# Appendix B

## Test Report for SZEM160200075301

# CONTENT

# 1 Effective (Isotropic) Radiated Power Output Data

**Part I - Test Results**

**Part 1 – 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 (GPRS) | 33.14 | 38.5 | 33.43 | 38.5 | 33.41 | 38.5 |

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

| Test Mode | Freq. (MHz) | Meas. Level (dBm) | SGP (dBm) | Substitution Gain(dBd) | Cable Loss (dB) | Substitution Level(ERP) / dBm | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| GSM/TM1 (GPRS) | 824.2 | 33.21 | 27.85 | 5.95 | 0.6 | 33.2 | 38.5 | Pass |
| GSM/TM1 (GPRS) | 836.6 | 33.5 | 27.43 | 6.65 | 0.6 | 33.48 | 38.5 | Pass |
| GSM/TM1 (GPRS) | 848.8 | 33.48 | 27.21 | 6.85 | 0.6 | 33.46 | 38.5 | Pass |

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

ERP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBd]

b: SGP=Signal Generator Level
c: RBW > emission bandwidth, VBW > 3 x RBW.
Detector: RMS

**Part 3 – RF Conducted Power of Transmitter for GSM1900**

| TEST CONDITIONS | RF Output Power(Conducted) | | | | | |
|---|---|---|---|---|---|---|
| | Channel512(L) | | Channel661(M) | | Channel810(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 (GPRS) | 30.14 | 38.5 | 30.07 | 38.5 | 30.02 | 38.5 |

**Part 4– Effective Isotropic Radiated Power of Transmitter (EIRP) for GSM1900**

| Test Mode | Freq. (MHz) | Meas. Level (dBm) | SGP (dBm) | Substitution Gain(dBi) | Cable Loss (dB) | Substitution Level(EIRP )/ dBm | Limit (dBm) | Result |
|---|---|---|---|---|---|---|---|---|
| GSM/TM1 (GPRS) | 1850.2 | 30.42 | 23.51 | 7.9 | 1 | 30.41 | 38.5 | Pass |
| GSM/TM1 (GPRS) | 1880.0 | 30.35 | 23.43 | 7.9 | 1 | 30.33 | 38.5 | Pass |
| GSM/TM1 (GPRS) | 1909.8 | 30.3 | 23.39 | 7.9 | 1 | 30.29 | 38.5 | Pass |

Note:

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

EIRP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBi]

b: SGP=Signal Generator Level

c: RBW > emission bandwidth, VBW > 3 x RBW.
Detector: RMS

# 2 Peak-to-Average Ratio

**Part I - Test Results**

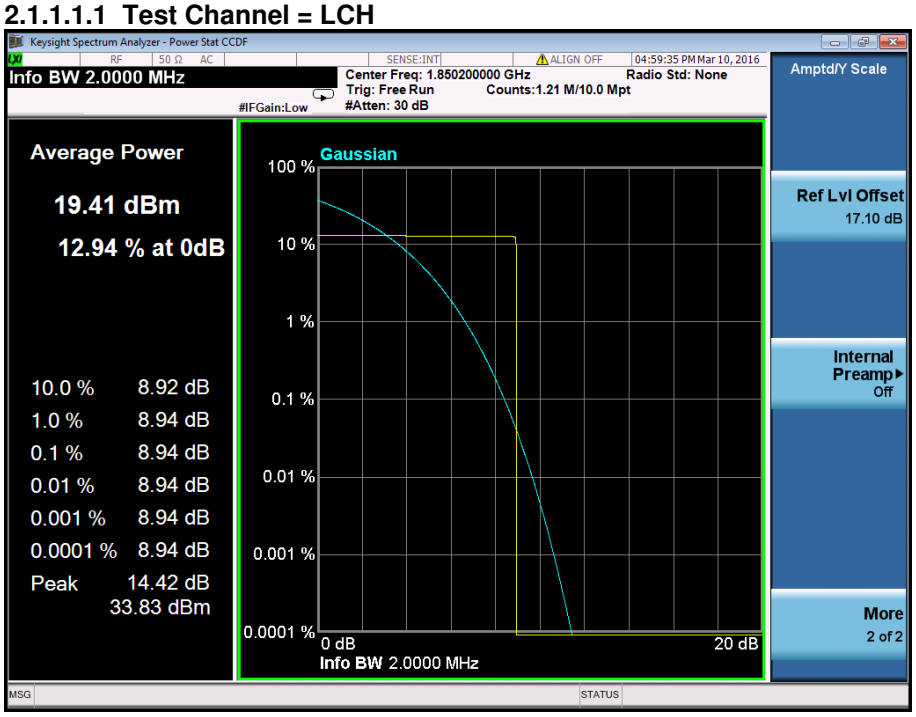
| Test Band | Test Mode | Test Channel | Measured[dB] | Limit [dB] | Verdict |
|---|---|---|---|---|---|
| GSM1900 | GSM/TM1 | LCH | 8.94 | 13 | PASS |
| | | MCH | 8.41 | 13 | PASS |
| | | HCH | 8.59 | 13 | PASS |

