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Report No.: SZEM141100609002  
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## **Appendix B for Test Report SZEM141100609002**

Authorized Signature:



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### 3 Appendix\_A: Effective (Isotropic) Radiated Power Output Data

#### Part I - Test Results

##### Part I – RF Conducted Power of Transmitter for GSM850

| TEST CONDITIONS | RF Output Power(Conducted) |             |               |             |               |             |
|-----------------|----------------------------|-------------|---------------|-------------|---------------|-------------|
|                 | Channel128(L)              |             | Channel190(M) |             | Channel251(H) |             |
|                 | 824.2MHz                   |             | 836.6 MHz     |             | 848.8 MHz     |             |
| Tnom/ Vnom      | Measured(dBm)              | Limit (dBm) | Measured(dBm) | Limit (dBm) | Measured(dBm) | Limit (dBm) |
| GSM/TM1         | 32.37                      | 38.5        | 32.36         | 38.5        | 32.30         | 38.5        |

##### Part 2– Effective Radiated Power of Transmitter (ERP) for GSM850

| Test Mode | Freq. (MHz) | Meas. Level (dBm) | Substitution Antenna Type | SGP (dBm) | Substitution Gain(dBd) | Cable Loss (dB) | Substitution Level(ERP) / dBm | Limit (dBm) | Result |
|-----------|-------------|-------------------|---------------------------|-----------|------------------------|-----------------|-------------------------------|-------------|--------|
| GSM/TM1   | 824.2       | 32.72             | Dipole Ant.               | 38.18     | -4.90                  | 0.6             | 32.68                         | 38.5        | Pass   |
| GSM/TM1   | 836.6       | 32.71             | Dipole Ant.               | 38.32     | -5.02                  | 0.6             | 32.70                         | 38.5        | Pass   |
| GSM/TM1   | 848.8       | 32.65             | Dipole Ant.               | 38.22     | -5.00                  | 0.6             | 32.62                         | 38.5        | Pass   |

#### Note1:

- a. For getting the ERP (Efficient Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

- b. SGP=Signal Generator Level

#### Note2:

RBW > emission bandwidth, VBW > 3 x RBW.

Detector: RMS



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### Part I – RF Conducted Power of Transmitter for GSM1900

| TEST CONDITIONS | RF Output Power(Conducted) |             |               |             |               |             |
|-----------------|----------------------------|-------------|---------------|-------------|---------------|-------------|
|                 | Channel128(L)              |             | Channel190(M) |             | Channel251(H) |             |
|                 | 1850.2MHz                  |             | 1880.0 MHz    |             | 1909.8 MHz    |             |
| Tnom/ Vnom      | Measured(dBm)              | Limit (dBm) | Measured(dBm) | Limit (dBm) | Measured(dBm) | Limit (dBm) |
| GSM/TM1         | 30.13                      | 33          | 29.35         | 33          | 29.27         | 33          |

### Part 2– Effective Isotropic Radiated Power of Transmitter (EIRP) for GSM1900

| Test Mode | Freq. (MHz) | Meas. Level (dBm) | Substitution Antenna Type | SGP (dBm) | Substitution Gain(dBi) | Cable Loss (dB) | Substitution Level(EIRP ) / dBm | Limit (dBm) | Result |
|-----------|-------------|-------------------|---------------------------|-----------|------------------------|-----------------|---------------------------------|-------------|--------|
| GSM/TM1   | 1850.2      | 32.63             | Horn Ant.                 | 29.08     | 4.5                    | 1               | 32.58                           | 33          | Pass   |
| GSM/TM1   | 1880.0      | 31.85             | Horn Ant.                 | 28.22     | 4.5                    | 1               | 31.72                           | 33          | Pass   |
| GSM/TM1   | 1909.8      | 31.77             | Horn Ant.                 | 28.19     | 4.5                    | 1               | 31.69                           | 33          | Pass   |

Note1:

- a. For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should be taken to calculate it,

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

- b. SGP=Signal Generator Level

Note2:

RBW > emission bandwidth, VBW > 3 x RBW.

Detector: RMS



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## 4 Appendix\_B: Peak-to-Average Ratio

### Part I - Test Results

| Test Band | Test Mode | Test Channel | Measured[dB] | Limit [dB] | Verdict |
|-----------|-----------|--------------|--------------|------------|---------|
| GSM850    | GSM/TM1   | LCH          | 0.10         | 13         | PASS    |
|           |           | MCH          | 0.14         | 13         | PASS    |
|           |           | HCH          | 0.07         | 13         | PASS    |
| GSM1900   | GSM/TM1   | LCH          | 0.11         | 13         | PASS    |
|           |           | MCH          | 0.09         | 13         | PASS    |
|           |           | HCH          | 0.12         | 13         | PASS    |

## 5 Appendix\_C: Modulation Characteristics

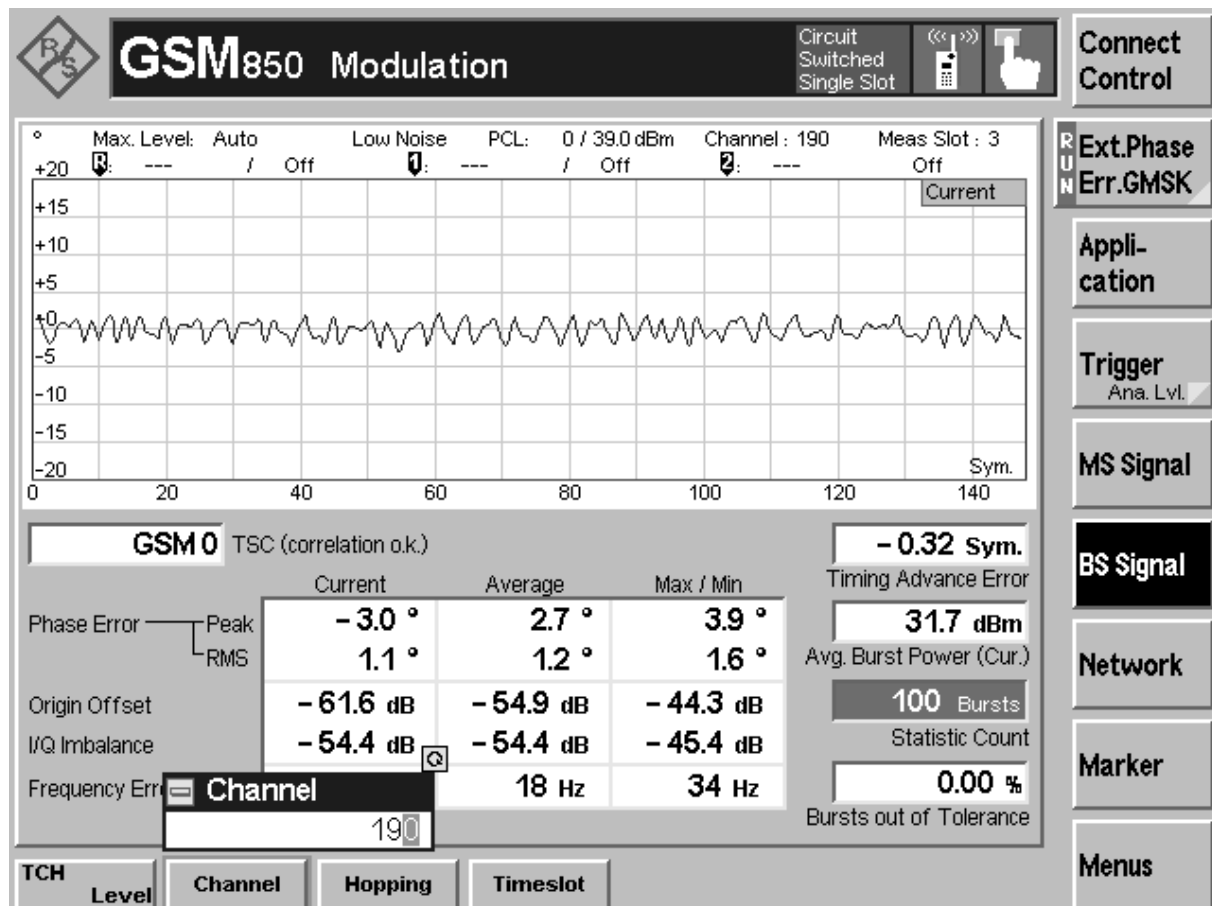
### Part I - Test Plots

#### 5.1 For GSM

##### 5.1.1 Test Band = GSM850

##### 5.1.1.1 Test Mode = GSM/TM1

##### 5.1.1.1.1 Test Channel = MCH

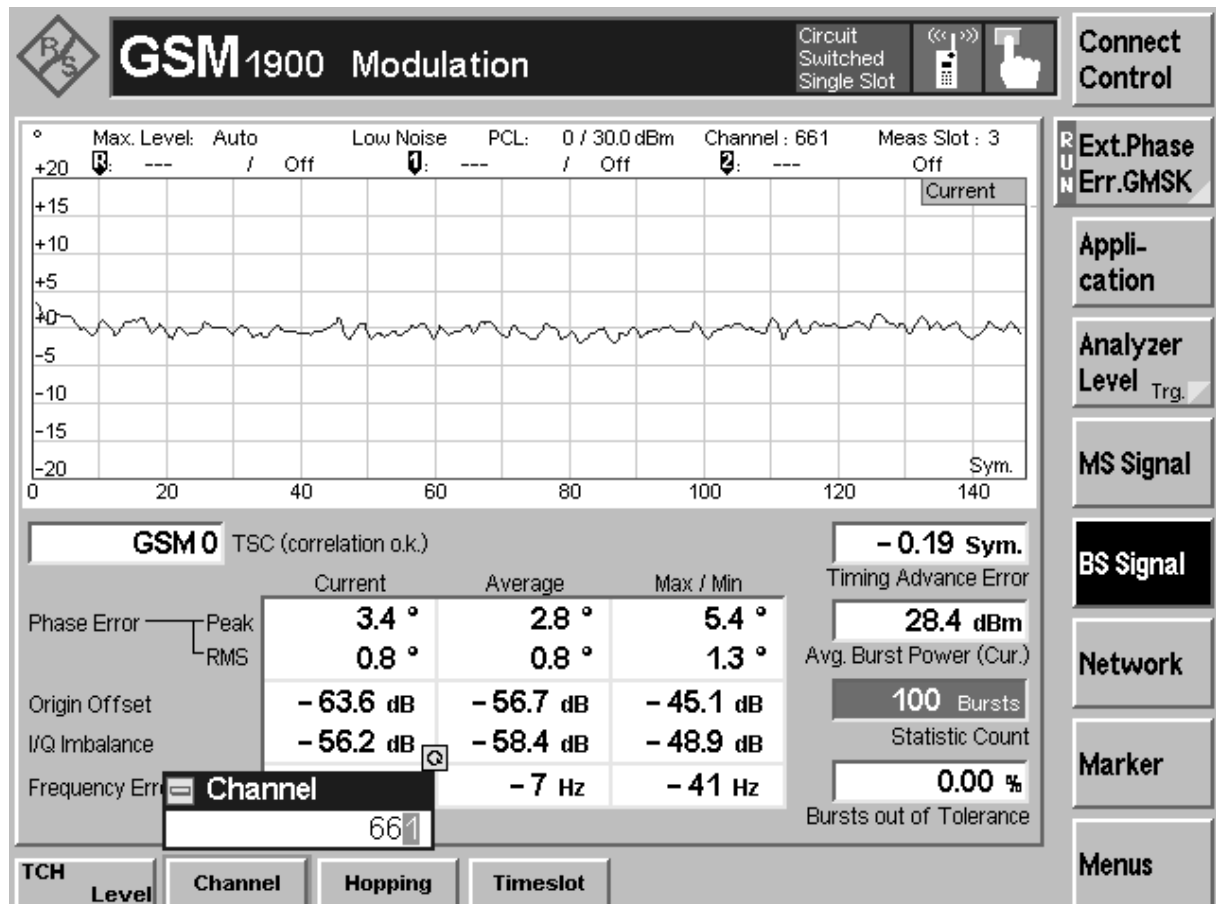




## 5.1.2 Test Band = GSM1900

### 5.1.2.1 Test Mode = GSM/TM1

#### 5.1.2.1.1 Test Channel = MCH





## 6 Appendix\_D: Bandwidth

### Part I - Test Results

| Test Band | Test Mode | Test Channel | Occupied Bandwidth [kHz] | Emission Bandwidth [kHz] | Verdict |
|-----------|-----------|--------------|--------------------------|--------------------------|---------|
| GSM850    | GSM/TM1   | LCH          | 241.0                    | 315.4                    | PASS    |
|           |           | MCH          | 241.5                    | 306.0                    | PASS    |
|           |           | HCH          | 241.4                    | 315.9                    | PASS    |
| GSM1900   | GSM/TM1   | LCH          | 243.0                    | 313.6                    | PASS    |
|           |           | MCH          | 244.4                    | 320.3                    | PASS    |
|           |           | HCH          | 241.6                    | 309.0                    | PASS    |



