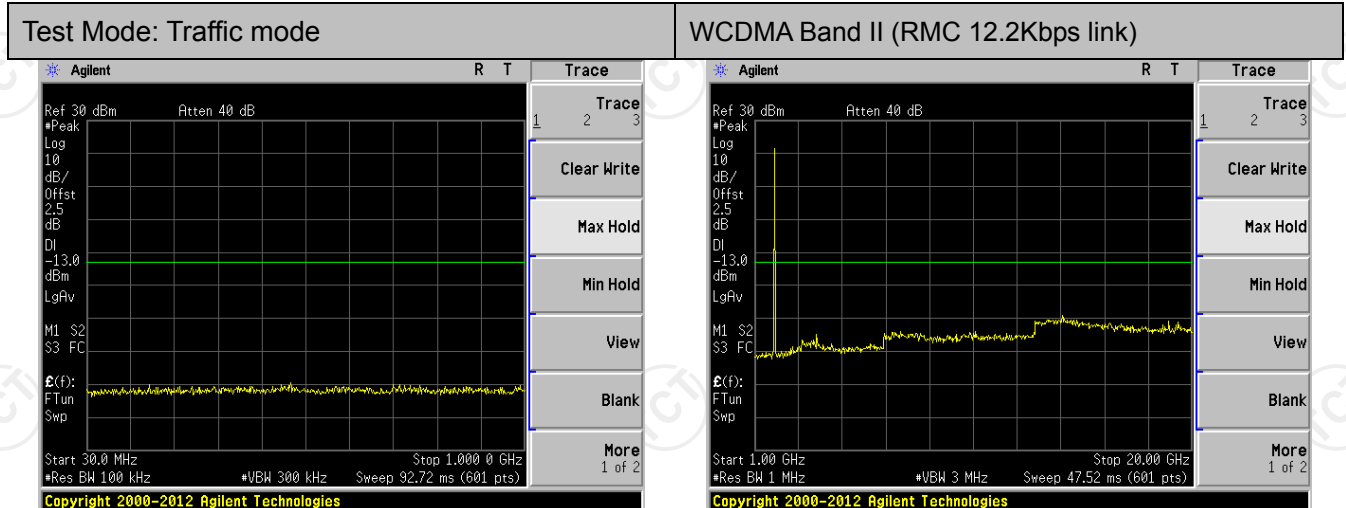
Lowest channel



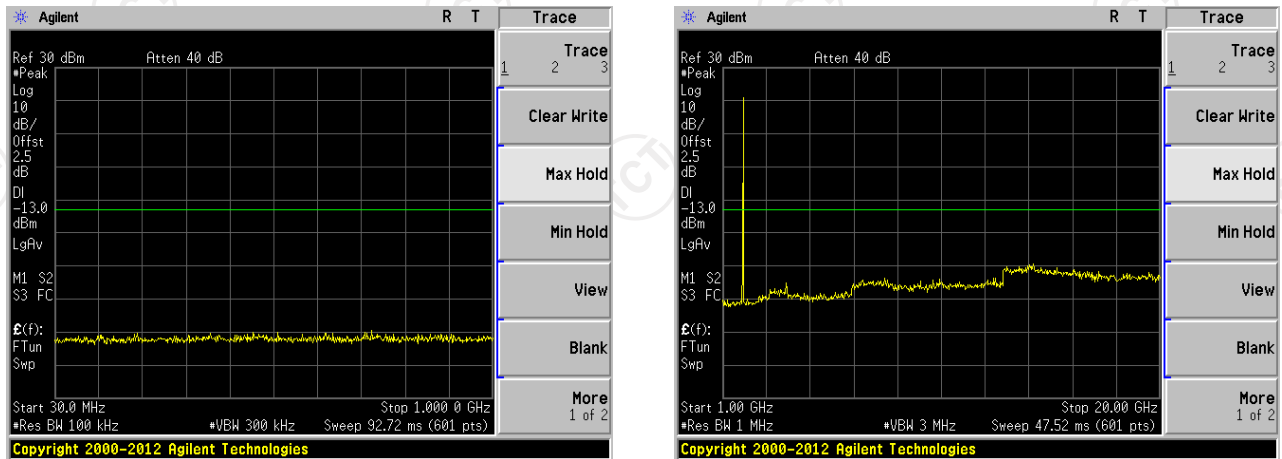
Middle channel



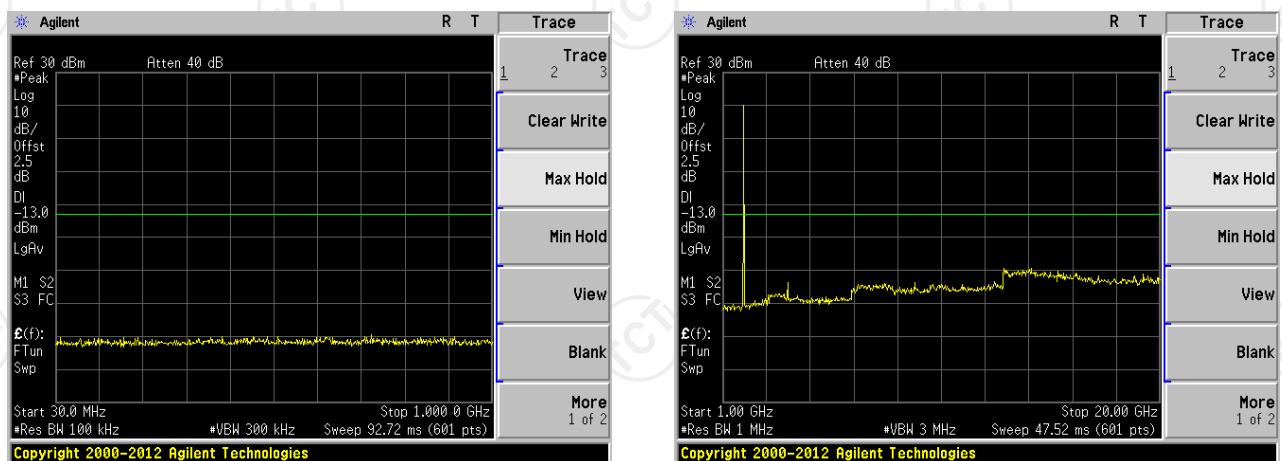
Highest channel



Lowest channel

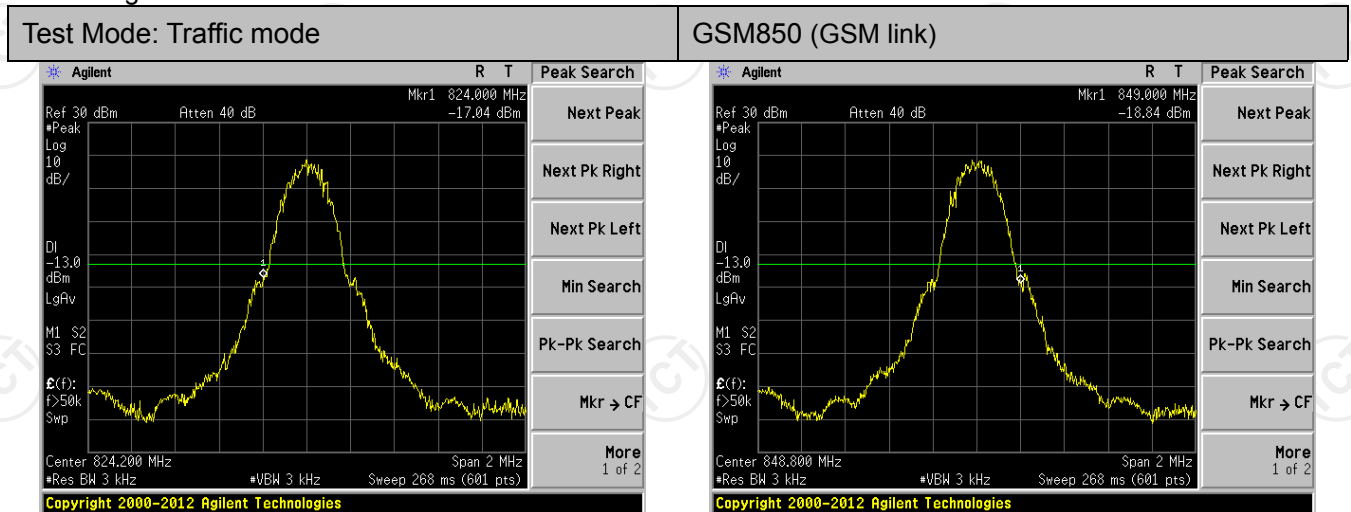


Middle channel



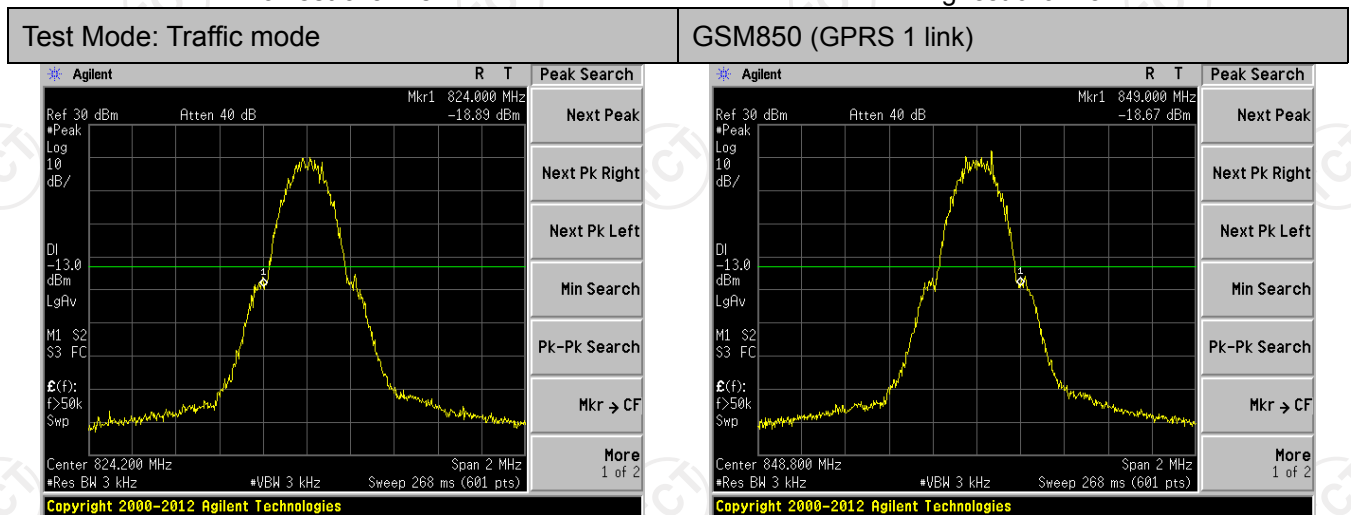
Highest channel

Band Edge:



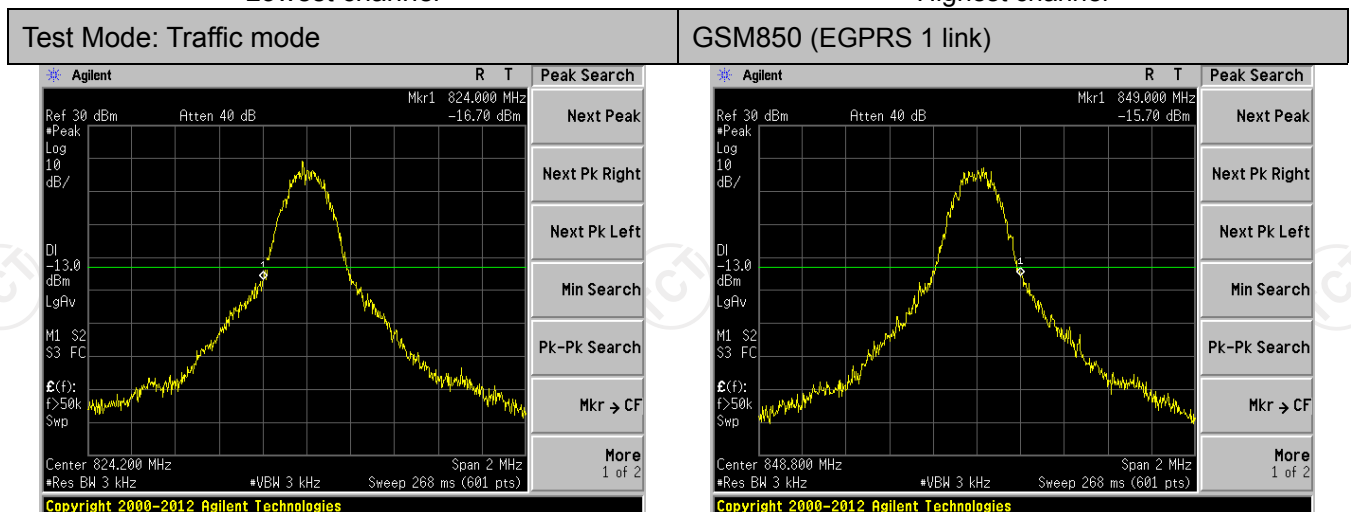
Lowest channel

Highest channel



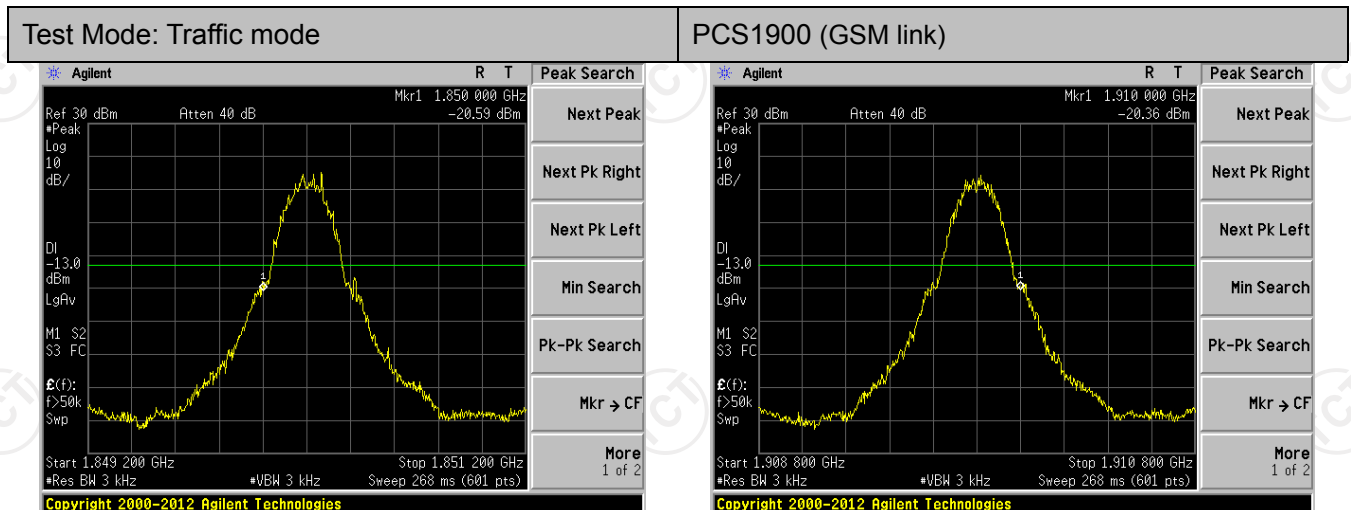
Lowest channel

Highest channel



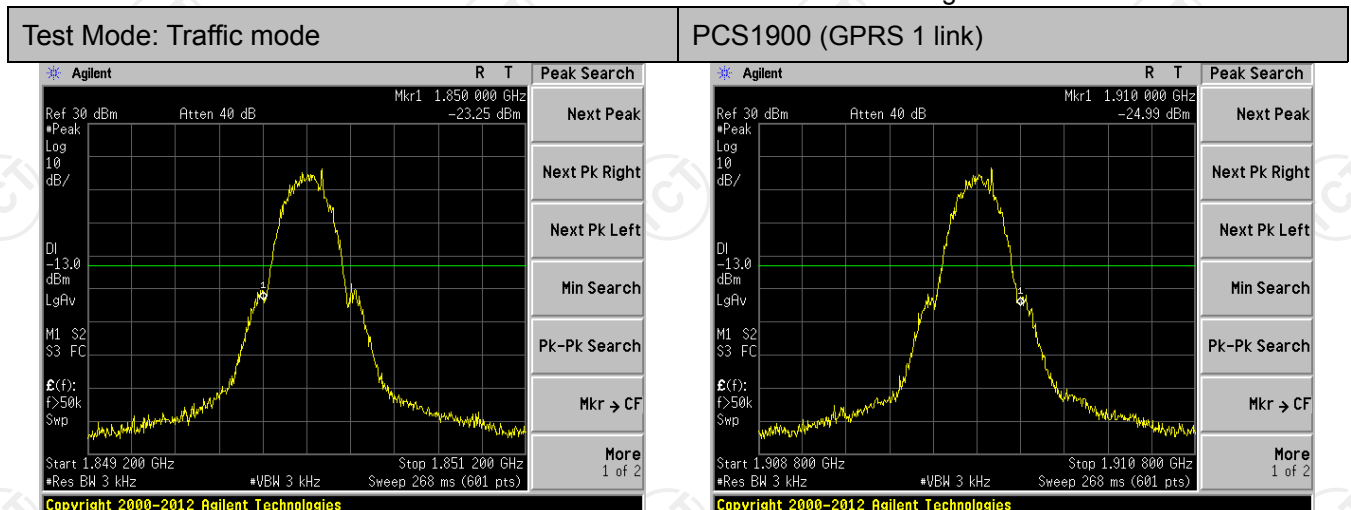
Lowest channel

Highest channel



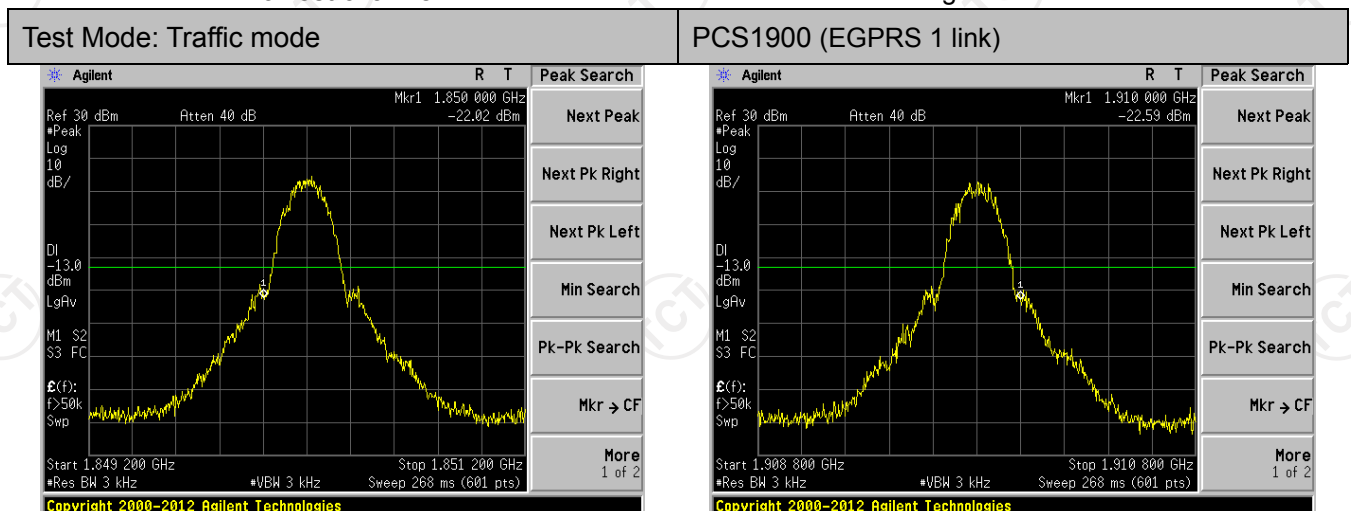
Lowest channel