# 2.1 For GSM

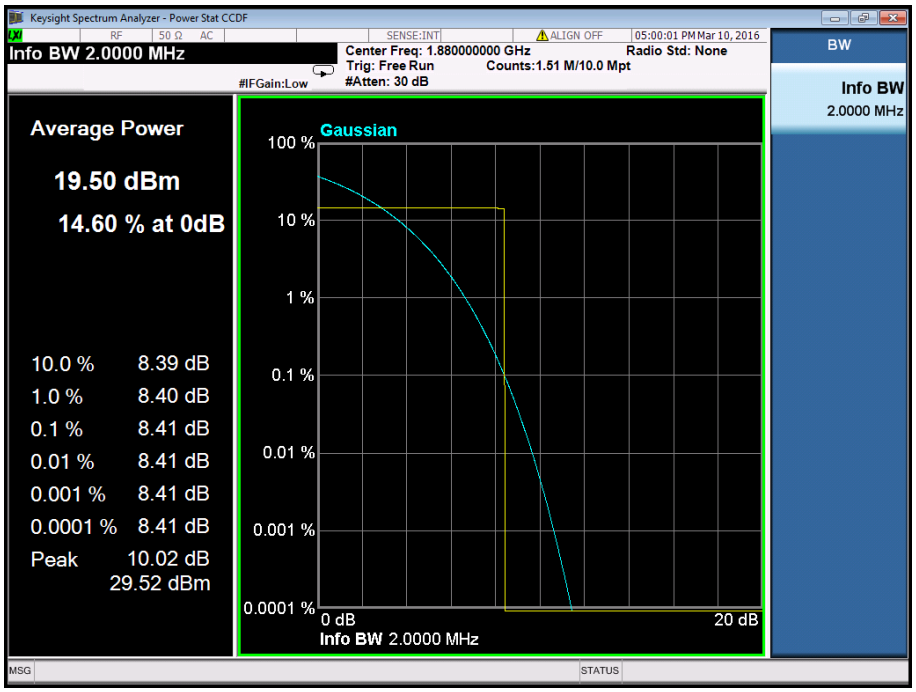
## 2.1.1 Test Band = GSM1900

### 2.1.1.1 Test Mode = GSM/TM1

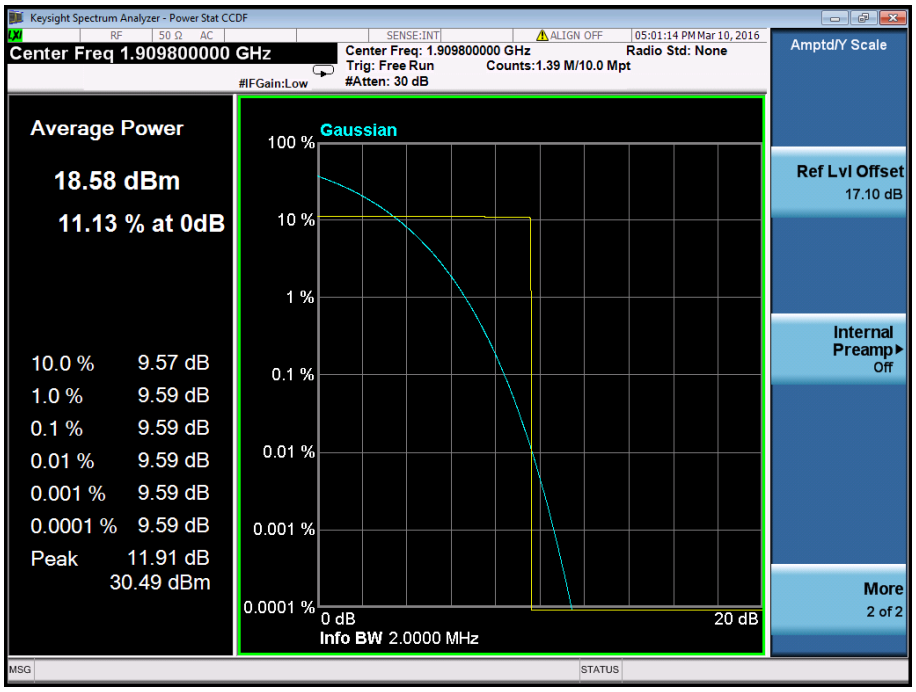
#### 2.1.1.1.1 Test Channel = LCH




#### 2.1.1.1.2 Test Channel = MCH



### 2.1.1.1.3 Test Channel = HCH



# 3 Modulation Characteristics

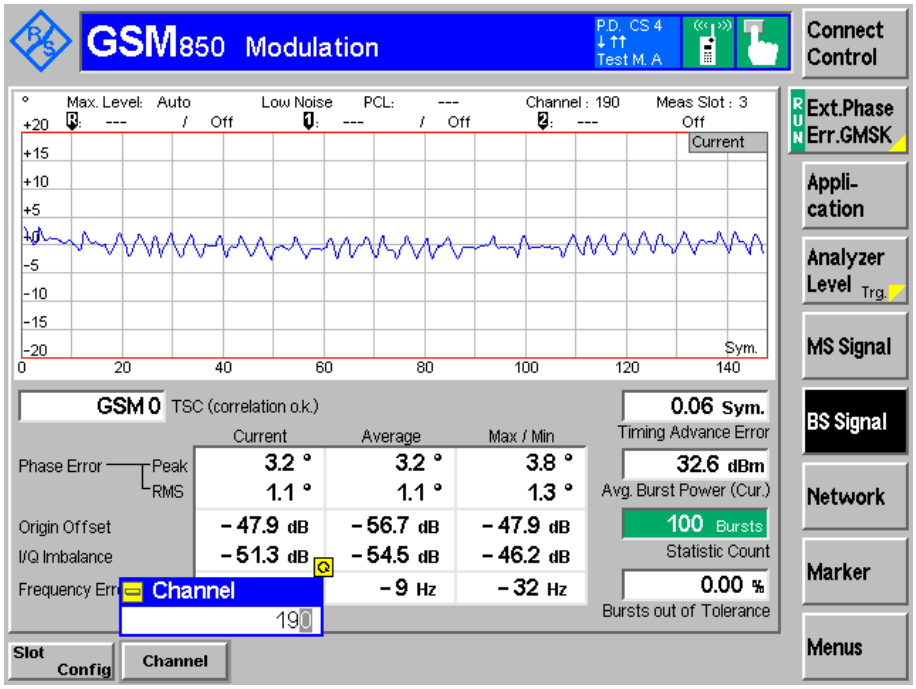
**Part I - Test Plots**

## 3.1 For GSM

### 3.1.1 Test Band = GSM850

#### 3.1.1.1 Test Mode = GSM/TM1

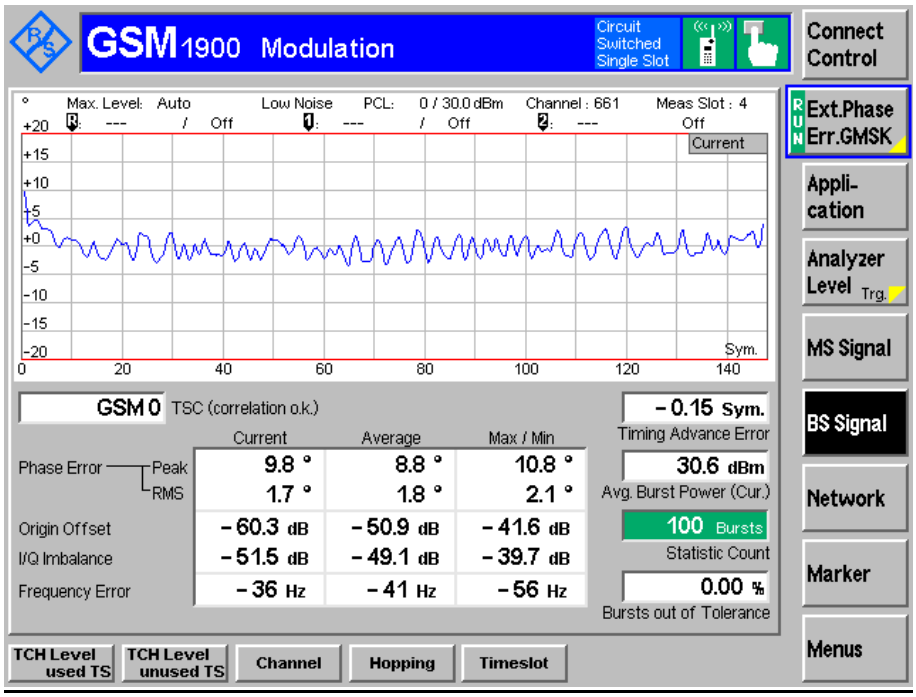
##### 3.1.1.1.1 Test Channel = MCH



## 3.1.2 Test Band = GSM1900

### 3.1.2.1 Test Mode = GSM/TM1

#### 3.1.2.1.1 Test