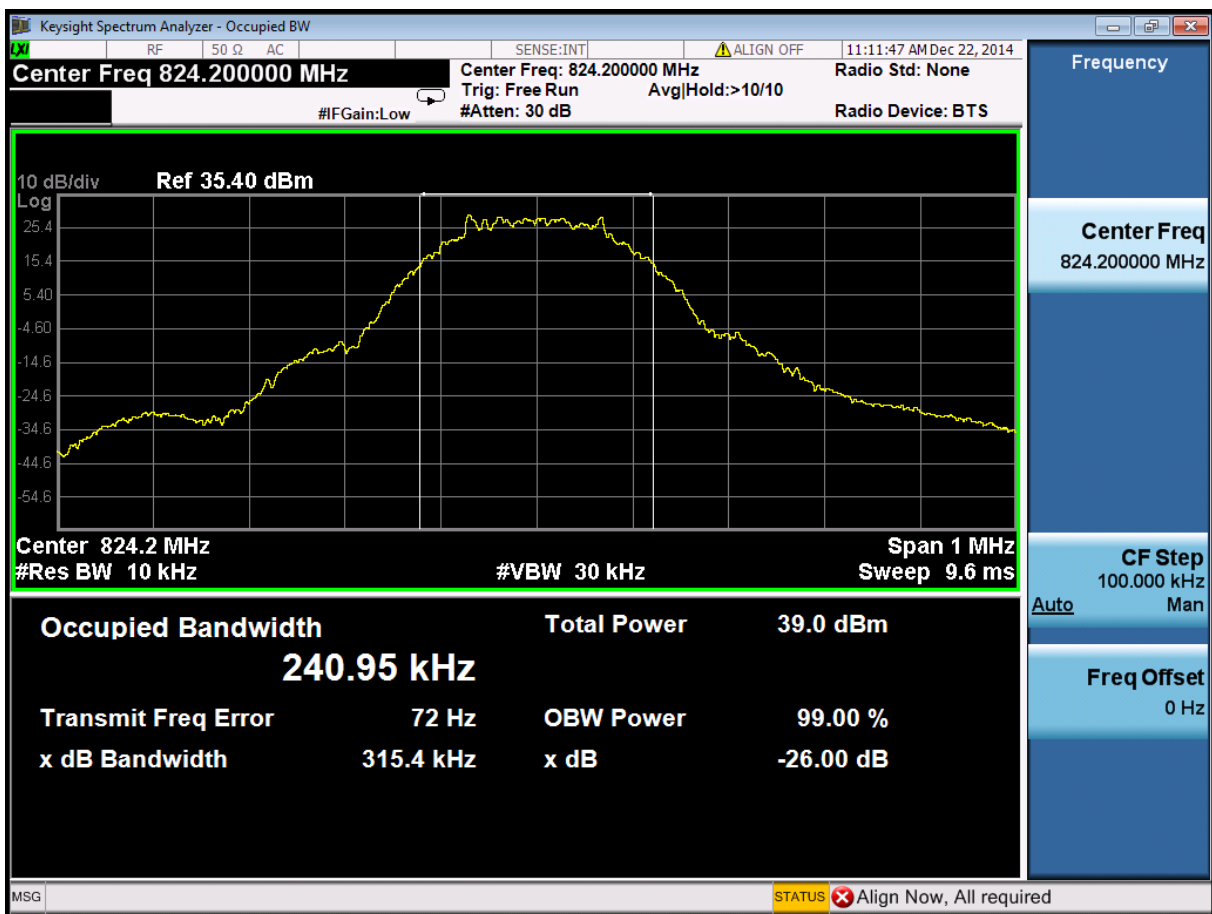
Part II - Test Plots

## 6.1 For GSM

### 6.1.1 Test Band = GSM850

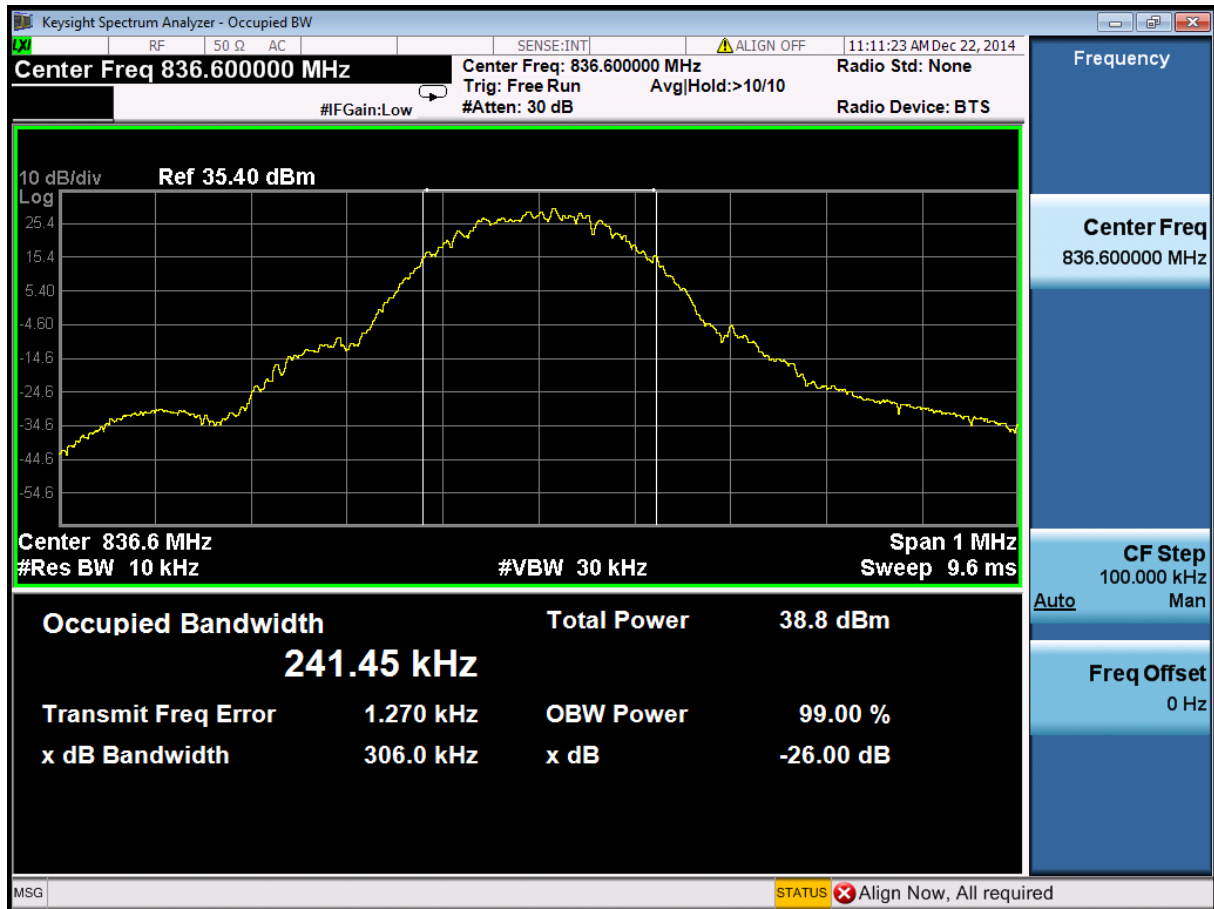
#### 6.1.1.1 Test Mode = GSM/TM1

##### 6.1.1.1.1 Test Channel = LCH



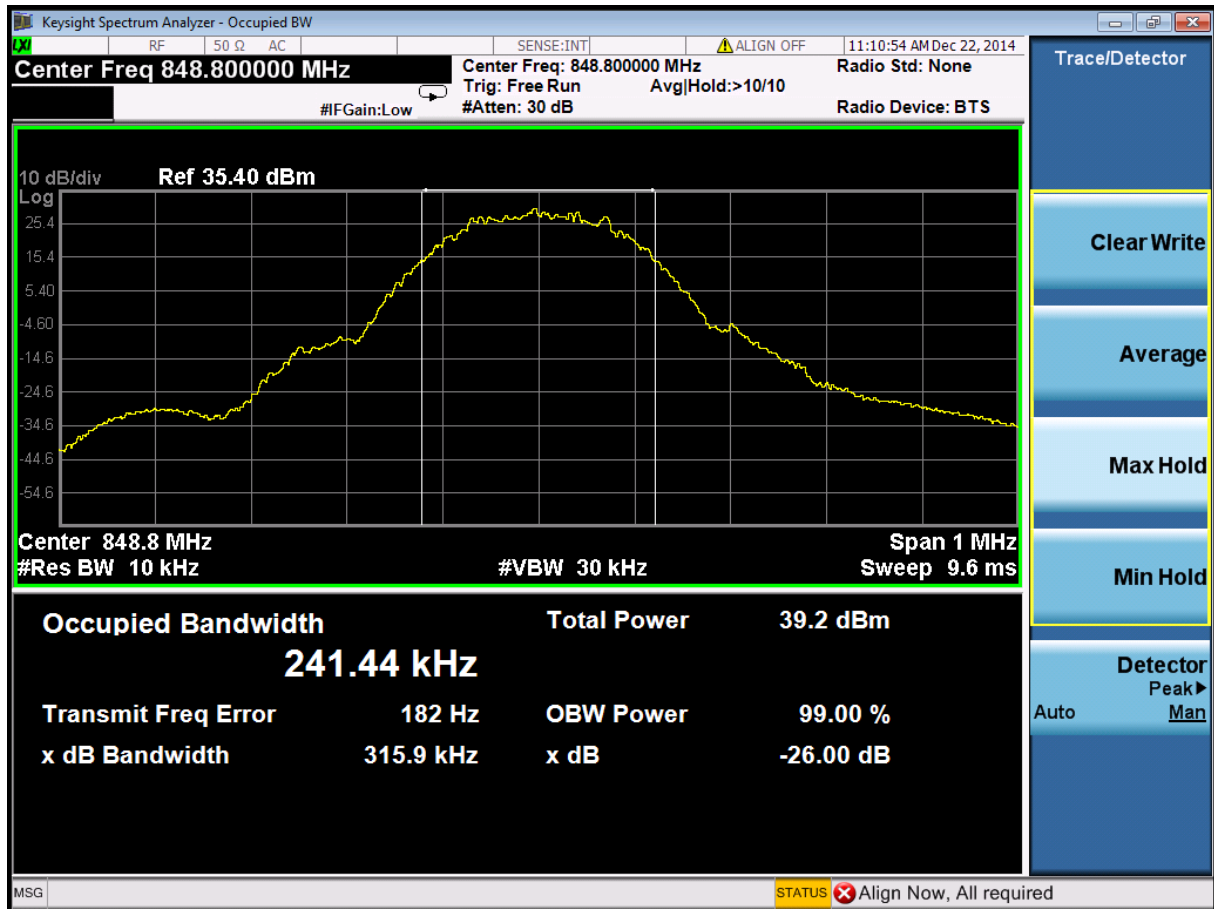


6.1.1.1.2 Test Channel = MCH





6.1.1.1.3 Test Channel = HCH

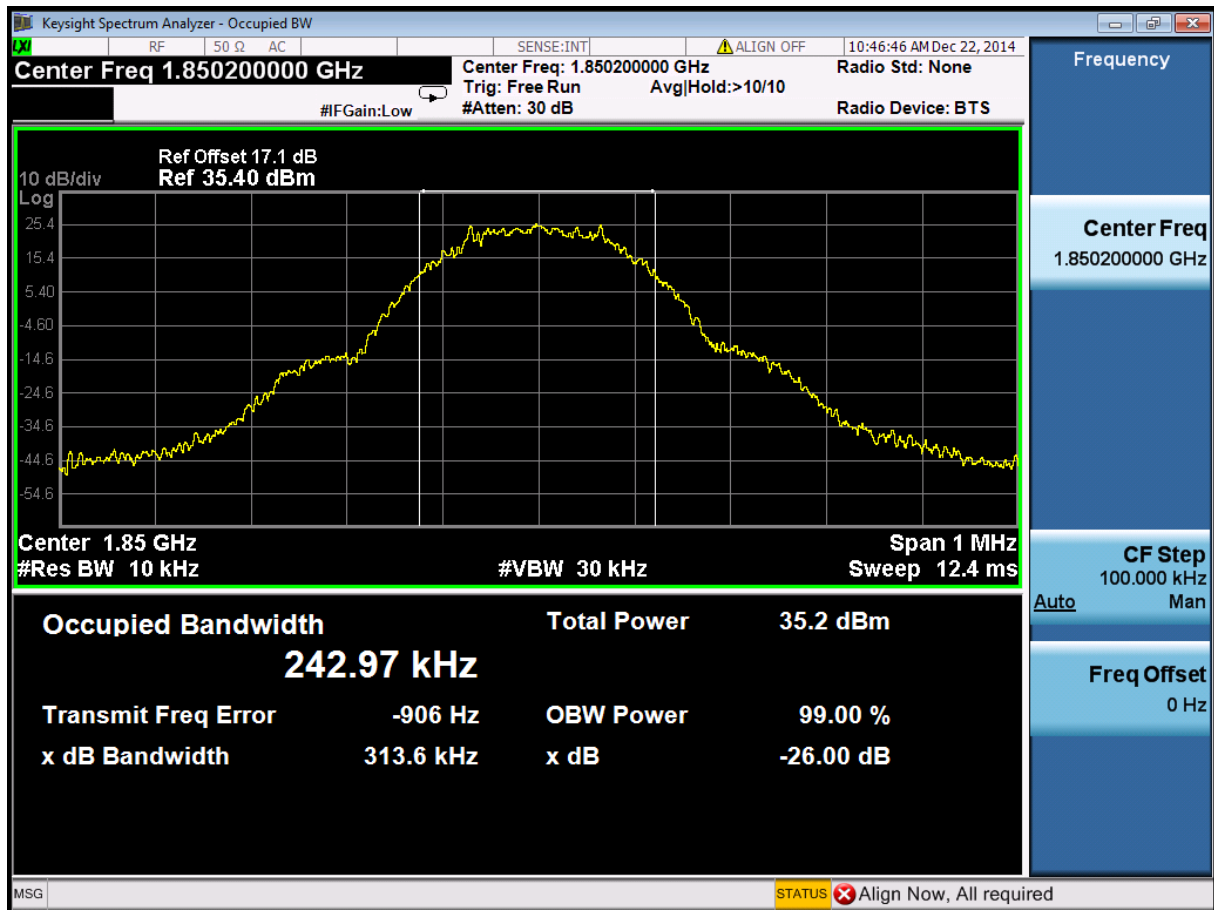




## 6.1.2 Test Band = GSM1900

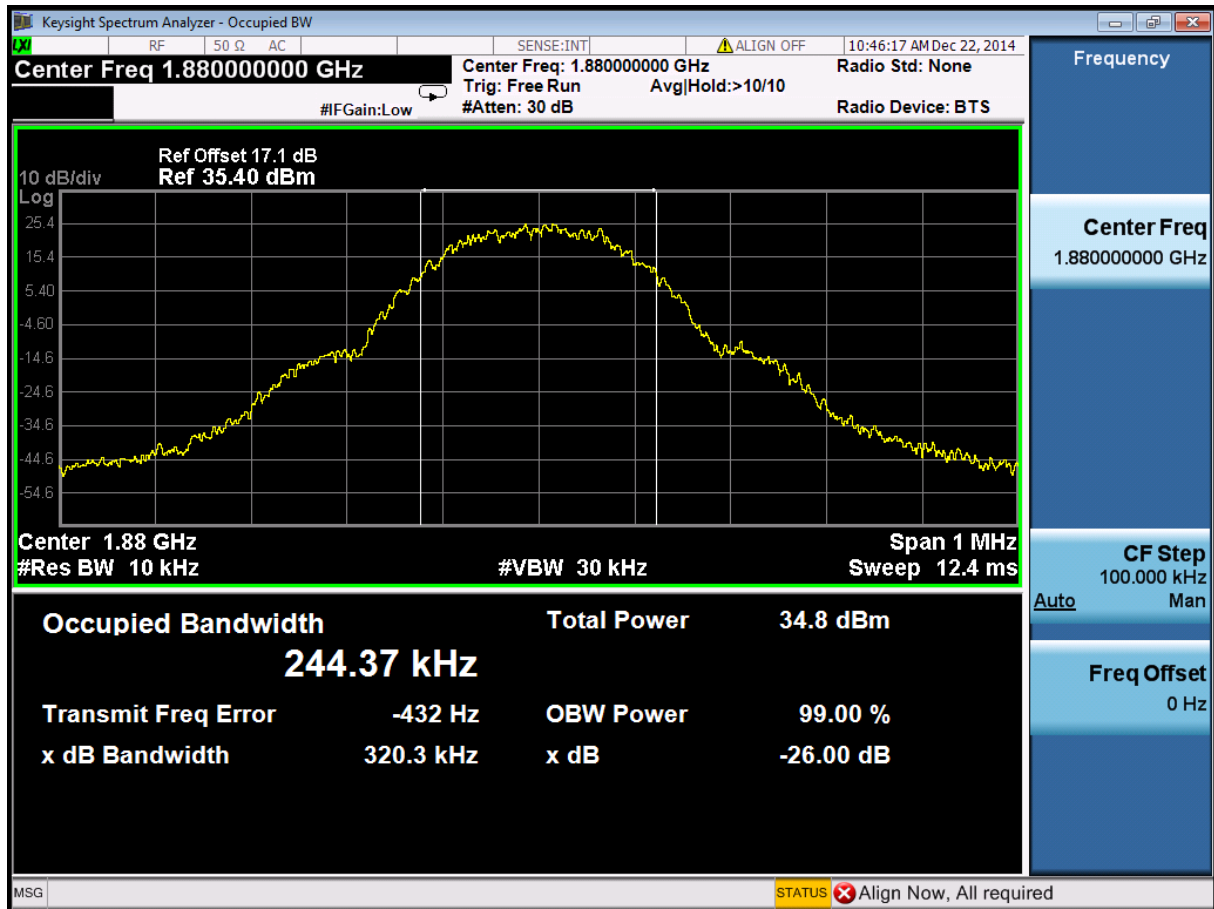
### 6.1.2.1 Test Mode = GSM/TM1

#### 6.1.2.1.1 Test Channel = LCH



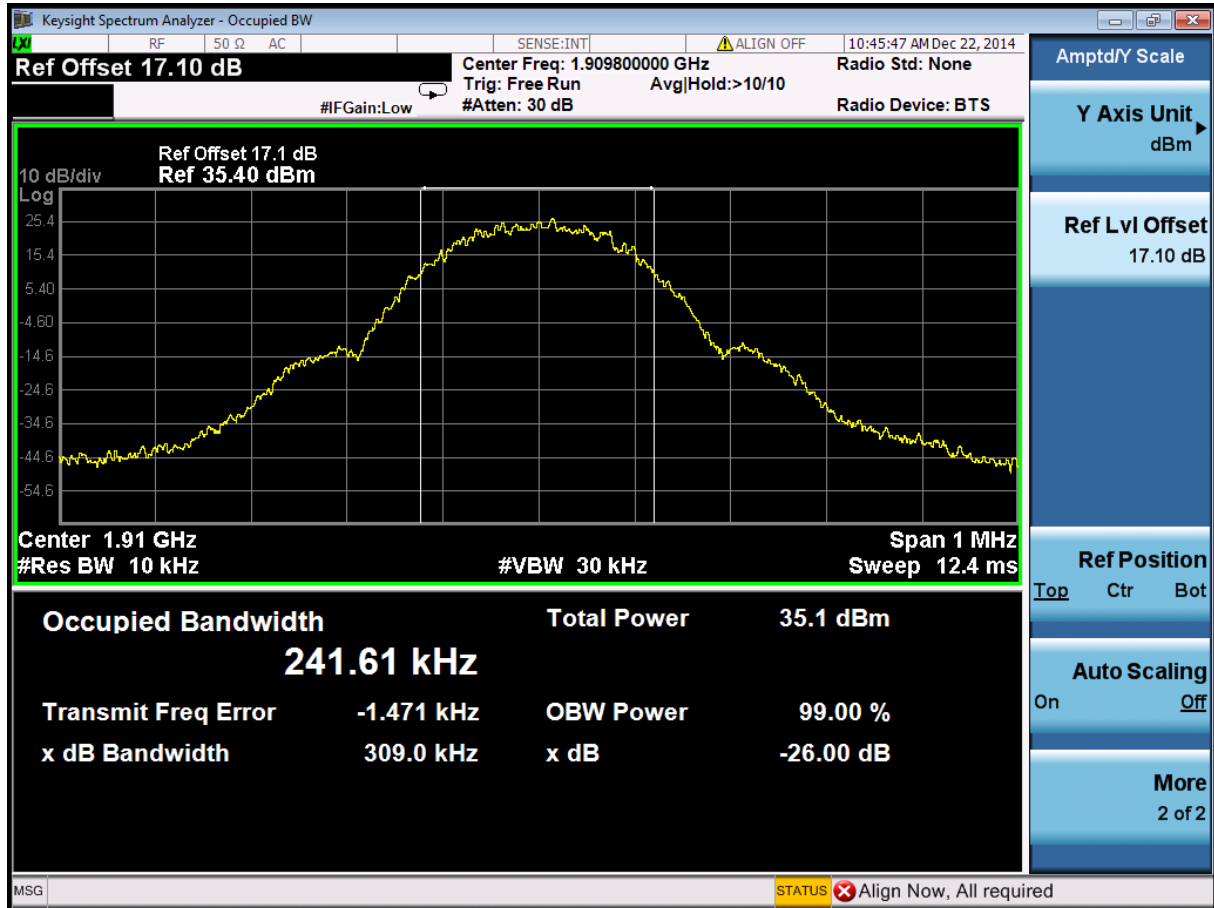