Highest channel



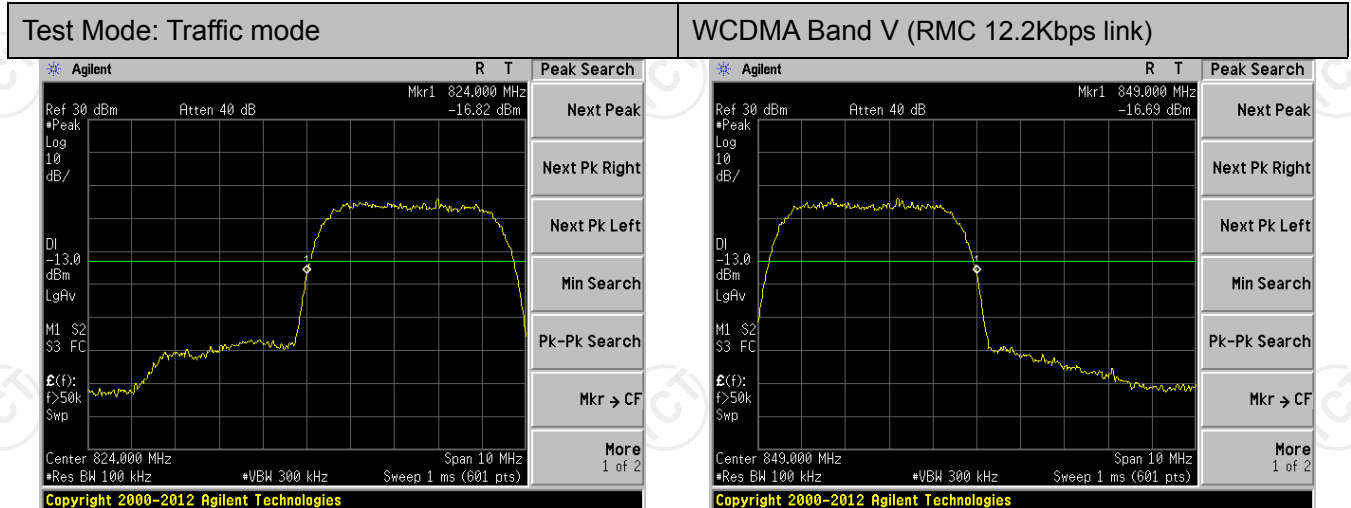
Lowest channel

Highest channel



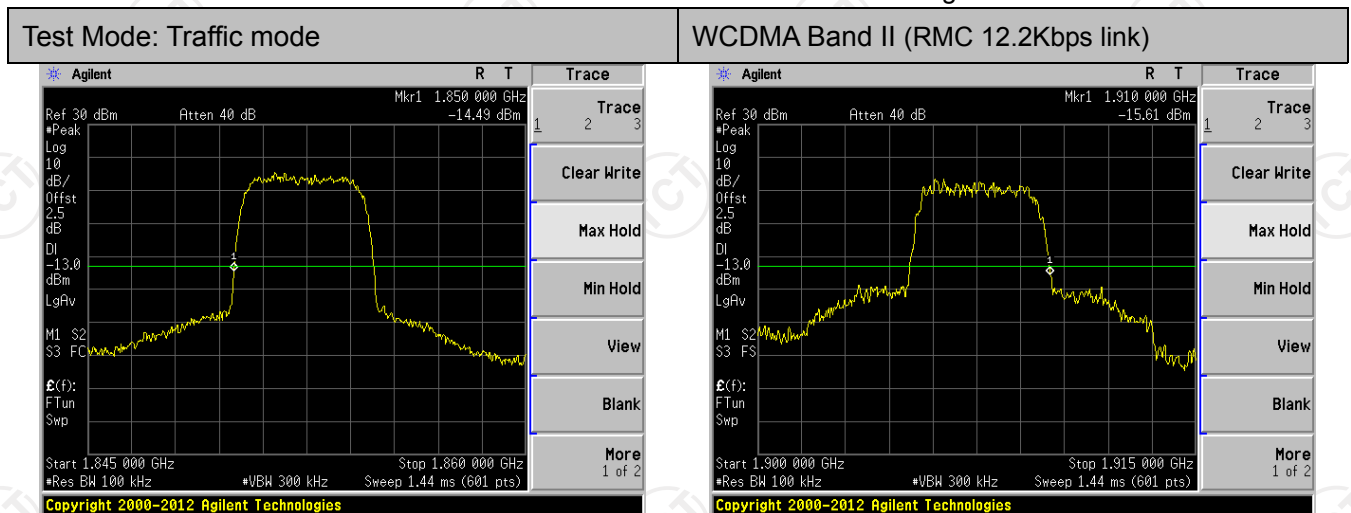
Lowest channel

Highest channel



Lowest channel

Highest channel

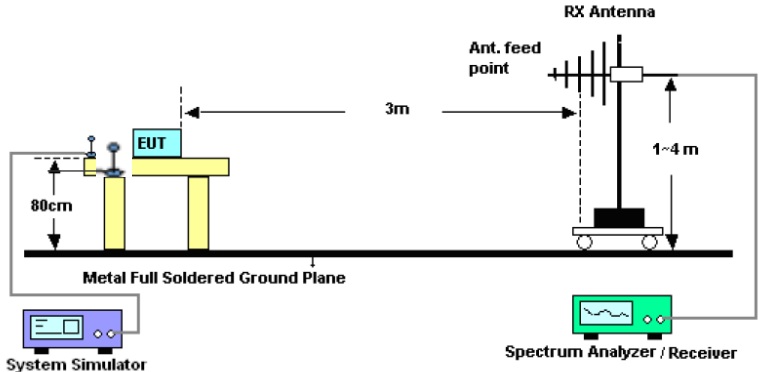
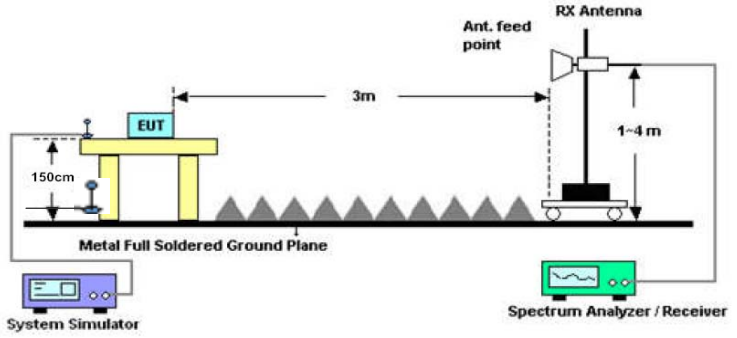