Channel = MCH



# 4 Bandwidth

**Part I - Test Results**

| Test Band | Test Mode | Test Channel | Occupied Bandwidth [kHz] | Emission Bandwidth [kHz] | Verdict |
|---|---|---|---|---|---|
| GSM850 | GSM/TM1 | LCH | 242.45 | 307.1 | PASS |
| | | MCH | 238.66 | 310.3 | PASS |
| | | HCH | 244.21 | 307.1 | PASS |

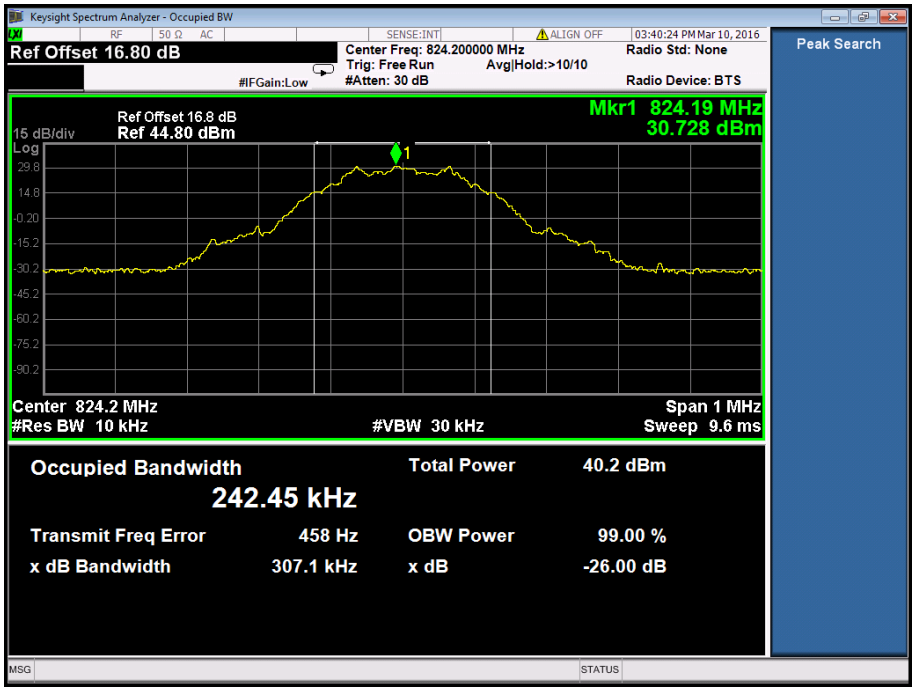
| Test Band | Test Mode | Test Channel | Occupied Bandwidth [kHz] | Emission Bandwidth [kHz] | Verdict |
|---|---|---|---|---|---|
| GSM1900 | GSM/TM1 | LCH | 244.64 | 307.1 | PASS |
| | | MCH | 250.08 | 307.0 | PASS |
| | | HCH | 244.97 | 310.2 | PASS |