6.1.2.1.2 Test Channel = MCH





6.1.2.1.3 Test Channel = HCH





## 7 Appendix\_E: Band Edges Compliance

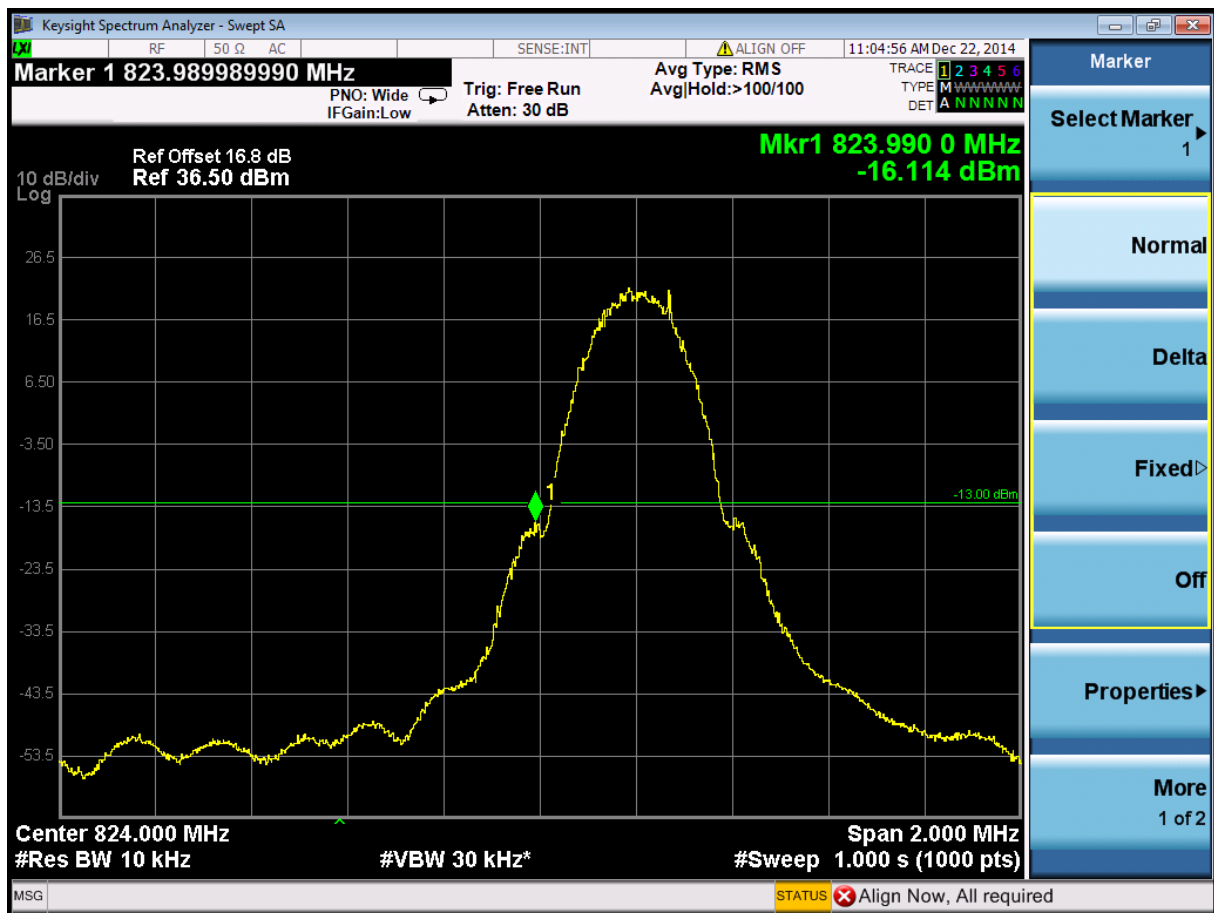
### Part I - Test Plots

#### 7.1 For GSM

##### 7.1.1 Test Band = GSM850

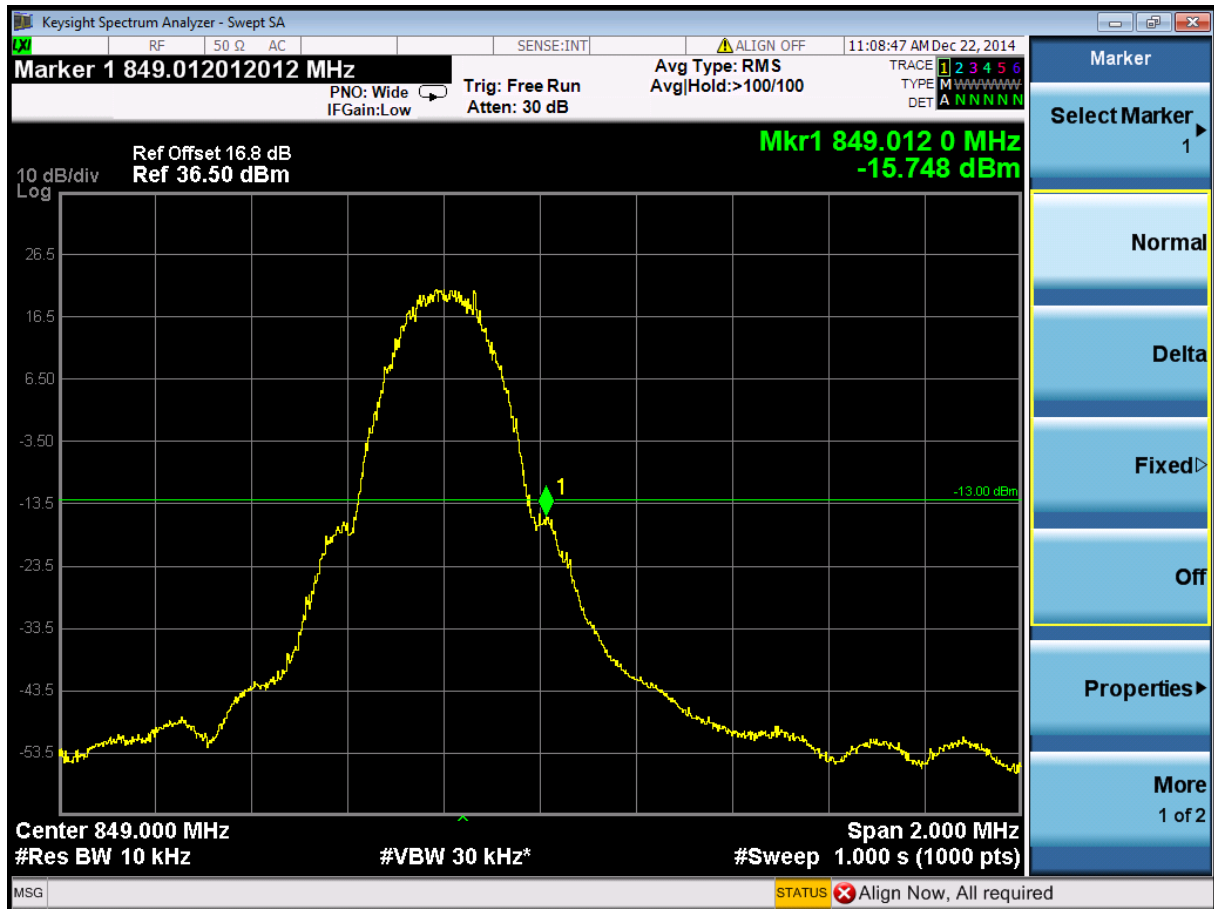
###### 7.1.1.1 Test Mode = GSM/TM1

###### 7.1.1.1.1 Test Channel = LCH





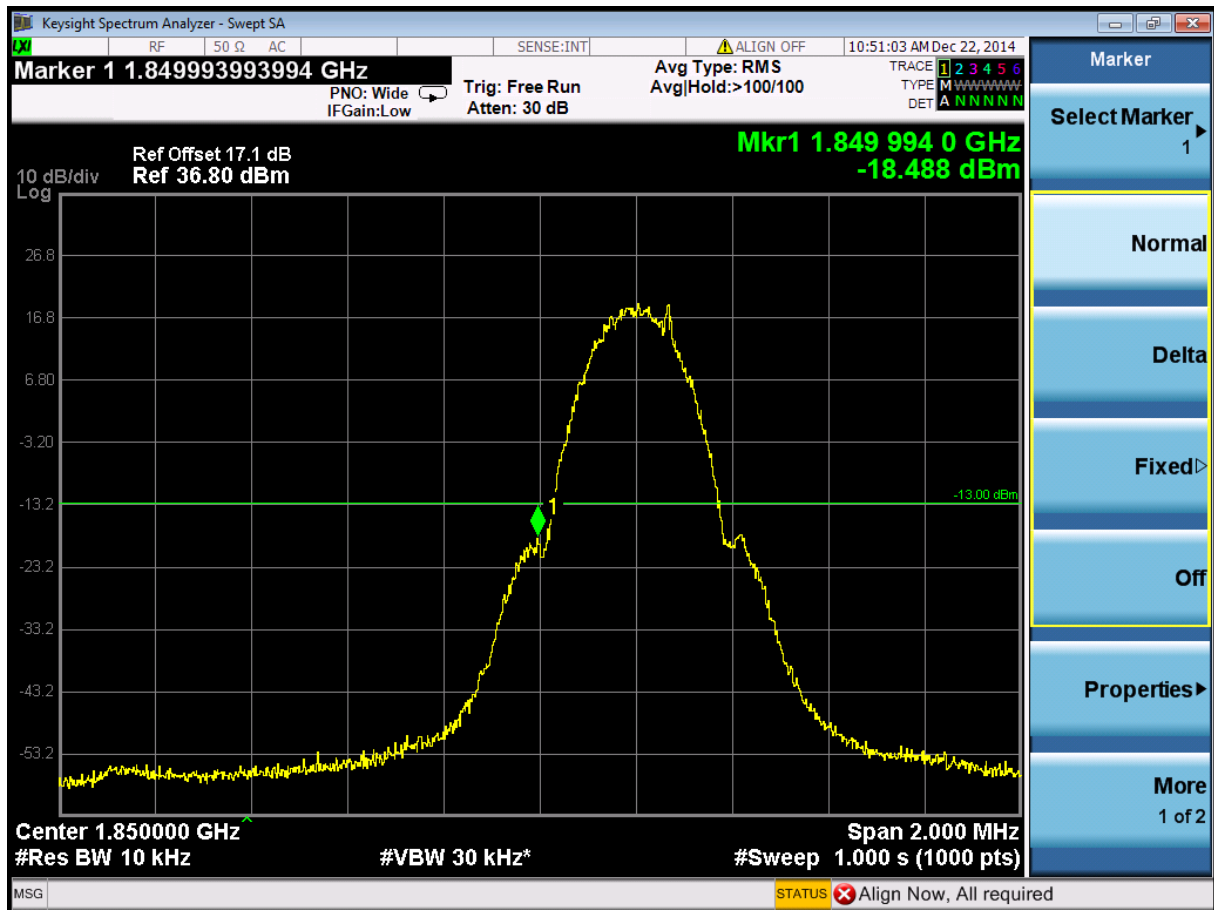
7.1.1.1.2 Test Channel = HCH



### 7.1.2 Test Band = GSM1900

#### 7.1.2.1 Test Mode = GSM/TM1

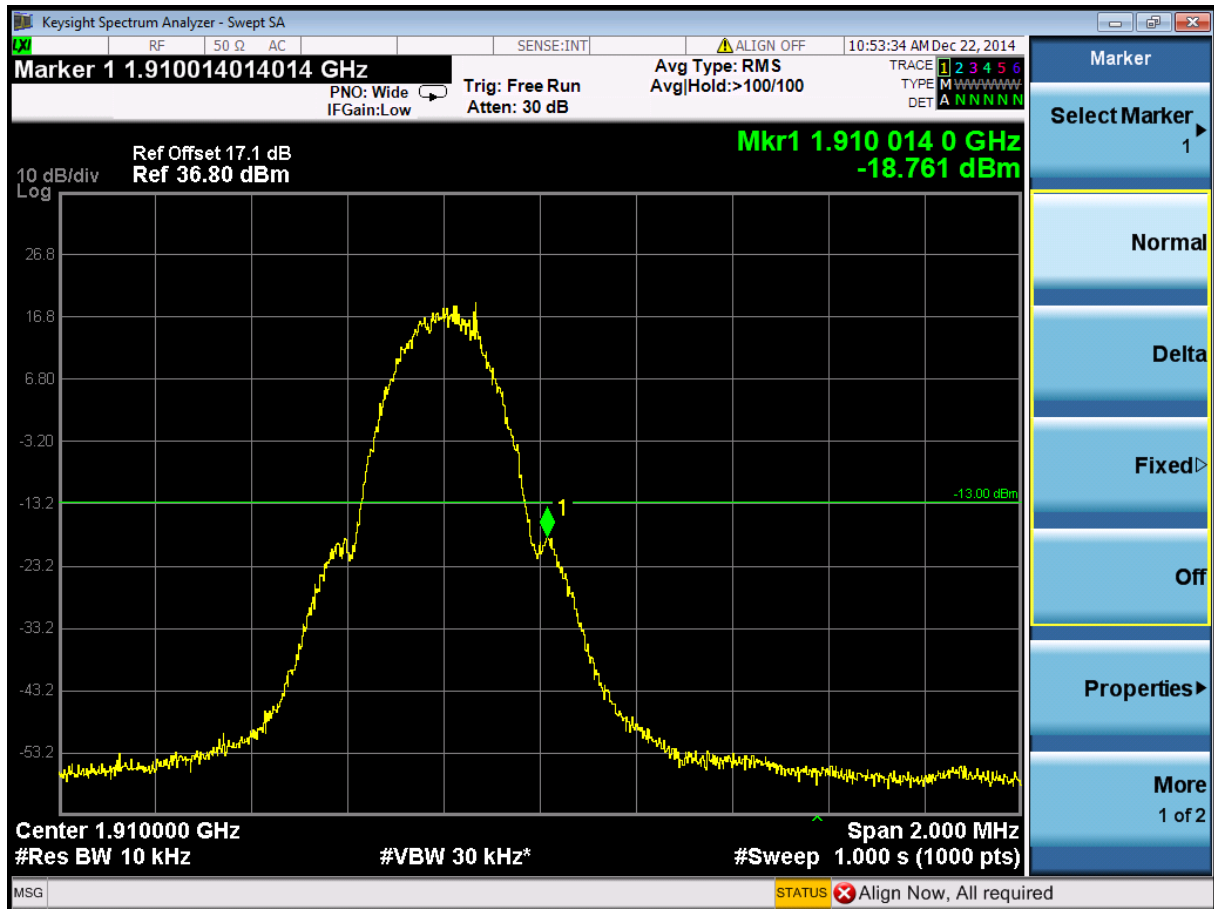
#### 7.1.2.1.1 Test Channel = LCH



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7.1.2.1.2 Test Channel = HCH





## 8 Appendix\_F: Spurious Emission at Antenna Terminal

NOTE: For the averaged unwanted emissions measurements, the measurement points in each sweep is greater than twice the Span/RBW in order to ensure bin-to-bin spacing of  $< \text{RBW}/2$  so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points =  $k * (\text{Span} / \text{RBW})$ " with  $k$  between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