Lowest channel

Highest channel

## 6.5. Effective Radiated Power and Effective Isotropic Radiated Power Measurement

### 6.5.1. Test Specification

|                   |                                                                                                                                                                                             |               |            |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------|
| Test Requirement: | FCC part 22.913(a) and FCC part 24.232(b)<br>FCC part 27.50(d)                                                                                                                              |               |            |
| Test Method:      | FCC part 2.1046                                                                                                                                                                             |               |            |
| Receiver Setup:   |                                                                                                                                                                                             | GSM/GPRS/EDGE | WCDMA/HSPA |
|                   | SPAN                                                                                                                                                                                        | 500kHz        | 10MHz      |
|                   | RBW                                                                                                                                                                                         | 10kHz         | 100kHz     |
|                   | VBW                                                                                                                                                                                         | 30kHz         | 300kHz     |
|                   | Detector                                                                                                                                                                                    | RMS           | RMS        |
|                   | Trace                                                                                                                                                                                       | Average       | Average    |
|                   | Average Type                                                                                                                                                                                | Power         | Power      |
|                   | Sweep Count                                                                                                                                                                                 | 100           | 100        |
| Limit:            | GSM850 7W ERP<br>PCS1900 2W EIRP<br>WCDMA Band V: 7W ERP<br>WCDMA Band II: 2W EIRP                                                                                                          |               |            |
| Test Setup:       | From 30MHz to 1GHz                                                                                                                                                                          |               |            |
|                   |  <p>Above 1GHz</p>  |               |            |
| Test Procedure:   | 1. The testing follows FCC KDB FCC KDB 971168 D01v03 Section 5.8. and ANSI / TIA-603-E.                                                                                                     |               |            |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               | <ol style="list-style-type: none"> <li>2. The EUT was placed on a non-conductive rotating platform 0.8 meters high below 1GHz and a non-conductive rotating platform 1.5 meters high above 1GHz in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB FCC KDB 971168 D01v03.</li> <li>3. Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment.</li> <li>4. Replace the transmitter under test with a substitution antenna. The center of the antenna should be at the same location as the center of the antenna under test.</li> <li>5. Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.<br/> <math display="block">\text{LOSS} = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}</math> </li> <li>6. Determine the effective radiated output power at each angular position from the readings in steps 3) and 5) using the following equation:<br/> <math display="block">\text{ERP (dBm)} = \text{LVL (dBm)} + \text{LOSS (dB)}</math> </li> <li>7. The maximum ERP is the maximum value determined in the preceding step.</li> <li>8. Calculating ERP:<br/> <math display="block">\text{ERP (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBd)}</math> <math display="block">\text{Antenna Gain (dBd)} = \text{Antenna Gain (dBi)} - 2.15</math> <math display="block">\text{EIRP} = \text{ERP} - 2.15</math> </li> </ol> |
| Test results: | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## 6.5.2. Test Instruments

| Radiated Emission Test Site (966) |                    |            |               |                 |
|-----------------------------------|--------------------|------------|---------------|-----------------|
| Name of Equipment                 | Manufacturer       | Model      | Serial Number | Calibration Due |
| System simulator                  | R&S                | CMU200     | 111382        | Sep. 27, 2018   |
| Spectrum Analyzer                 | ROHDE&SCHW ARZ     | R&S        | FSQ           | Sep. 27, 2018   |
| Signal Generator                  | HP                 | 83623B     | 3614A00396    | Sep. 27, 2018   |
| Broadband Antenna                 | Schwarzbeck        | VULB9163   | 340           | Sep. 27, 2018   |
| Horn Antenna                      | Schwarzbeck        | BBHA 9120D | 631           | Sep. 27, 2018   |
| Broadband Antenna                 | Schwarzbeck        | VULB9163   | 412           | Sep. 27, 2018   |
| Horn Antenna                      | Schwarzbeck        | BBHA 9120D | 1201          | Mar. 05, 2018   |
| Dipole Antenna                    | TCT                | TCT-RF     | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-1GHz)            | TCT                | RE-low-01  | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-40GHz)           | TCT                | RE-high-02 | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-1GHz)            | TCT                | RE-low-03  | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-40GHz)           | TCT                | RE-High-04 | N/A           | Sep. 27, 2018   |
| Antenna Mast                      | Keleto             | CC-A-4M    | N/A           | N/A             |
| EMI Test Software                 | Shurple Technology | EZ-EMC     | N/A           | N/A             |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 6.5.3. Test Data

| EUT mode             | Channel | EUT Pol. | Antenna Pol. | ERP(dBm) | Limit (dBm) | Result |
|----------------------|---------|----------|--------------|----------|-------------|--------|
| GSM850<br>(GSM link) | Lowest  | H        | V            | 32.11    | 38.45       | Pass   |
|                      |         |          | H            | 29.35    |             |        |
|                      |         | E1       | V            | 24.05    |             |        |
|                      |         |          | H            | 29.64    |             |        |
|                      |         | E2       | V            | 23.23    |             |        |
|                      |         |          | H            | 27.38    |             |        |
|                      | Middle  | H        | V            | 32.09    | 38.45       | Pass   |
|                      |         |          | H            | 29.47    |             |        |
|                      |         | E1       | V            | 24.27    |             |        |
|                      |         |          | H            | 29.89    |             |        |
|                      |         | E2       | V            | 24.93    |             |        |
|                      |         |          | H            | 28.00    |             |        |
|                      | Highest | H        | V            | 31.90    | 38.45       | Pass   |
|                      |         |          | H            | 29.20    |             |        |
|                      |         | E1       | V            | 24.20    |             |        |
|                      |         |          | H            | 28.78    |             |        |
|                      |         | E2       | V            | 23.00    |             |        |
|                      |         |          | H            | 28.44    |             |        |

| EUT mode                | Channel | EUT Pol. | Antenna Pol. | ERP(dBm) | Limit (dBm) | Result |
|-------------------------|---------|----------|--------------|----------|-------------|--------|
| GSM850<br>(GPRS 1 link) | Lowest  | H        | V            | 32.10    | 38.45       | Pass   |
|                         |         |          | H            | 29.02    |             |        |
|                         |         | E1       | V            | 23.70    |             |        |
|                         |         |          | H            | 29.27    |             |        |
|                         |         | E2       | V            | 22.84    |             |        |
|                         |         |          | H            | 26.97    |             |        |
|                         | Middle  | H        | V            | 32.11    | 38.45       | Pass   |
|                         |         |          | H            | 29.05    |             |        |
|                         |         | E1       | V            | 23.82    |             |        |
|                         |         |          | H            | 29.43    |             |        |
|                         |         | E2       | V            | 24.51    |             |        |
|                         |         |          | H            | 27.57    |             |        |
|                         | Highest | H        | V            | 32.53    | 38.45       | Pass   |
|                         |         |          | H            | 28.81    |             |        |
|                         |         | E1       | V            | 23.79    |             |        |
|                         |         |          | H            | 28.35    |             |        |
|                         |         | E2       | V            | 22.65    |             |        |
|                         |         |          | H            | 28.07    |             |        |

| EUT mode                 | Channel | EUT Pol. | Antenna Pol. | ERP(dBm) | Limit (dBm) | Result |
|--------------------------|---------|----------|--------------|----------|-------------|--------|
| GSM850<br>(EGPRS 1 link) | Lowest  | H        | V            | 29.42    | 38.45       | Pass   |
|                          |         |          | H            | 24.37    |             |        |
|                          |         | E1       | V            | 18.98    |             |        |
|                          |         |          | H            | 24.86    |             |        |
|                          |         | E2       | V            | 18.34    |             |        |
|                          |         |          | H            | 22.72    |             |        |
|                          | Middle  | H        | V            | 28.65    | 38.45       | Pass   |
|                          |         |          | H            | 24.75    |             |        |
|                          |         | E1       | V            | 19.50    |             |        |
|                          |         |          | H            | 25.42    |             |        |
|                          |         | E2       | V            | 20.05    |             |        |
|                          |         |          | H            | 23.31    |             |        |
|                          | Highest | H        | V            | 28.87    | 38.45       | Pass   |
|                          |         |          | H            | 24.14    |             |        |
|                          |         | E1       | V            | 19.08    |             |        |
|                          |         |          | H            | 23.91    |             |        |
|                          |         | E2       | V            | 19.50    |             |        |
|                          |         |          | H            | 23.21    |             |        |

| EUT mode              | Channel | EUT Pol. | Antenna Pol. | EIRP (dBm) | Limit (dBm) | Result |
|-----------------------|---------|----------|--------------|------------|-------------|--------|
| PCS1900<br>(GSM link) | Lowest  | H        | V            | 28.60      | 33.01       | Pass   |
|                       |         |          | H            | 25.85      |             |        |
|                       |         | E1       | V            | 21.10      |             |        |
|                       |         |          | H            | 26.11      |             |        |
|                       |         | E2       | V            | 20.36      |             |        |
|                       |         |          | H            | 24.07      |             |        |
|                       | Middle  | H        | V            | 28.72      | 33.01       | Pass   |
|                       |         |          | H            | 26.00      |             |        |
|                       |         | E1       | V            | 21.34      |             |        |
|                       |         |          | H            | 26.39      |             |        |
|                       |         | E2       | V            | 21.94      |             |        |
|                       |         |          | H            | 24.68      |             |        |
|                       | Highest | H        | V            | 29.18      | 33.01       | Pass   |
|                       |         |          | H            | 25.86      |             |        |
|                       |         | E1       | V            | 21.38      |             |        |
|                       |         |          | H            | 25.48      |             |        |
|                       |         | E2       | V            | 20.31      |             |        |
|                       |         |          | H            | 25.19      |             |        |

| EUT mode                 | Channel | EUT Pol. | Antenna Pol. | EIRP (dBm) | Limit (dBm) | Result |
|--------------------------|---------|----------|--------------|------------|-------------|--------|
| PCS1900<br>(GPRS 1 link) | Lowest  | H        | V            | 28.21      | 33.01       | Pass   |
|                          |         |          | H            | 25.44      |             |        |
|                          |         | E1       | V            | 20.66      |             |        |
|                          |         |          | H            | 25.64      |             |        |
|                          |         | E2       | V            | 21.86      |             |        |
|                          |         |          | H            | 23.55      |             |        |
|                          | Middle  | H        | V            | 28.24      | 33.01       | Pass   |
|                          |         |          | H            | 25.46      |             |        |
|                          |         | E1       | V            | 20.76      |             |        |
|                          |         |          | H            | 25.78      |             |        |
|                          |         | E2       | V            | 21.40      |             |        |
|                          |         |          | H            | 24.12      |             |        |
|                          | Highest | H        | V            | 28.71      | 33.01       | Pass   |
|                          |         |          | H            | 25.36      |             |        |
|                          |         | E1       | V            | 20.85      |             |        |
|                          |         |          | H            | 24.92      |             |        |
|                          |         | E2       | V            | 20.88      |             |        |
|                          |         |          | H            | 24.73      |             |        |