# 4.1 For GSM

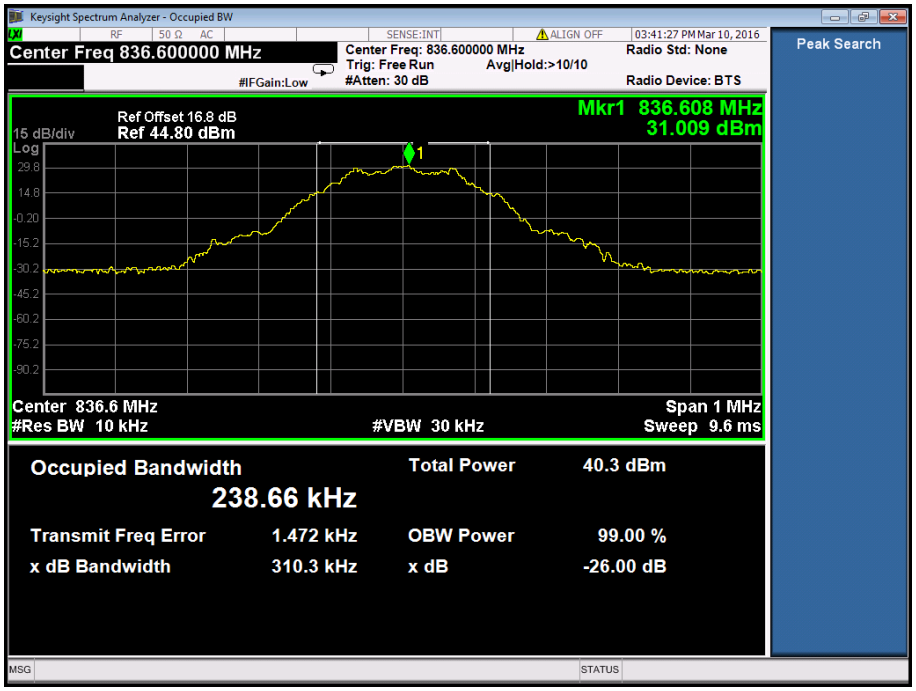
## 4.1.1 Test Band = GSM850

### 4.1.1.1 Test Mode = GSM/TM1

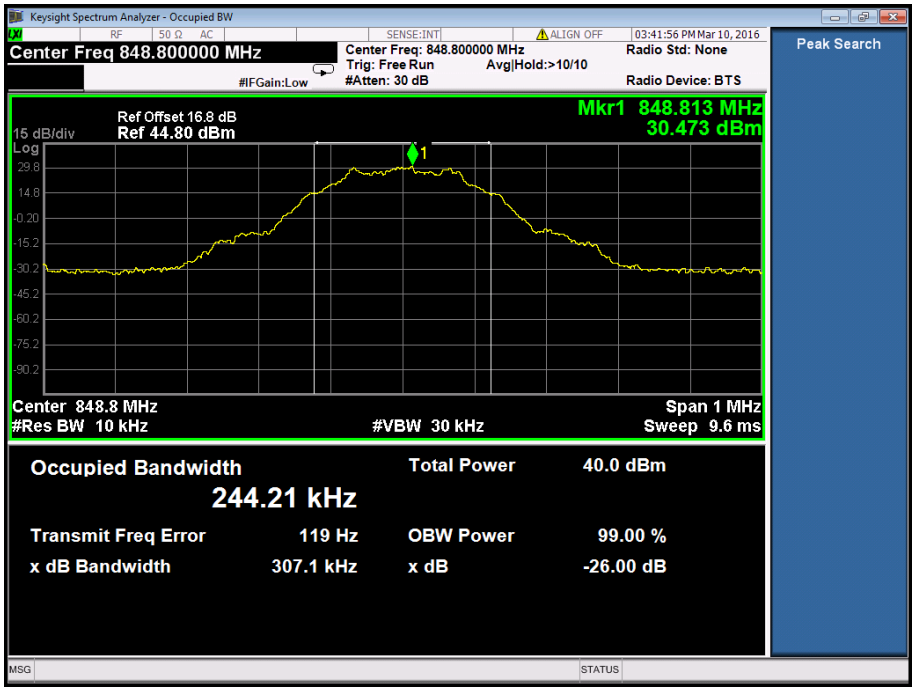
#### 4.1.1.1.1 Test Channel = LCH




#### 4.1.1.1.2 Test Channel = MCH



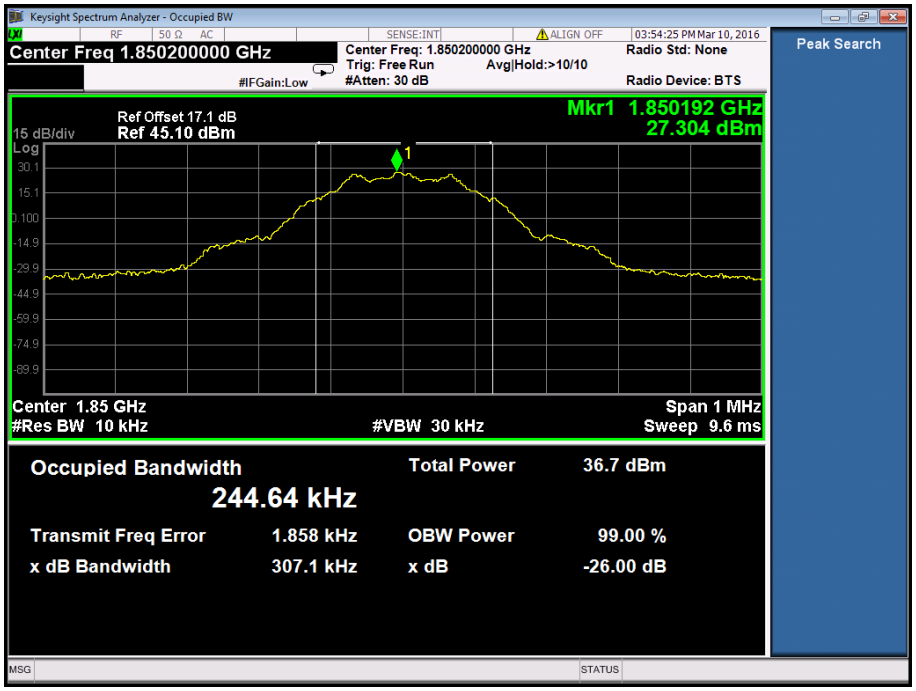
#### 4.1.1.1.3 Test Channel = HCH



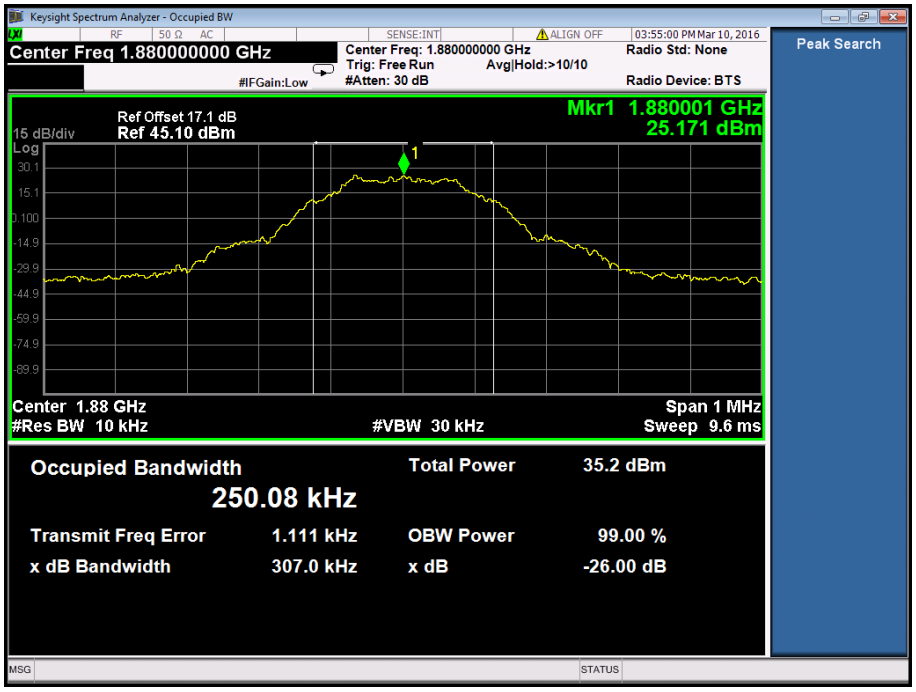

## 4.1.2 Test Band = GSM1900

### 4.1.2.1 Test Mode = GSM/TM1

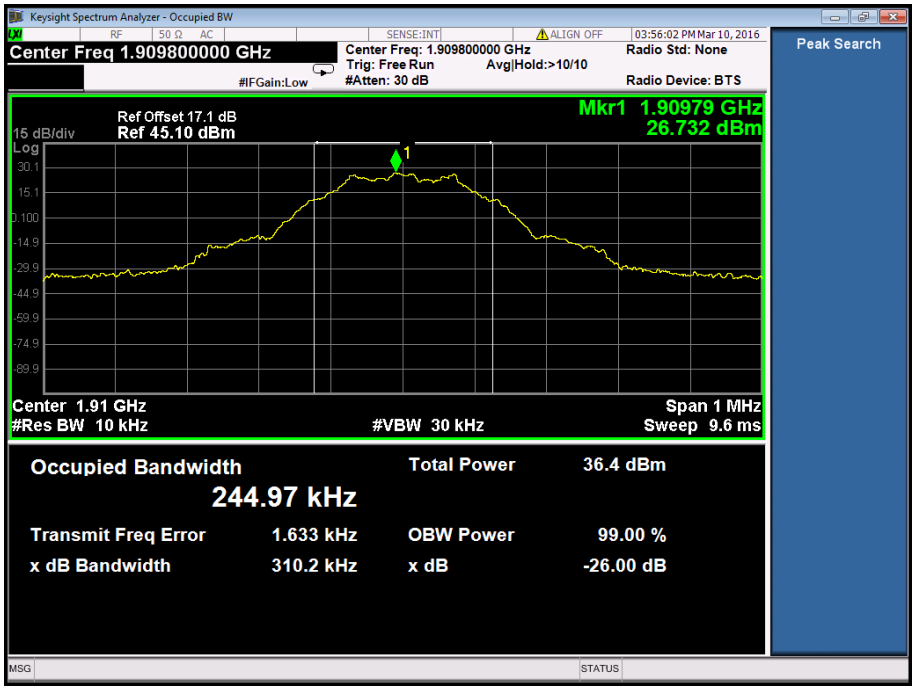