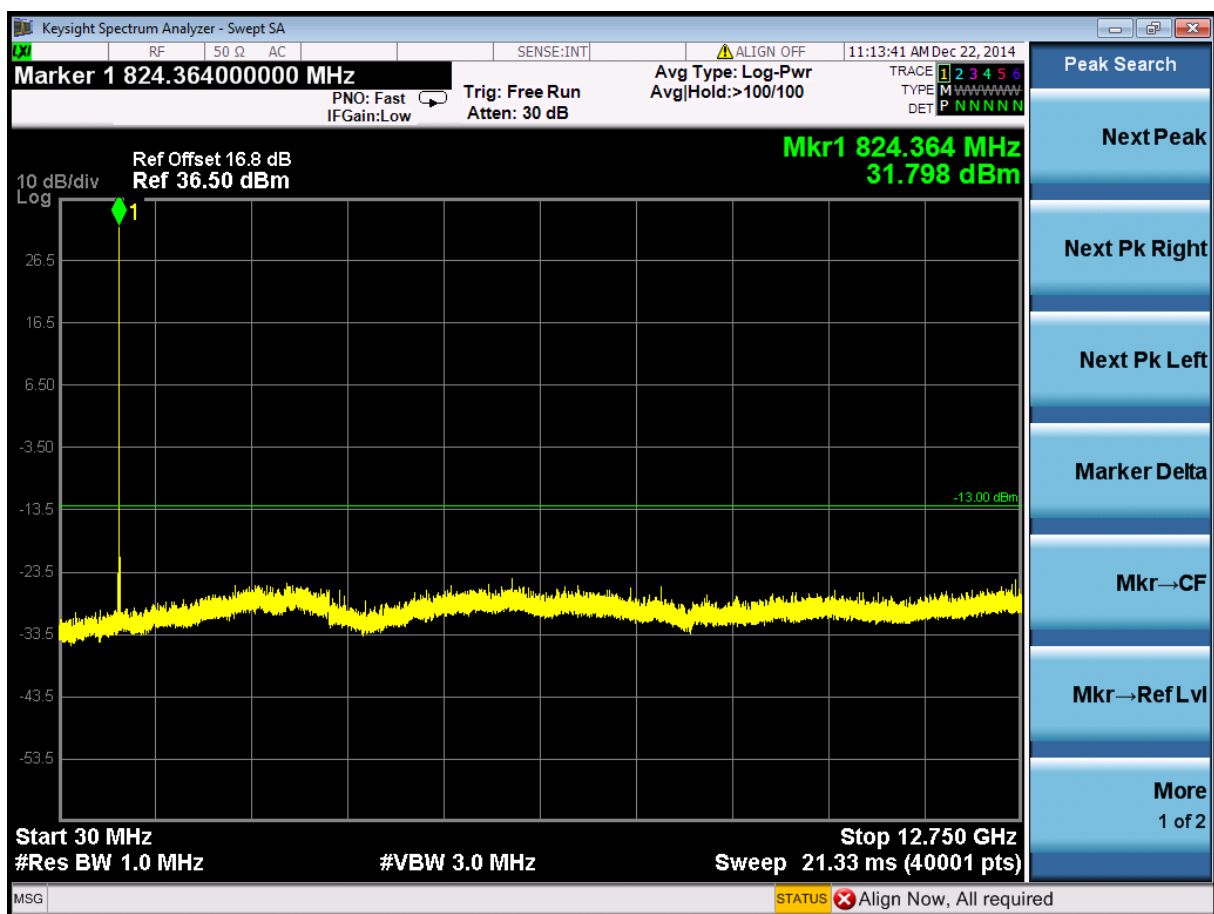
Part I - Test Plots

### 8.1 For GSM

#### 8.1.1 Test Band = GSM850

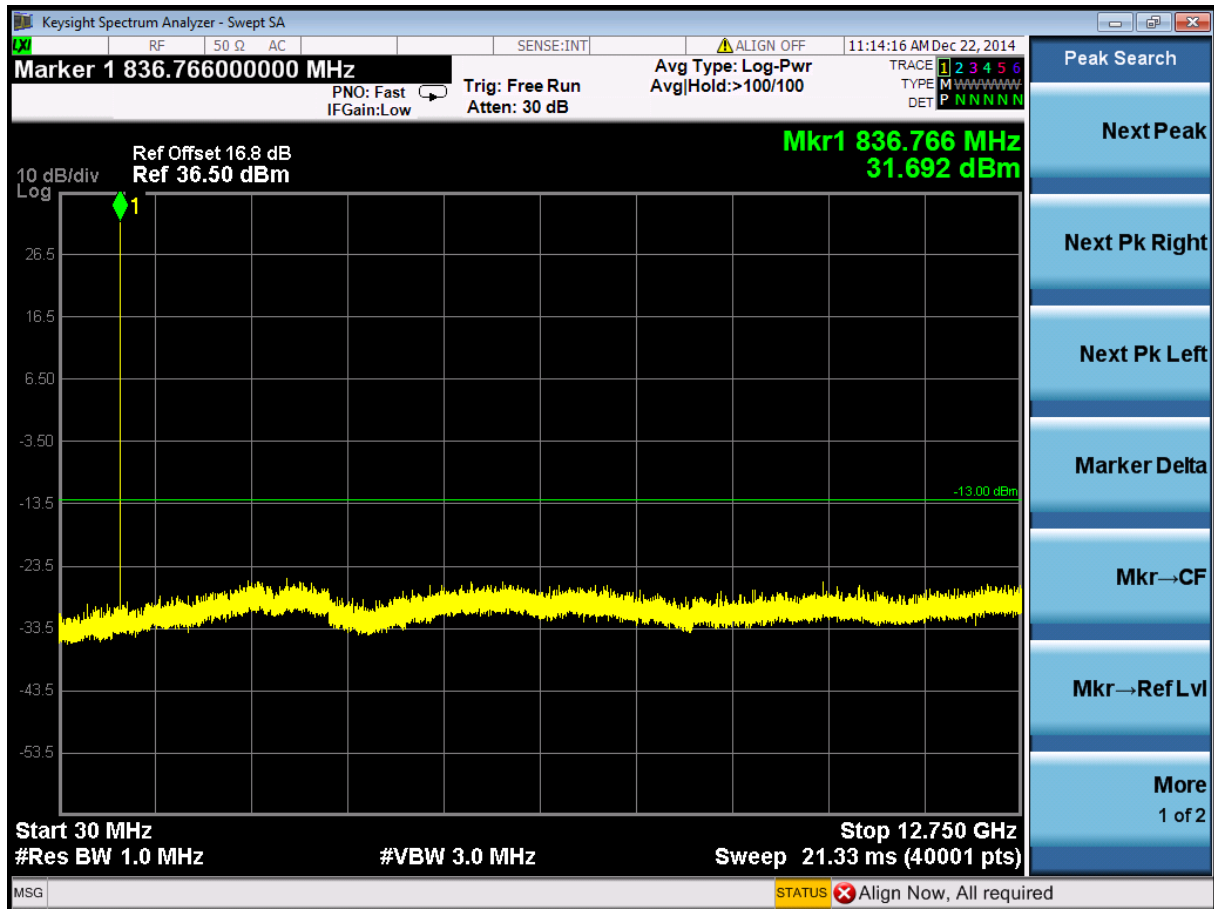
##### 8.1.1.1 Test Mode = GSM/TM1

##### 8.1.1.1.1 Test Channel = LCH



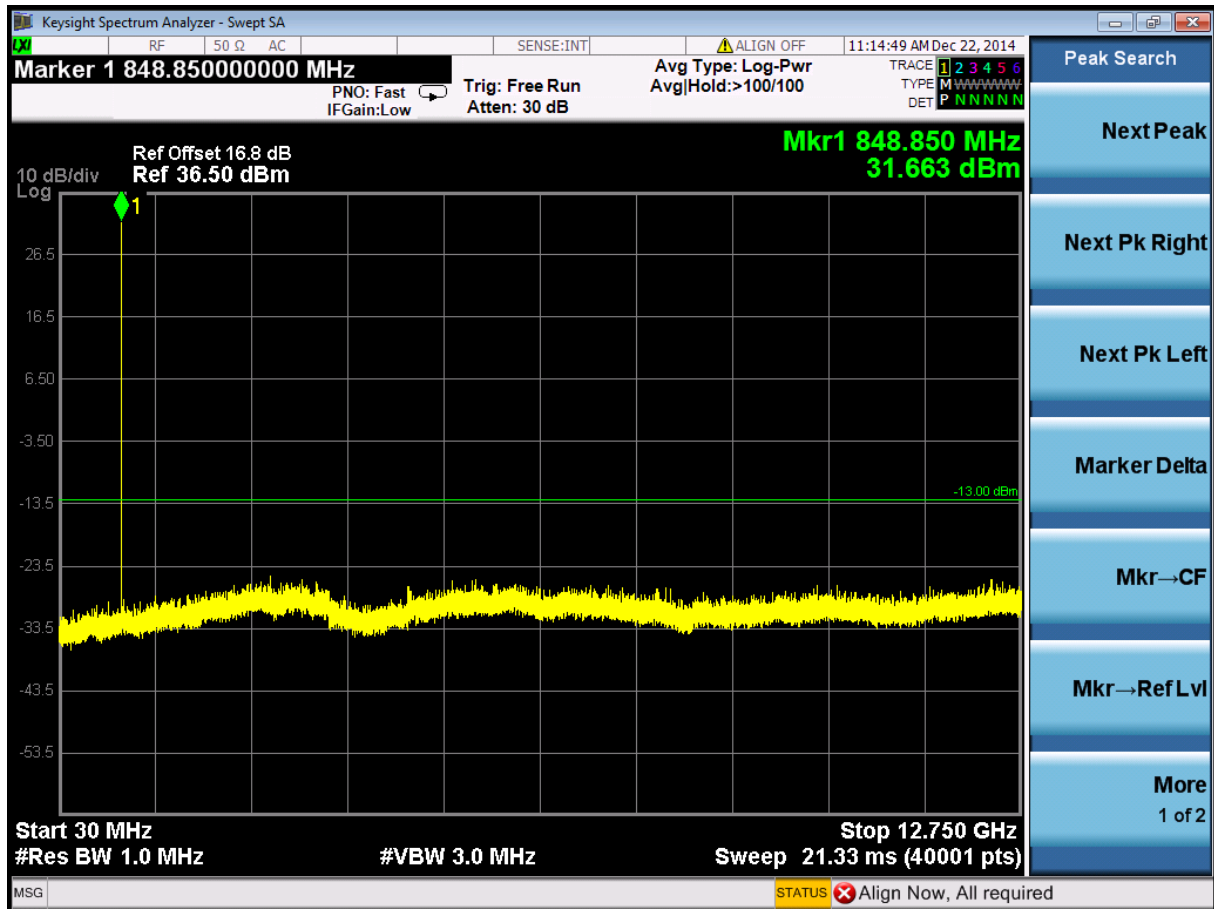


8.1.1.1.2 Test Channel = MCH





8.1.1.1.3 Test Channel = HCH

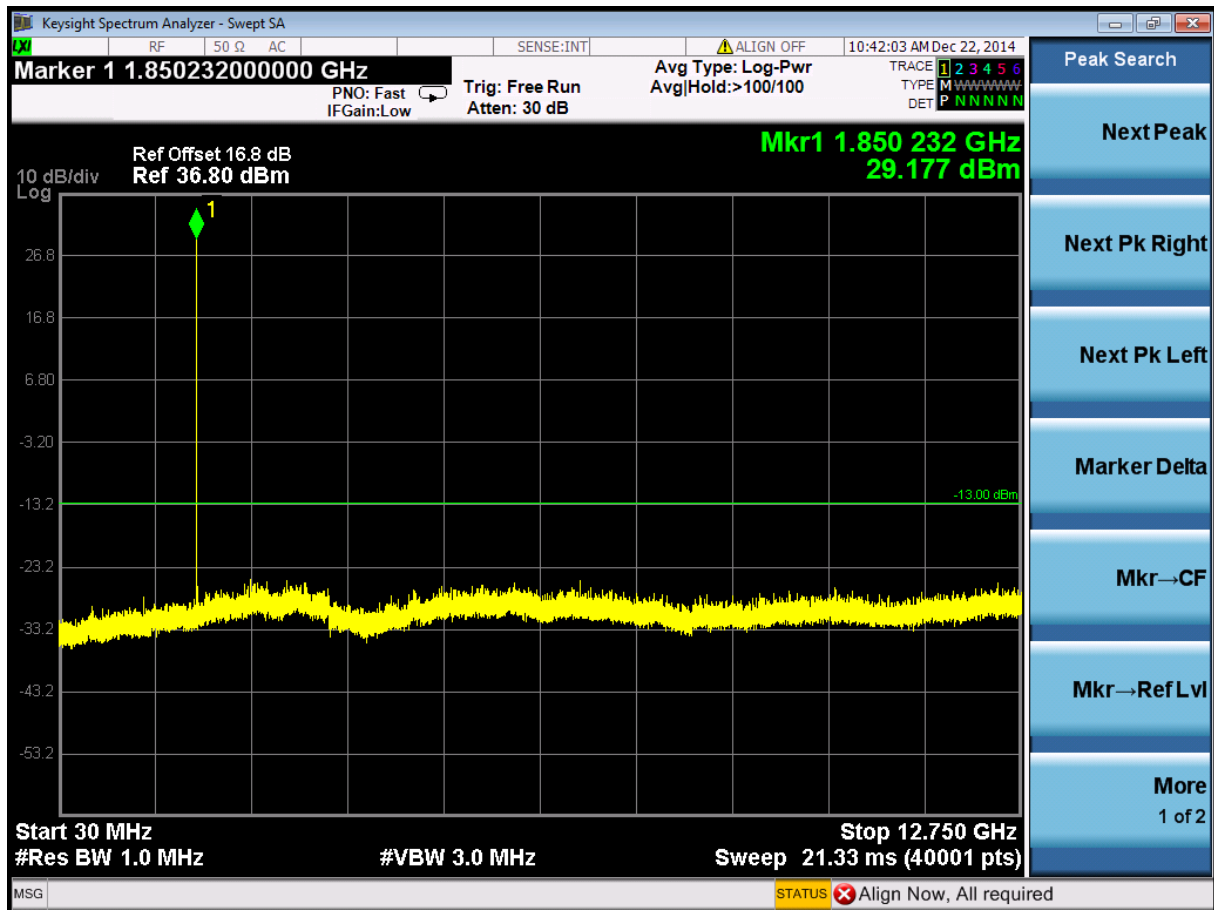




## 8.1.2 Test Band = GSM1900

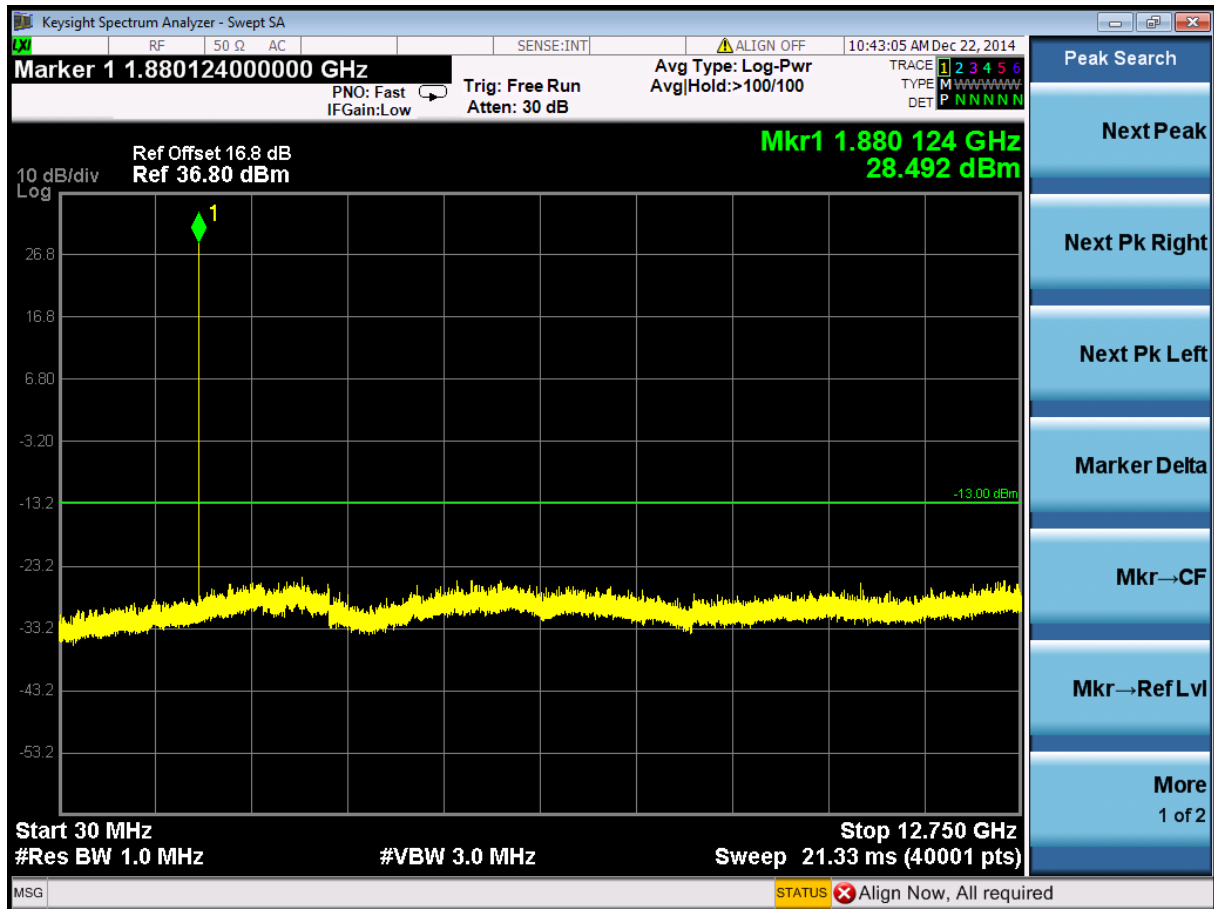
### 8.1.2.1 Test Mode = GSM/TM1

#### 8.1.2.1.1 Test Channel = LCH



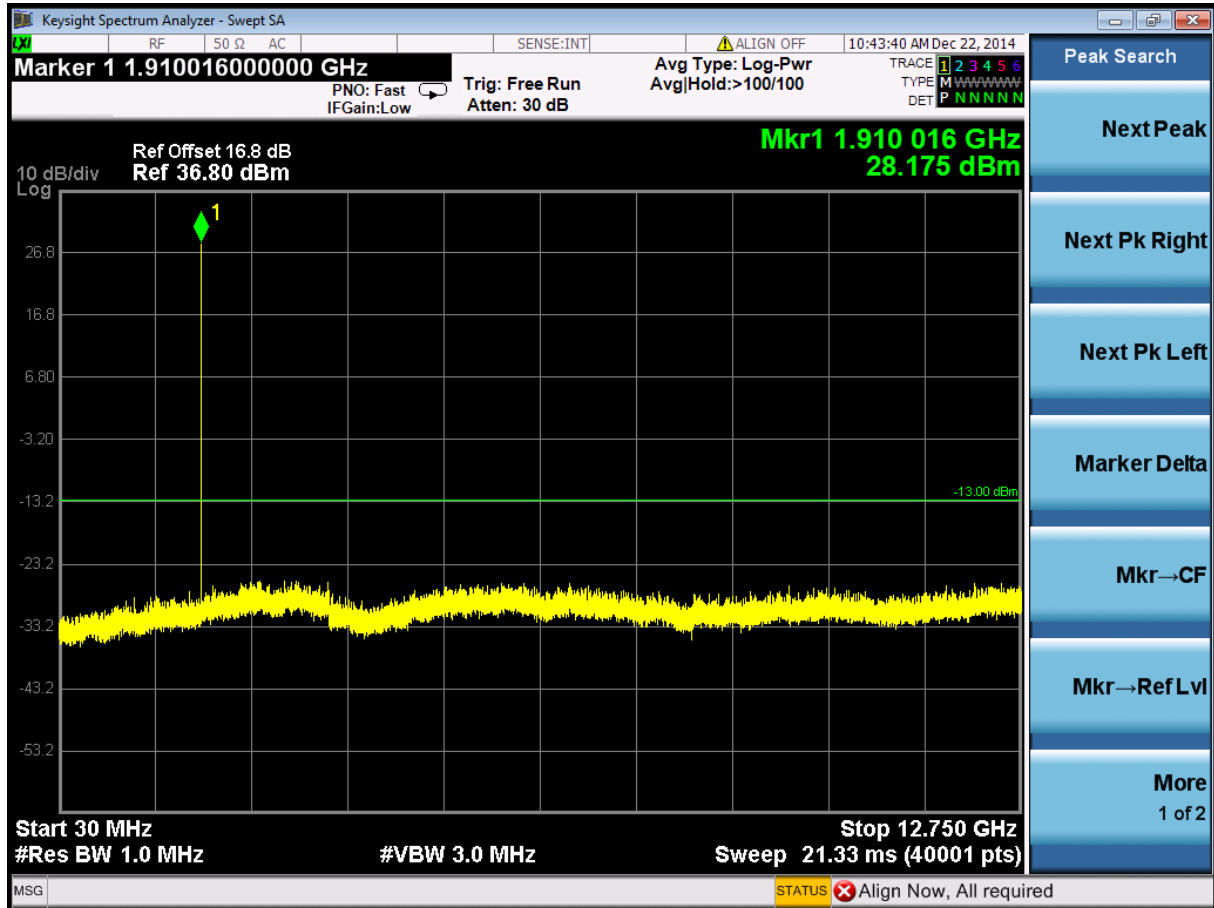


8.1.2.1.2 Test Channel = MCH





8.1.2.1.3 Test Channel = HCH





## 9 Appendix\_G: Field Strength of Spurious Radiation

Part I - Test Plots

### 9.1 For GSM

#### 9.1.1 Test Band = GSM850

##### 9.1.1.1 Test Mode = GSM/TM1

| Frequency (MHz) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|----------------|---------------------|-----------------|--------------|
| 33.433          | -65.1          | -13.0               | -52.1           | Vertical     |
| 51.741          | -64.4          | -13.0               | -51.4           | Vertical     |
| 80.866          | -60.8          | -13.0               | -47.8           | Vertical     |
| 238.181         | -69.4          | -13.0               | -56.4           | Vertical     |
| 511.868         | -62.6          | -13.0               | -49.6           | Vertical     |
| 729.731         | -60.2          | -13.0               | -47.2           | Vertical     |
| 1673.978        | -43.3          | -13.0               | -30.3           | Vertical     |
| 2509.725        | -39.7          | -13.0               | -26.7           | Vertical     |
| 4183.536        | -35.6          | -13.0               | -22.6           | Vertical     |
| 5860.756        | -40.7          | -13.0               | -27.7           | Vertical     |
| 7384.531        | -38.2          | -13.0               | -25.2           | Vertical     |
| 8842.855        | -35.8          | -13.0               | -22.8           | Vertical     |

| Frequency (MHz) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|----------------|---------------------|-----------------|--------------|
| 41.934          | -64.8          | -13.0               | -51.8           | Horizontal   |
| 87.209          | -62.0          | -13.0               | -49.0           | Horizontal   |
| 185.581         | -64.6          | -13.0               | -51.6           | Horizontal   |
| 405.429         | -65.0          | -13.0               | -52.0           | Horizontal   |
| 587.556         | -61.7          | -13.0               | -48.7           | Horizontal   |
| 746.697         | -59.0          | -13.0               | -46.0           | Horizontal   |
| 1673.978        | -34.2          | -13.0               | -21.2           | Horizontal   |
| 2509.725        | -39.5          | -13.0               | -26.5           | Horizontal   |
| 3348.556        | -38.5          | -13.0               | -25.5           | Horizontal   |