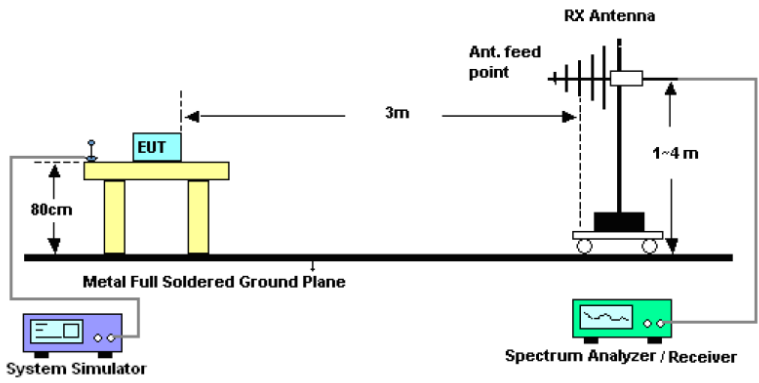
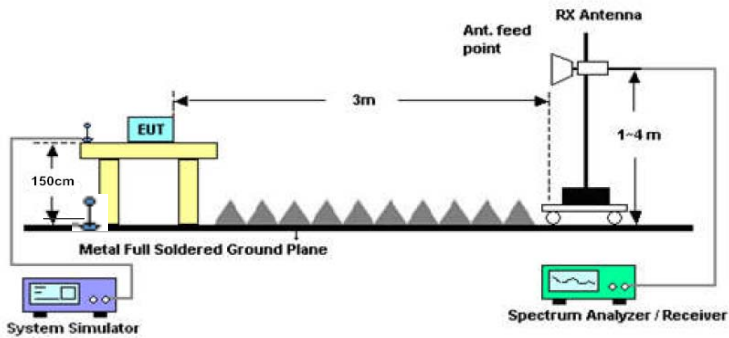
| EUT mode                  | Channel | EUT Pol. | Antenna Pol. | EIRP (dBm) | Limit (dBm) | Result |
|---------------------------|---------|----------|--------------|------------|-------------|--------|
| PCS1900<br>(EGPRS 1 link) | Lowest  | H        | V            | 25.02      | 33.01       | Pass   |
|                           |         |          | H            | 20.72      |             |        |
|                           |         | E1       | V            | 14.99      |             |        |
|                           |         |          | H            | 20.98      |             |        |
|                           |         | E2       | V            | 14.06      |             |        |
|                           |         |          | H            | 18.51      |             |        |
|                           | Middle  | H        | V            | 24.90      | 33.01       | Pass   |
|                           |         |          | H            | 20.70      |             |        |
|                           |         | E1       | V            | 20.09      |             |        |
|                           |         |          | H            | 21.11      |             |        |
|                           |         | E2       | V            | 19.83      |             |        |
|                           |         |          | H            | 20.11      |             |        |
|                           | Highest | H        | V            | 24.40      | 33.01       | Pass   |
|                           |         |          | H            | 20.39      |             |        |
|                           |         | E1       | V            | 20.00      |             |        |
|                           |         |          | H            | 20.90      |             |        |
|                           |         | E2       | V            | 19.78      |             |        |
|                           |         |          | H            | 20.62      |             |        |

| EUT mode        | Channel | EUT Pol. | Antenna Pol. | ERP(dBm) | Limit (dBm) | Result |
|-----------------|---------|----------|--------------|----------|-------------|--------|
| WCDMA<br>Band V | Lowest  | H        | V            | 21.79    | 38.45       | Pass   |
|                 |         |          | H            | 21.70    |             |        |
|                 |         | E1       | V            | 19.16    |             |        |
|                 |         |          | H            | 21.60    |             |        |
|                 |         | E2       | V            | 19.37    |             |        |
|                 |         |          | H            | 19.88    |             |        |
|                 | Middle  | H        | V            | 21.50    | 38.45       | Pass   |
|                 |         |          | H            | 20.25    |             |        |
|                 |         | E1       | V            | 19.76    |             |        |
|                 |         |          | H            | 21.21    |             |        |
|                 |         | E2       | V            | 19.38    |             |        |
|                 |         |          | H            | 21.21    |             |        |
|                 | Highest | H        | V            | 21.40    | 38.45       | Pass   |
|                 |         |          | H            | 19.90    |             |        |
|                 |         | E1       | V            | 19.56    |             |        |
|                 |         |          | H            | 19.35    |             |        |
|                 |         | E2       | V            | 21.28    |             |        |
|                 |         |          | H            | 19.61    |             |        |

| EUT mode         | Channel | EUT Pol. | Antenna Pol. | EIRP(dBm) | Limit (dBm) | Result |
|------------------|---------|----------|--------------|-----------|-------------|--------|
| WCDMA<br>Band II | Lowest  | H        | V            | 20.71     | 33.01       | Pass   |
|                  |         |          | H            | 20.60     |             |        |
|                  |         | E1       | V            | 18.06     |             |        |
|                  |         |          | H            | 20.48     |             |        |
|                  |         | E2       | V            | 17.24     |             |        |
|                  |         |          | H            | 19.74     |             |        |
|                  | Middle  | H        | V            | 20.38     | 33.01       | Pass   |
|                  |         |          | H            | 20.11     |             |        |
|                  |         | E1       | V            | 17.60     |             |        |
|                  |         |          | H            | 20.04     |             |        |
|                  |         | E2       | V            | 18.24     |             |        |
|                  |         |          | H            | 20.05     |             |        |
|                  | Highest | H        | V            | 20.28     | 33.01       | Pass   |
|                  |         |          | H            | 19.77     |             |        |
|                  |         | E1       | V            | 16.42     |             |        |
|                  |         |          | H            | 19.20     |             |        |
|                  |         | E2       | V            | 16.18     |             |        |
|                  |         |          | H            | 19.50     |             |        |

## 6.6. Field Strength of Spurious Radiation Measurement

### 6.6.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC part 22.917(a) and FCC part 24.238(a)<br>FCC part 27.53(g)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Test Method:</b>      | FCC part 2.1053                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Operation mode:</b>   | Refer to item 4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Limit:</b>            | -13dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Test setup:</b>       | <p>For 30MHz~1GHz</p>  <p>Above 1GHz</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Test Procedure:</b>   | <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB FCC KDB 971168 D01v03 Section 5.8 and ANSI / TIA-603-E.</li> <li>2. The EUT was placed on a rotatable wooden table 0.8 meters below 1GHz and a rotatable wooden table 1.5 meters above 1GHz above the ground.</li> <li>3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.</li> <li>4. The table was rotated 360 degrees to determine the position of the highest spurious emission.</li> <li>5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.</li> </ol> |

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | <ol style="list-style-type: none"> <li>6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.</li> <li>7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.</li> <li>8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.</li> <li>9. Taking the record of output power at antenna port.</li> <li>10. Repeat step 7 to step 8 for another polarization.</li> <li>11. <math>EIRP\ (dBm) = S.G.\ Power - Tx\ Cable\ Loss + Tx\ Antenna\ Gain</math></li> <li>12. <math>ERP\ (dBm) = EIRP - 2.15</math></li> <li>13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> <li>14. The limit line is derived from <math>43 + 10\log(P)</math> dB below the transmitter power P(Watts)<br/> <math>= P(W) - [43 + 10\log(P)]\ (dB)</math><br/> <math>= [30 + 10\log(P)]\ (dBm) - [43 + 10\log(P)]\ (dB)</math><br/> <math>= -13dBm.</math></li> </ol> |
| <b>Test results:</b> | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Remark:</b>       | All modulations have been tested, but only the worst modulation show in this test item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## 6.6.2. Test Instruments

| Radiated Emission Test Site (966) |                    |            |               |                 |
|-----------------------------------|--------------------|------------|---------------|-----------------|
| Name of Equipment                 | Manufacturer       | Model      | Serial Number | Calibration Due |
| System simulator                  | R&S                | CMU200     | 111382        | Sep. 27, 2018   |
| Spectrum Analyzer                 | ROHDE&SCHW ARZ     | R&S        | FSQ           | Sep. 27, 2018   |
| Signal Generator                  | HP                 | 83623B     | 3614A00396    | Sep. 27, 2018   |
| Broadband Antenna                 | Schwarzbeck        | VULB9163   | 340           | Sep. 27, 2018   |
| Horn Antenna                      | Schwarzbeck        | BBHA 9120D | 631           | Sep. 27, 2018   |
| Broadband Antenna                 | Schwarzbeck        | VULB9163   | 412           | Sep. 27, 2018   |
| Horn Antenna                      | Schwarzbeck        | BBHA 9120D | 1201          | Mar. 05, 2018   |
| Horn Antenna                      | Schwarzbeck        | BBH 9170   | 582           | Jun. 07, 2018   |
| Dipole Antenna                    | TCT                | TCT-RF     | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-1GHz)            | TCT                | RE-low-01  | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-40GHz)           | TCT                | RE-high-02 | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-1GHz)            | TCT                | RE-low-03  | N/A           | Sep. 27, 2018   |
| Coax cable (9kHz-40GHz)           | TCT                | RE-High-04 | N/A           | Sep. 27, 2018   |
| Antenna Mast                      | Keleto             | CC-A-4M    | N/A           | N/A             |
| EMI Test Software                 | Shurple Technology | EZ-EMC     | N/A           | N/A             |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