#### 4.1.2.1.1 Test Channel = LCH



#### 4.1.2.1.2 Test Channel = MCH




#### 4.1.2.1.3 Test Channel = HCH



# 5 Band Edges Compliance

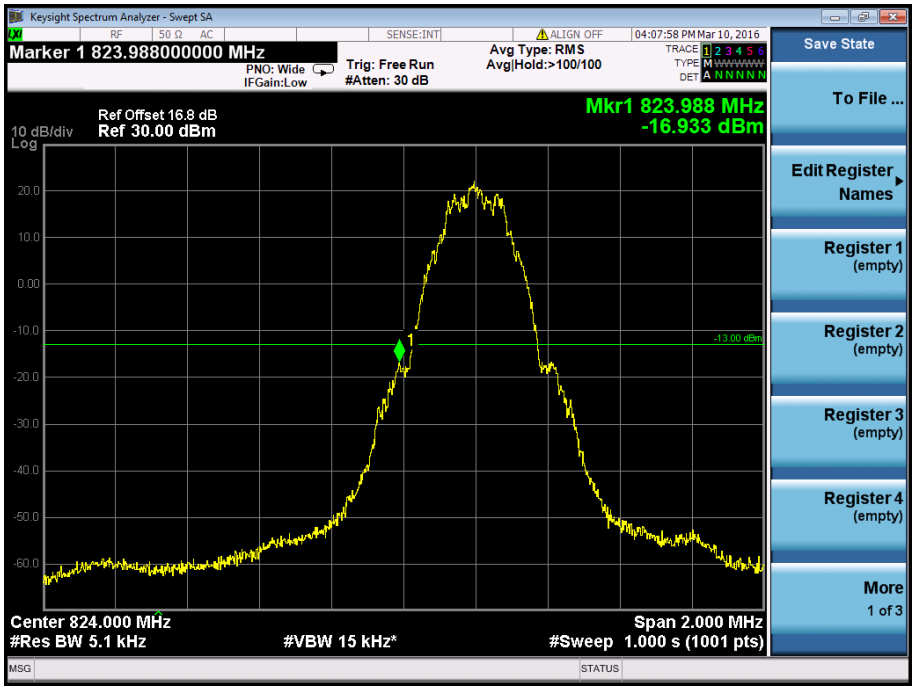
Part I - Test Plots

## 5.1 For GSM

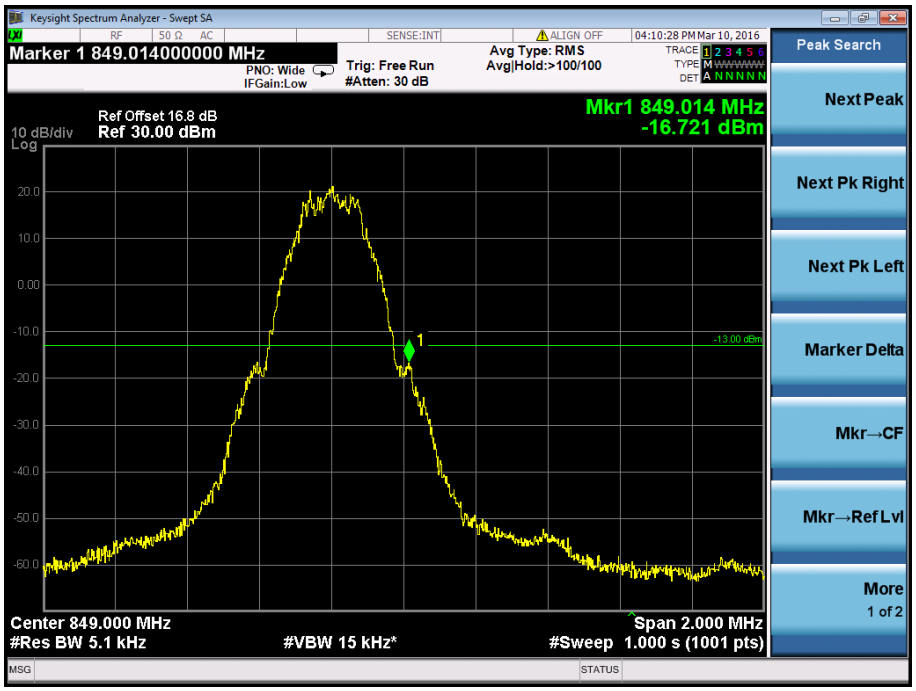
### 5.1.1 Test Band = GSM850

#### 5.1.1.1 Test Mode = GSM/TM1

##### 5.1.1.1.1 Test Channel = LCH



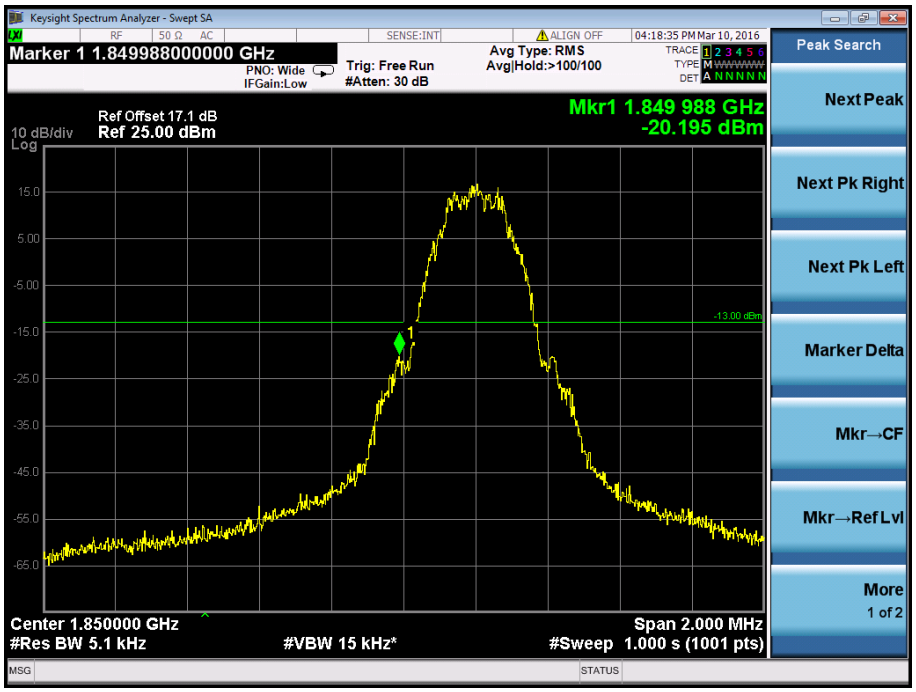
### 5.1.1.1.2 Test Channel = HCH



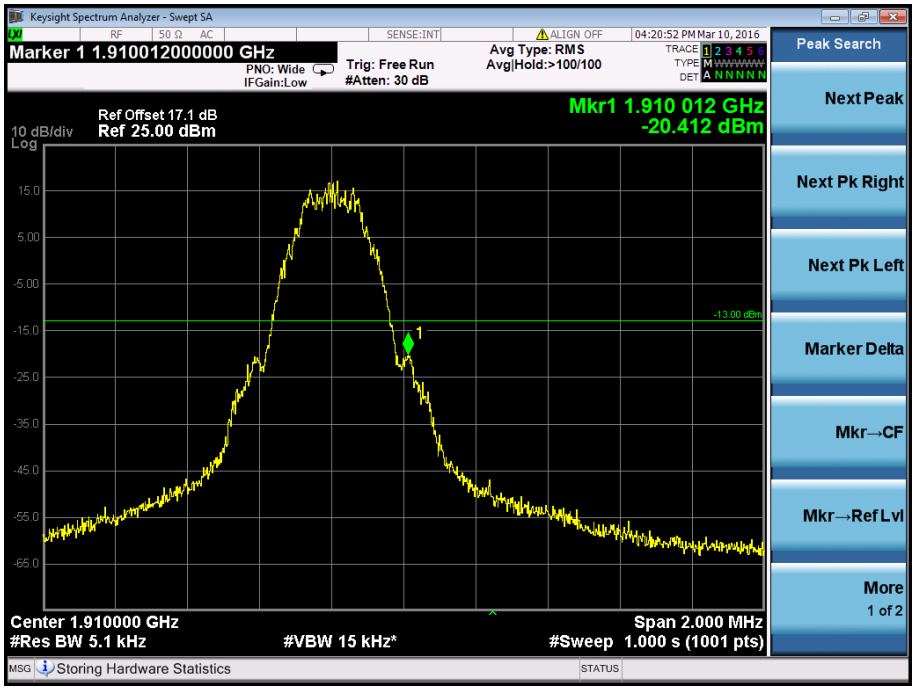
## 5.1.2 Test Band = GSM1900

### 5.1.2.1 Test Mode = GSM/TM1

#### 5.1.2.1.1 Test Channel = LCH




#### 5.1.2.1.2 Test Channel = HCH



# 6 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 < RBW/2 so that narrowband signals are not lost between frequency bins. As to the present test item, the "Measurement Points = k * (Span / RBW)" with k between 4 and 5, which results in an acceptable level error of less than 0.5 dB.