| 4183.536        | -28.4          | -13.0               | -15.4           | Horizontal   |
| 6050.147        | -39.9          | -13.0               | -26.9           | Horizontal   |
| 8861.624        | -36.3          | -13.0               | -23.3           | Horizontal   |

**9.1.2 Test Band = GSM1900****9.1.2.1 Test Mode = GSM/TM1**

| Frequency (MHz) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|----------------|---------------------|-----------------|--------------|
| 34.323          | -67.6          | -13.0               | -54.6           | Vertical     |
| 51.402          | -68.1          | -13.0               | -55.1           | Vertical     |
| 79.028          | -60.5          | -13.0               | -47.5           | Vertical     |
| 273.400         | -69.3          | -13.0               | -56.3           | Vertical     |
| 485.672         | -65.4          | -13.0               | -52.4           | Vertical     |
| 870.619         | -56.9          | -13.0               | -43.9           | Vertical     |
| 3759.831        | -29.0          | -13.0               | -16.0           | Vertical     |
| 5636.772        | -35.4          | -13.0               | -22.4           | Vertical     |
| 7521.645        | -34.1          | -13.0               | -21.1           | Vertical     |
| 9893.956        | -34.0          | -13.0               | -21.0           | Vertical     |
| 11357.628       | -32.1          | -13.0               | -19.1           | Vertical     |
| 12466.700       | -29.4          | -13.0               | -16.4           | Vertical     |

| Frequency (MHz) | Level (dBuV/m) | Limit Line (dBuV/m) | Over Limit (dB) | Polarization |
|-----------------|----------------|---------------------|-----------------|--------------|
| 38.126          | -66.7          | -13.0               | -53.7           | Horizontal   |
| 47.663          | -66.2          | -13.0               | -53.2           | Horizontal   |
| 88.652          | -64.3          | -13.0               | -51.3           | Horizontal   |
| 213.723         | -67.5          | -13.0               | -54.5           | Horizontal   |
| 492.092         | -62.9          | -13.0               | -49.9           | Horizontal   |
| 876.391         | -57.0          | -13.0               | -44.0           | Horizontal   |
| 3070.699        | -44.6          | -13.0               | -31.6           | Horizontal   |
| 3759.831        | -23.9          | -13.0               | -10.9           | Horizontal   |
| 6088.229        | -38.8          | -13.0               | -25.8           | Horizontal   |
| 7616.578        | -37.3          | -13.0               | -24.3           | Horizontal   |
| 10629.089       | -31.5          | -13.0               | -18.5           | Horizontal   |
| 12466.700       | -29.2          | -13.0               | -16.2           | Horizontal   |

**NOTE:**

- 1) The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