## 6.6.3. Test Data

| Test mode:      | GSM850            |             | Test channel: | Lowest  |
|-----------------|-------------------|-------------|---------------|---------|
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 1648.40         | Vertical          | -36.68      | -13.00        | Pass    |
| 2472.60         | V                 | -39.39      |               |         |
| 3296.80         | V                 | -41.61      |               |         |
| 4121.00         | V                 | -43.76      |               |         |
| 4945.20         | V                 | ---         |               |         |
| 1648.40         | Horizontal        | -41.87      | -13.00        | Pass    |
| 2472.60         | H                 | -45.69      |               |         |
| 3296.80         | H                 | -47.23      |               |         |
| 4121.00         | H                 | -49.91      |               |         |
| 4945.20         | H                 | ---         |               |         |
| Test mode:      | GSM850            |             | Test channel: | Middle  |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 1673.20         | Vertical          | -37.91      | -13.00        | Pass    |
| 2509.80         | V                 | -40.16      |               |         |
| 3346.40         | V                 | -42.02      |               |         |
| 4183.00         | V                 | -43.82      |               |         |
| 5019.60         | V                 | ---         |               |         |
| 1673.20         | Horizontal        | -42.24      | -13.00        | Pass    |
| 2509.80         | H                 | -45.43      |               |         |
| 3346.40         | H                 | -46.71      |               |         |
| 4183.00         | H                 | -48.95      |               |         |
| 5019.60         | H                 | ---         |               |         |
| Test mode:      | GSM850            |             | Test channel: | Highest |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 1697.60         | Vertical          | -38.04      | -13.00        | Pass    |
| 2546.40         | V                 | -40.05      |               |         |
| 3395.20         | V                 | -41.69      |               |         |
| 4244.00         | V                 | -43.30      |               |         |
| 5092.80         | V                 | ---         |               |         |
| 1697.60         | Horizontal        | -41.89      | -13.00        | Pass    |
| 2546.40         | H                 | -44.73      |               |         |
| 3395.20         | H                 | -45.87      |               |         |
| 4244.00         | H                 | -47.86      |               |         |
| 5092.80         | H                 | ---         |               |         |

Remark :

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

| Test mode:      | PCS1900           |             | Test channel: | Lowest  |
|-----------------|-------------------|-------------|---------------|---------|
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 3700.40         | Vertical          | -36.83      | -13.00        | Pass    |
| 5550.60         | V                 | -39.22      |               |         |
| 7400.80         | V                 | -41.20      |               |         |
| 9251.00         | V                 | -43.10      |               |         |
| 11101.20        | V                 | ---         |               |         |
| 3700.40         | Horizontal        | -41.42      | -13.00        | Pass    |
| 5550.60         | H                 | -44.81      |               |         |
| 7400.80         | H                 | -46.17      |               |         |
| 9251.00         | H                 | -48.55      |               |         |
| 11101.20        | H                 | ---         |               |         |
| Test mode:      | PCS1900           |             | Test channel: | Middle  |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 3760.00         | Vertical          | -34.43      | -13.00        | Pass    |
| 5640.00         | V                 | -36.91      |               |         |
| 7520.00         | V                 | -38.96      |               |         |
| 9400.00         | V                 | -40.93      |               |         |
| 11280.00        | V                 | ---         |               |         |
| 3760.00         | Horizontal        | -39.19      | -13.00        | Pass    |
| 5640.00         | H                 | -42.69      |               |         |
| 7520.00         | H                 | -44.12      |               |         |
| 9400.00         | H                 | -46.59      |               |         |
| 11280.00        | H                 | ---         |               |         |
| Test mode:      | PCS1900           |             | Test channel: | Highest |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 3819.60         | Vertical          | -35.67      | -13.00        | Pass    |
| 5729.40         | V                 | -38.06      |               |         |
| 7639.20         | V                 | -40.05      |               |         |
| 9549.00         | V                 | -41.96      |               |         |
| 11458.80        | V                 | ---         |               |         |
| 3819.60         | Horizontal        | -40.27      | -13.00        | Pass    |
| 5729.40         | H                 | -43.67      |               |         |
| 7639.20         | H                 | -45.04      |               |         |
| 9549.00         | H                 | -47.43      |               |         |
| 11458.80        | H                 | ---         |               |         |

Remark :

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

| Test mode:      | WCDMA Band V      |             | Test channel: | Lowest  |
|-----------------|-------------------|-------------|---------------|---------|
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 1652.80         | Vertical          | -35.92      | -13.00        | Pass    |
| 2479.20         | V                 | -39.73      |               |         |
| 3305.60         | V                 | -42.54      |               |         |
| 4132.00         | V                 | -40.09      |               |         |
| 4958.40         | V                 | ---         |               |         |
| 1652.80         | Horizontal        | -38.84      | -13.00        | Pass    |
| 2479.20         | H                 | -41.62      |               |         |
| 3305.60         | H                 | -47.10      |               |         |
| 4132.00         | H                 | -50.82      |               |         |
| 4958.40         | H                 | ---         |               |         |
| Test mode:      | WCDMA Band V      |             | Test channel: | Middle  |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 1672.80         | Vertical          | -38.23      | -13.00        | Pass    |
| 2509.20         | V                 | -39.59      |               |         |
| 3345.60         | V                 | -43.27      |               |         |
| 4182.00         | V                 | -45.75      |               |         |
| 5018.40         | V                 | ---         |               |         |
| 1672.80         | Horizontal        | -40.77      | -13.00        | Pass    |
| 2509.20         | H                 | -42.75      |               |         |
| 3345.60         | H                 | -47.50      |               |         |
| 4182.00         | H                 | -49.96      |               |         |
| 5018.40         | H                 | ---         |               |         |
| Test mode:      | WCDMA Band V      |             | Test channel: | Highest |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 1693.20         | Vertical          | -36.95      | -13.00        | Pass    |
| 2539.80         | V                 | -39.43      |               |         |
| 3386.40         | V                 | -42.10      |               |         |
| 4233.00         | V                 | -45.01      |               |         |
| 5079.60         | V                 | ---         |               |         |
| 1693.20         | Horizontal        | -40.37      | -13.00        | Pass    |
| 2539.80         | H                 | -42.85      |               |         |
| 3386.40         | H                 | -44.27      |               |         |
| 4233.00         | H                 | -50.51      |               |         |
| 5079.60         | H                 | ---         |               |         |

Remark :

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured.
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

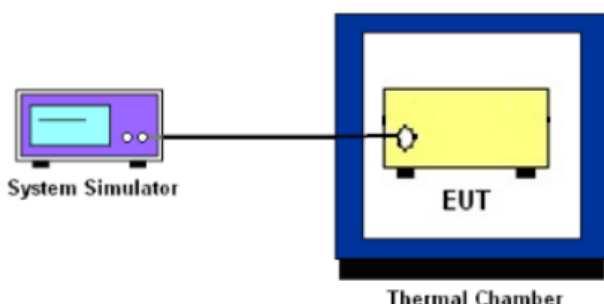
| Test mode:      | WCDMA Band II     |             | Test channel: | Lowest  |
|-----------------|-------------------|-------------|---------------|---------|
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 3704.80         | Vertical          | -38.37      | -13.00        | Pass    |
| 5557.20         | V                 | -41.47      |               |         |
| 7409.60         | V                 | -44.04      |               |         |
| 9262.00         | V                 | -46.50      |               |         |
| 11114.40        | V                 | ---         |               |         |
| 3704.80         | Horizontal        | -44.32      | -13.00        | Pass    |
| 5557.20         | H                 | -48.70      |               |         |
| 7409.60         | H                 | -50.48      |               |         |
| 9262.00         | H                 | -53.58      |               |         |
| 11114.40        | H                 | ---         |               |         |
| Test mode:      | WCDMA Band II     |             | Test channel: | Middle  |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 3760.00         | Vertical          | -39.21      | -13.00        | Pass    |
| 5640.00         | V                 | -42.15      |               |         |
| 7520.00         | V                 | -44.57      |               |         |
| 9400.00         | V                 | -46.91      |               |         |
| 11280.00        | V                 | ---         |               |         |
| 3760.00         | Horizontal        | -44.84      | -13.00        | Pass    |
| 5640.00         | H                 | -49.00      |               |         |
| 7520.00         | H                 | -50.68      |               |         |
| 9400.00         | H                 | -53.61      |               |         |
| 11280.00        | H                 | ---         |               |         |
| Test mode:      | WCDMA Band II     |             | Test channel: | Highest |
| Frequency (MHz) | Spurious Emission |             | Limit (dBm)   | Result  |
|                 | Polarization      | Level (dBm) |               |         |
| 3815.20         | Vertical          | -38.52      | -13.00        | Pass    |
| 5722.80         | V                 | -41.26      |               |         |
| 7630.40         | V                 | -43.51      |               |         |
| 9538.00         | V                 | -45.69      |               |         |
| 11445.60        | V                 | ---         |               |         |
| 3815.20         | Horizontal        | -43.77      | -13.00        | Pass    |
| 5722.80         | H                 | -47.64      |               |         |
| 7630.40         | H                 | -49.20      |               |         |
| 9538.00         | H                 | -51.93      |               |         |
| 11445.60        | H                 | ---         |               |         |