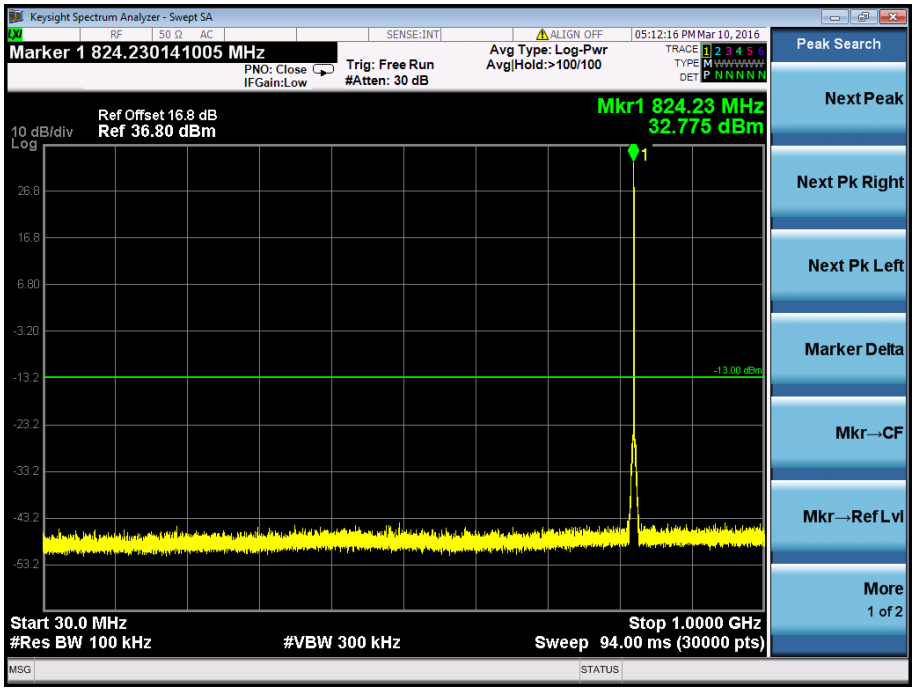
Part I - Test Plots

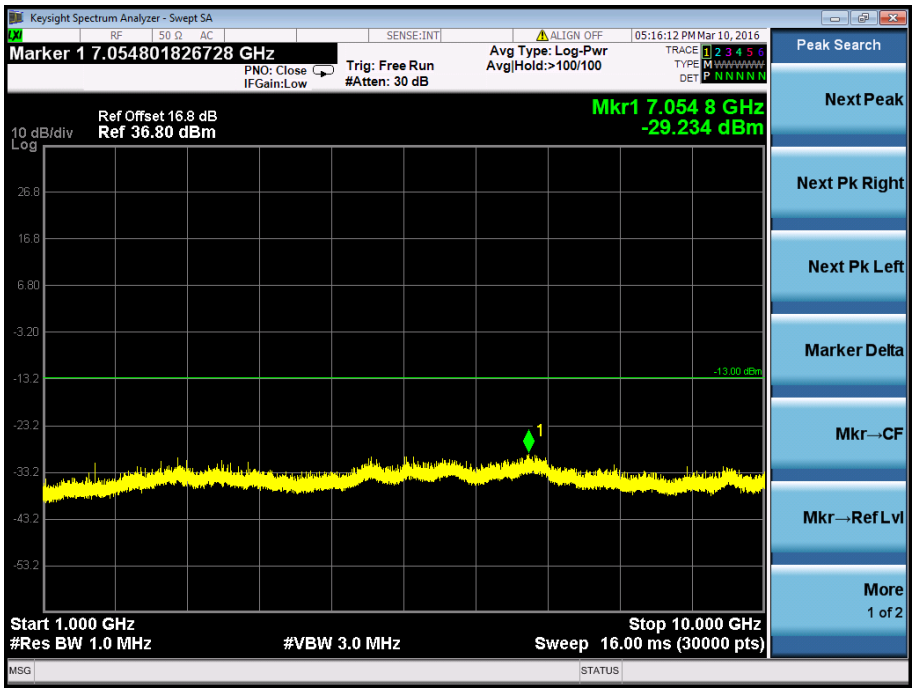
## 6.1 For GSM

### 6.1.1 Test Band = GSM850

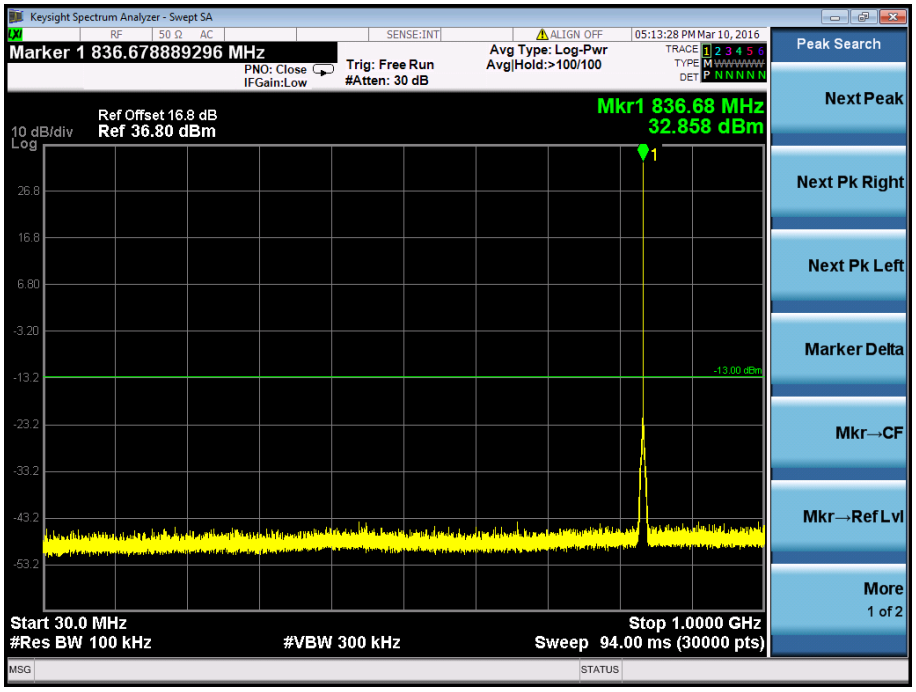