- 2) Pretest was performed at the EUT in low, middle, high channel, but only the worst test channel(Channel 192 for GSM850 and Channel 661 for GSM1900)and only the data of the worst case show in the test report.



## 10 Appendix\_H: Frequency Stability

### 10.1 For GSM

#### 10.1.1 Frequency Error VS. Voltage:

| Test Band | Test Mode | Test Channel | Test Temp. | Test Volt. | Freq. Error [Hz] | Freq. vs. rated [ppm] | Limit [ppm] | Verdict |
|-----------|-----------|--------------|------------|------------|------------------|-----------------------|-------------|---------|
| GSM850    | GSM/TM1   | LCH          | TN         | VL         | -2.91            | -0.00353              | ±2.5        | PASS    |
|           |           |              |            | VN         | -7.81            | -0.00948              | ±2.5        | PASS    |
|           |           |              |            | VH         | 0.71             | 0.00086               | ±2.5        | PASS    |
|           |           | MCH          | TN         | VL         | -7.55            | -0.00902              | ±2.5        | PASS    |
|           |           |              |            | VN         | -6.33            | -0.00757              | ±2.5        | PASS    |
|           |           |              |            | VH         | -4.97            | -0.00594              | ±2.5        | PASS    |
|           |           | HCH          | TN         | VL         | -1.03            | -0.00121              | ±2.5        | PASS    |
|           |           |              |            | VN         | -5.75            | -0.00677              | ±2.5        | PASS    |
|           |           |              |            | VH         | -9.17            | -0.0108               | ±2.5        | PASS    |
| GSM1900   | GSM/TM1   | LCH          | TN         | VL         | -12.79           | -0.00691              | ±2.5        | PASS    |
|           |           |              |            | VN         | -10.14           | -0.00548              | ±2.5        | PASS    |
|           |           |              |            | VH         | -8.59            | -0.00464              | ±2.5        | PASS    |
|           |           | MCH          | TN         | VL         | -2.45            | -0.0013               | ±2.5        | PASS    |
|           |           |              |            | VN         | -1.74            | -0.00093              | ±2.5        | PASS    |
|           |           |              |            | VH         | -7.43            | -0.00395              | ±2.5        | PASS    |
|           |           | HCH          | TN         | VL         | -1.10            | -0.00058              | ±2.5        | PASS    |
|           |           |              |            | VN         | -8.33            | -0.00436              | ±2.5        | PASS    |
|           |           |              |            | VH         | -18.98           | -0.00994              | ±2.5        | PASS    |