Remark :

1. The emission behaviour belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

## 6.7. Frequency Stability Measurement

### 6.7.1. Test Specification

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Requirement:</b> | FCC Part 2.1055 ; FCC Part 22.355 ; FCC Part 24.235<br>FCC Part 27.54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Test Method:</b>      | FCC Part 2.1055(a)(1)(b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Operation mode:</b>   | Refer to item 4.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Limit:</b>            | $\pm 2.5$ ppm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Test Setup:</b>       |  <p>The diagram shows a 'System Simulator' (a purple box with a screen) connected by a black line to a yellow box labeled 'EUT'. The 'EUT' is positioned inside a blue square frame labeled 'Thermal Chamber'.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Test Procedure:</b>   | <p><b>Test Procedures for Temperature Variation</b></p> <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB FCC KDB 971168 D01v03 Section 9.0.</li> <li>2. The EUT was set up in the thermal chamber and connected with the system simulator.</li> <li>3. With power OFF, the temperature was decreased to <math>-30^{\circ}\text{C}</math> and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.</li> <li>4. With power OFF, the temperature was raised in <math>10^{\circ}\text{C}</math> steps up to <math>50^{\circ}\text{C}</math>. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.</li> </ol> <p><b>Test Procedures for Voltage Variation</b></p> <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB FCC KDB 971168 D01v03 Section 9.0.</li> <li>2. The EUT was placed in a temperature chamber at <math>25\pm 5^{\circ}\text{C}</math> and connected with the system simulator.</li> <li>3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.</li> <li>4. The variation in frequency was measured for the worst case.</li> </ol> |
| <b>Test Result:</b>      | PASS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Remark:</b>           | All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**6.7.2. Test Instruments**

| Equipment                                         | Manufacturer | Model             | Serial Number | Calibration Due |
|---------------------------------------------------|--------------|-------------------|---------------|-----------------|
| System simulator                                  | R&S          | CMU200            | 111382        | Sep. 27, 2018   |
| Programable<br>tempratuce and<br>humidity chamber | JQ           | JQ-2000           | N/A           | Sep. 27, 2018   |
| DC power supply                                   | Kingrang     | KR3005K<br>30V/5A | N/A           | Sep. 27, 2018   |
| RF cable<br>(9kHz-40GHz)                          | TCT          | RE-04             | N/A           | Sep. 27, 2018   |
| Antenna Connector                                 | TCT          | RFC-03            | N/A           | Sep. 27, 2018   |

**Note:** The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

### 6.7.3. Test Data

#### Test Result of Temperature Variation

| Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz     |                  |                 |        |             |        |
|--------------------------------------------------------------------------------|------------------|-----------------|--------|-------------|--------|
| Power supplied (Vdc)                                                           | Temperature (°C) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                  | Hz              | ppm    |             |        |
| 3.70                                                                           | -30              | 35              | 0.0420 | 2.5         | Pass   |
|                                                                                | -20              | 40              | 0.0475 |             |        |
|                                                                                | -10              | 34              | 0.0402 |             |        |
|                                                                                | 0                | 28              | 0.0329 |             |        |
|                                                                                | 10               | 32              | 0.0384 |             |        |
|                                                                                | 20               | 28              | 0.0329 |             |        |
|                                                                                | 30               | 46              | 0.0548 |             |        |
|                                                                                | 40               | 41              | 0.0493 |             |        |
|                                                                                | 50               | 40              | 0.0475 |             |        |
| Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz  |                  |                 |        |             |        |
| Power supplied (Vdc)                                                           | Temperature (°C) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                  | Hz              | ppm    |             |        |
| 3.70                                                                           | -30              | 22              | 0.0258 | 2.5         | Pass   |
|                                                                                | -20              | 24              | 0.0290 |             |        |
|                                                                                | -10              | 20              | 0.0242 |             |        |
|                                                                                | 0                | 18              | 0.0211 |             |        |
|                                                                                | 10               | 19              | 0.0227 |             |        |
|                                                                                | 20               | 16              | 0.0195 |             |        |
|                                                                                | 30               | 31              | 0.0370 |             |        |
|                                                                                | 40               | 26              | 0.0306 |             |        |
|                                                                                | 50               | 24              | 0.0290 |             |        |
| Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz |                  |                 |        |             |        |
| Power supplied (Vdc)                                                           | Temperature (°C) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                  | Hz              | ppm    |             |        |
| 3.70                                                                           | -30              | 49              | 0.0583 | 2.5         | Pass   |
|                                                                                | -20              | 56              | 0.0670 |             |        |
|                                                                                | -10              | 47              | 0.0565 |             |        |
|                                                                                | 0                | 41              | 0.0494 |             |        |
|                                                                                | 10               | 46              | 0.0550 |             |        |
|                                                                                | 20               | 40              | 0.0482 |             |        |
|                                                                                | 30               | 67              | 0.0799 |             |        |
|                                                                                | 40               | 58              | 0.0699 |             |        |
|                                                                                | 50               | 55              | 0.0663 |             |        |

| Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz     |                  |                 |        |     |        |
|--------------------------------------------------------------------------------|------------------|-----------------|--------|-----|--------|
| Power supplied (Vdc)                                                           | Temperature (°C) | Frequency error |        |     | Result |
|                                                                                |                  | Hz              | ppm    |     |        |
| 3.70                                                                           | -30              | 34              | 0.0181 | 2.5 | Pass   |
|                                                                                | -20              | 41              | 0.0218 |     |        |
|                                                                                | -10              | 34              | 0.0181 |     |        |
|                                                                                | 0                | 28              | 0.0151 |     |        |
|                                                                                | 10               | 34              | 0.0181 |     |        |
|                                                                                | 20               | 30              | 0.0157 |     |        |
|                                                                                | 30               | 49              | 0.0260 |     |        |
|                                                                                | 40               | 42              | 0.0224 |     |        |
|                                                                                | 50               | 40              | 0.0212 |     |        |
| Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz  |                  |                 |        |     |        |
| Power supplied (Vdc)                                                           | Temperature (°C) | Frequency error |        |     | Result |
|                                                                                |                  | Hz              | ppm    |     |        |
| 3.70                                                                           | -30              | 38              | 0.0199 | 2.5 | Pass   |
|                                                                                | -20              | 44              | 0.0233 |     |        |
|                                                                                | -10              | 35              | 0.0186 |     |        |
|                                                                                | 0                | 29              | 0.0153 |     |        |
|                                                                                | 10               | 36              | 0.0193 |     |        |
|                                                                                | 20               | 29              | 0.0153 |     |        |
|                                                                                | 30               | 50              | 0.0266 |     |        |
|                                                                                | 40               | 41              | 0.0219 |     |        |
|                                                                                | 50               | 44              | 0.0233 |     |        |
| Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz |                  |                 |        |     |        |
| Power supplied (Vdc)                                                           | Temperature (°C) | Frequency error |        |     | Result |
|                                                                                |                  | Hz              | ppm    |     |        |
| 3.70                                                                           | -30              | 102             | 0.0542 | 2.5 | Pass   |
|                                                                                | -20              | 120             | 0.0637 |     |        |
|                                                                                | -10              | 98              | 0.0521 |     |        |
|                                                                                | 0                | 81              | 0.0431 |     |        |
|                                                                                | 10               | 99              | 0.0527 |     |        |
|                                                                                | 20               | 83              | 0.0443 |     |        |
|                                                                                | 30               | 134             | 0.0714 |     |        |
|                                                                                | 40               | 113             | 0.0599 |     |        |
|                                                                                | 50               | 118             | 0.0629 |     |        |

| Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz   |                  |                 |        |             |        |
|--------------------------------------------------------------------------|------------------|-----------------|--------|-------------|--------|
| Power supplied (Vdc)                                                     | Temperature (°C) | Frequency error |        | Limit (ppm) | Result |
|                                                                          |                  | Hz              | ppm    |             |        |
| 3.70                                                                     | -30              | 97              | 0.1159 | 2.5         | Pass   |
|                                                                          | -20              | 139             | 0.1658 |             |        |
|                                                                          | -10              | 158             | 0.1885 |             |        |
|                                                                          | 0                | 70              | 0.0841 |             |        |
|                                                                          | 10               | 108             | 0.1295 |             |        |
|                                                                          | 20               | 120             | 0.1431 |             |        |
|                                                                          | 30               | 181             | 0.2158 |             |        |
|                                                                          | 40               | 169             | 0.2022 |             |        |
|                                                                          | 50               | 203             | 0.2431 |             |        |
| Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880.0MHz |                  |                 |        |             |        |
| Power supplied (Vdc)                                                     | Temperature (°C) | Frequency error |        | Limit (ppm) | Result |
|                                                                          |                  | Hz              | ppm    |             |        |
| 3.70                                                                     | -30              | 93              | 0.0493 | 2.5         | Pass   |
|                                                                          | -20              | 83              | 0.0439 |             |        |
|                                                                          | -10              | 71              | 0.0379 |             |        |
|                                                                          | 0                | 67              | 0.0355 |             |        |
|                                                                          | 10               | 61              | 0.0325 |             |        |
|                                                                          | 20               | 53              | 0.0283 |             |        |
|                                                                          | 30               | 67              | 0.0355 |             |        |
|                                                                          | 40               | 75              | 0.0397 |             |        |
|                                                                          | 50               | 71              | 0.0379 |             |        |

## Test Result of Voltage Variation

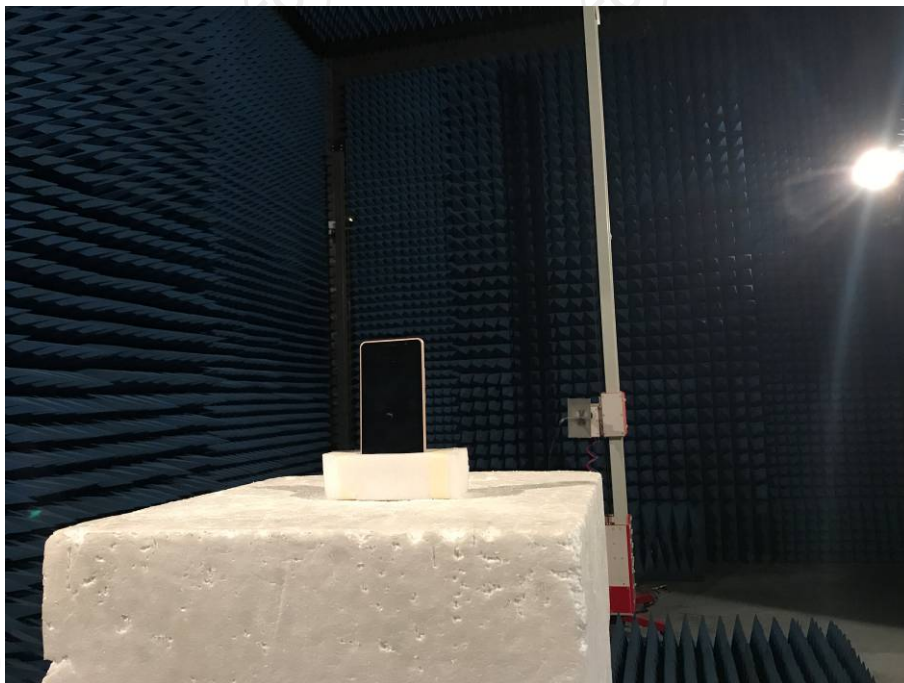
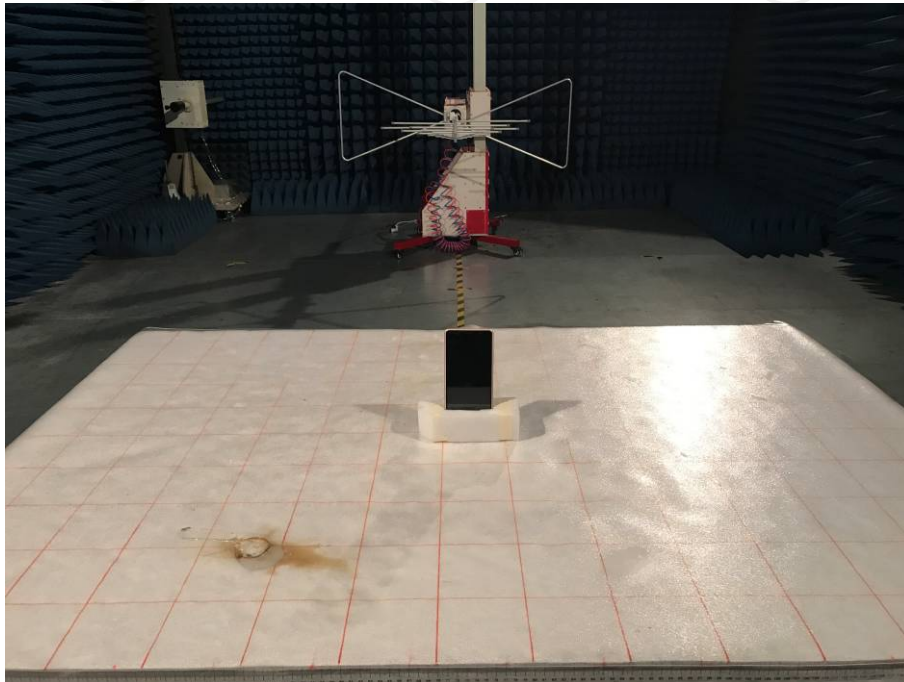
| Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz     |                      |                 |        |             |        |
|--------------------------------------------------------------------------------|----------------------|-----------------|--------|-------------|--------|
| Temperature (°C)                                                               | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                      | Hz              | ppm    |             |        |
| 25                                                                             | 4.25                 | 50              | 0.0599 | 2.5         | Pass   |
|                                                                                | 3.7                  | 58              | 0.0696 |             |        |
|                                                                                | 3.4                  | 66              | 0.0792 |             |        |
| Reference Frequency: GSM850 (GPRS 1 link) Middle channel=190 channel=836.6MHz  |                      |                 |        |             |        |
| Temperature (°C)                                                               | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                      | Hz              | ppm    |             |        |
| 25                                                                             | 4.25                 | 32              | 0.0377 | 2.5         | Pass   |
|                                                                                | 3.7                  | 23              | 0.0274 |             |        |
|                                                                                | 3.4                  | 26              | 0.0308 |             |        |
| Reference Frequency: GSM850 (EGPRS 1 link) Middle channel=190 channel=836.6MHz |                      |                 |        |             |        |
| Temperature (°C)                                                               | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                      | Hz              | ppm    |             |        |
| 25                                                                             | 4.25                 | 26              | 0.0313 | 2.5         | Pass   |
|                                                                                | 3.7                  | 30              | 0.0357 |             |        |
|                                                                                | 3.4                  | 33              | 0.0399 |             |        |

| Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz     |                      |                 |        |             |        |
|--------------------------------------------------------------------------------|----------------------|-----------------|--------|-------------|--------|
| Temperature (°C)                                                               | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                      | Hz              | ppm    |             |        |
| 25                                                                             | 4.25                 | 46              | 0.0244 | 2.5         | Pass   |
|                                                                                | 3.7                  | 56              | 0.0298 |             |        |
|                                                                                | 3.4                  | 56              | 0.0298 |             |        |
| Reference Frequency: PCS1900 (GPRS 1 link) Middle channel=661 channel=1880MHz  |                      |                 |        |             |        |
| Temperature (°C)                                                               | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                      | Hz              | ppm    |             |        |
| 25                                                                             | 4.25                 | 43              | 0.0230 | 2.5         | Pass   |
|                                                                                | 3.7                  | 32              | 0.0171 |             |        |
|                                                                                | 3.4                  | 34              | 0.0183 |             |        |
| Reference Frequency: PCS1900 (EGPRS 1 link) Middle channel=661 channel=1880MHz |                      |                 |        |             |        |
| Temperature (°C)                                                               | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                                |                      | Hz              | ppm    |             |        |
| 25                                                                             | 4.25                 | 62              | 0.0329 | 2.5         | Pass   |
|                                                                                | 3.7                  | 71              | 0.0378 |             |        |
|                                                                                | 3.4                  | 71              | 0.0380 |             |        |

| Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz  |                      |                 |        |             |        |
|-------------------------------------------------------------------------|----------------------|-----------------|--------|-------------|--------|
| Temperature (°C)                                                        | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                         |                      | Hz              | ppm    |             |        |
| 25                                                                      | 4.25                 | 54              | 0.0288 | 2.5         | Pass   |
|                                                                         | 3.7                  | 46              | 0.0243 |             |        |
|                                                                         | 3.4                  | 51              | 0.0269 |             |        |
| Reference Frequency: WCDMA Band II Middle channel=940 channel=1880.0MHz |                      |                 |        |             |        |
| Temperature (°C)                                                        | Power supplied (Vdc) | Frequency error |        | Limit (ppm) | Result |
|                                                                         |                      | Hz              | ppm    |             |        |
| 25                                                                      | 4.25                 | 14              | 0.0161 | 2.5         | Pass   |
|                                                                         | 3.7                  | 17              | 0.0203 |             |        |
|                                                                         | 3.4                  | 10              | 0.0120 |             |        |

## Appendix A: Photographs of Test Setup

### Radiated Emission



## Appendix B: Photographs of EUT

Refer to test report TCT171211E016

**\*\*\*\*\*END OF REPORT\*\*\*\*\***