10.1.2 Frequency Error VS. Temperature:

| Test Band | Test Mode | Test Channel | Test Volt. | Test Temp. | Freq. Error [Hz] | Freq. vs. rated [ppm] | Limit [ppm] | Verdict |
|-----------|-----------|--------------|------------|------------|------------------|-----------------------|-------------|---------|
| GSM850    | GSM/TM1   | LCH          | VN         | -30        | -1.81            | -0.00220              | ±2.5        | PASS    |
|           |           |              |            | -20        | -1.10            | -0.00133              | ±2.5        | PASS    |
|           |           |              |            | -10        | -1.42            | -0.00172              | ±2.5        | PASS    |
|           |           |              |            | 0          | -3.36            | -0.00408              | ±2.5        | PASS    |
|           |           |              |            | 10         | 1.42             | 0.00172               | ±2.5        | PASS    |
|           |           |              |            | 20         | 2.65             | 0.00322               | ±2.5        | PASS    |
|           |           |              |            | 30         | 2.32             | 0.00281               | ±2.5        | PASS    |
|           |           |              |            | 40         | 0.84             | 0.00102               | ±2.5        | PASS    |
|           |           |              |            | 50         | 5.94             | 0.00721               | ±2.5        | PASS    |
|           |           | MCH          | VN         | -30        | 0.00             | 0.00000               | ±2.5        | PASS    |
|           |           |              |            | -20        | 2.71             | 0.00324               | ±2.5        | PASS    |
|           |           |              |            | -10        | -0.52            | -0.00062              | ±2.5        | PASS    |
|           |           |              |            | 0          | -1.87            | -0.00224              | ±2.5        | PASS    |
|           |           |              |            | 10         | 0.52             | 0.00062               | ±2.5        | PASS    |
|           |           |              |            | 20         | -1.03            | -0.00123              | ±2.5        | PASS    |
|           |           |              |            | 30         | 1.03             | 0.00123               | ±2.5        | PASS    |
|           |           |              |            | 40         | 1.61             | 0.00192               | ±2.5        | PASS    |
|           |           |              |            | 50         | 2.45             | 0.00293               | ±2.5        | PASS    |
|           |           | HCH          | VN         | -30        | 0.26             | 0.00031               | ±2.5        | PASS    |
|           |           |              |            | -20        | 4.91             | 0.00578               | ±2.5        | PASS    |
|           |           |              |            | -10        | -0.71            | -0.00084              | ±2.5        | PASS    |
|           |           |              |            | 0          | -1.16            | -0.00137              | ±2.5        | PASS    |
|           |           |              |            | 10         | -0.90            | -0.00106              | ±2.5        | PASS    |
|           |           |              |            | 20         | -1.16            | -0.00137              | ±2.5        | PASS    |
|           |           |              |            | 30         | -1.36            | -0.00160              | ±2.5        | PASS    |
|           |           |              |            | 40         | -2.26            | -0.00266              | ±2.5        | PASS    |
|           |           |              |            | 50         | -0.19            | -0.00022              | ±2.5        | PASS    |



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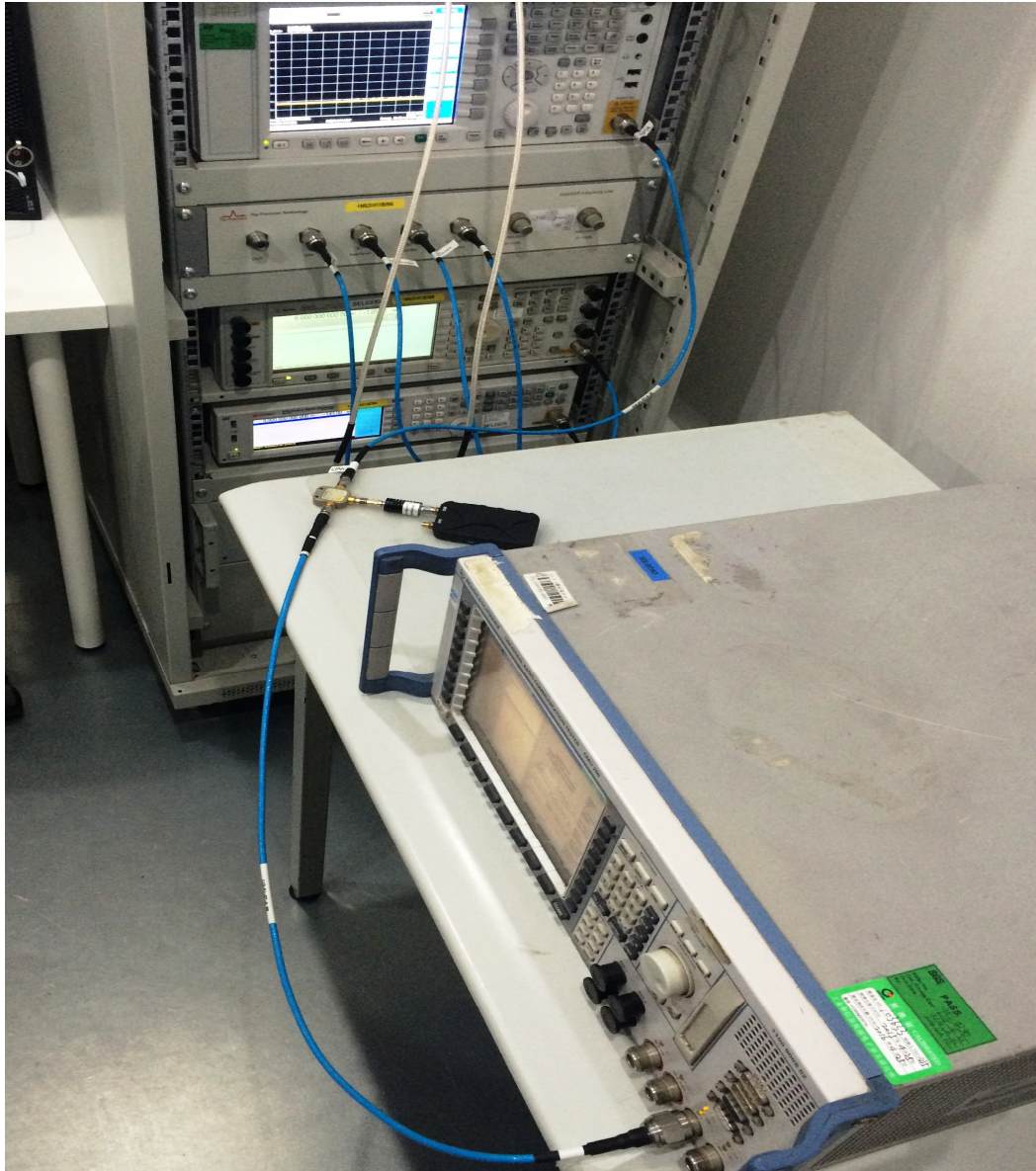
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|         |         |     |    |     |        |          |      |      |
|---------|---------|-----|----|-----|--------|----------|------|------|
| GSM1900 | GSM/TM1 | LCH | VN | -30 | -14.85 | -0.00803 | ±2.5 | PASS |
|         |         |     |    | -20 | -8.78  | -0.00475 | ±2.5 | PASS |
|         |         |     |    | -10 | -13.95 | -0.00754 | ±2.5 | PASS |
|         |         |     |    | 0   | -2.13  | -0.00115 | ±2.5 | PASS |
|         |         |     |    | 10  | 1.74   | 0.00094  | ±2.5 | PASS |
|         |         |     |    | 20  | -4.97  | -0.00269 | ±2.5 | PASS |
|         |         |     |    | 30  | -13.75 | -0.00743 | ±2.5 | PASS |
|         |         |     |    | 40  | -10.33 | -0.00558 | ±2.5 | PASS |
|         |         |     |    | 50  | 1.42   | 0.00077  | ±2.5 | PASS |
|         |         | MCH | VN | -30 | -5.68  | -0.00302 | ±2.5 | PASS |
|         |         |     |    | -20 | -7.30  | -0.00388 | ±2.5 | PASS |
|         |         |     |    | -10 | -13.04 | -0.00694 | ±2.5 | PASS |
|         |         |     |    | 0   | -0.58  | -0.00031 | ±2.5 | PASS |
|         |         |     |    | 10  | -15.24 | -0.00811 | ±2.5 | PASS |
|         |         |     |    | 20  | -7.55  | -0.00402 | ±2.5 | PASS |
|         |         |     |    | 30  | 2.52   | 0.00134  | ±2.5 | PASS |
|         |         |     |    | 40  | -8.78  | -0.00467 | ±2.5 | PASS |
|         |         |     |    | 50  | -11.82 | -0.00629 | ±2.5 | PASS |
|         |         | HCH | VN | -30 | -14.59 | -0.00764 | ±2.5 | PASS |
|         |         |     |    | -20 | -5.10  | -0.00267 | ±2.5 | PASS |
|         |         |     |    | -10 | -6.65  | -0.00348 | ±2.5 | PASS |
|         |         |     |    | 0   | -11.62 | -0.00608 | ±2.5 | PASS |
|         |         |     |    | 10  | 1.16   | 0.00061  | ±2.5 | PASS |
|         |         |     |    | 20  | 2.71   | 0.00142  | ±2.5 | PASS |
|         |         |     |    | 30  | -6.20  | -0.00325 | ±2.5 | PASS |
|         |         |     |    | 40  | -13.50 | -0.00707 | ±2.5 | PASS |
|         |         |     |    | 50  | -2.07  | -0.00108 | ±2.5 | PASS |

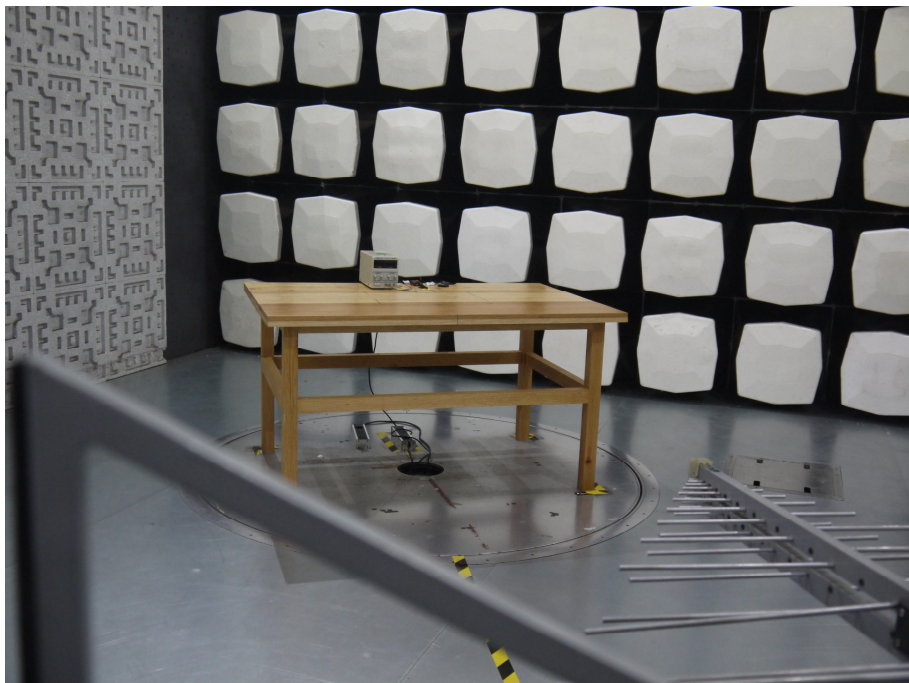
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## 11 Appendix I: Test Setup

RF Conducted Test:



Tx below 1GHz



Tx above 1GHz



The End