#### 6.1.1.1 Test Mode = GSM/TM1

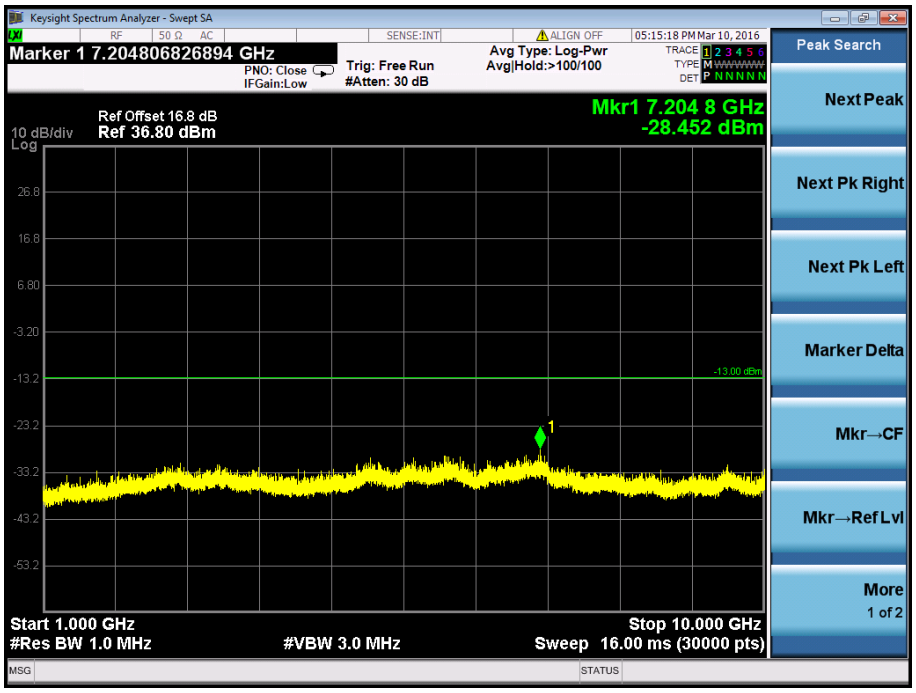
##### 6.1.1.1.1 Test Channel = LCH



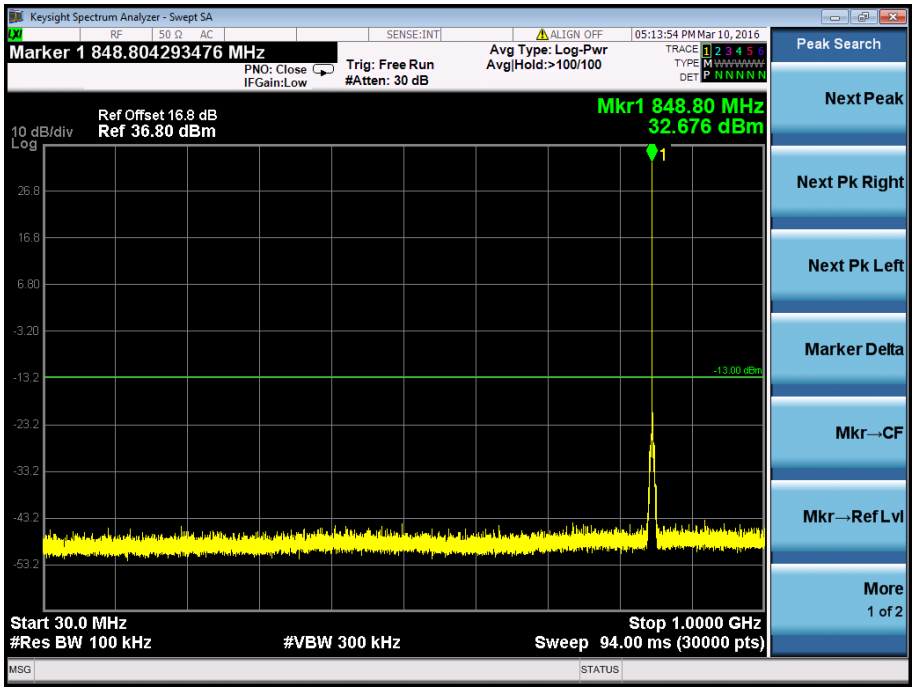


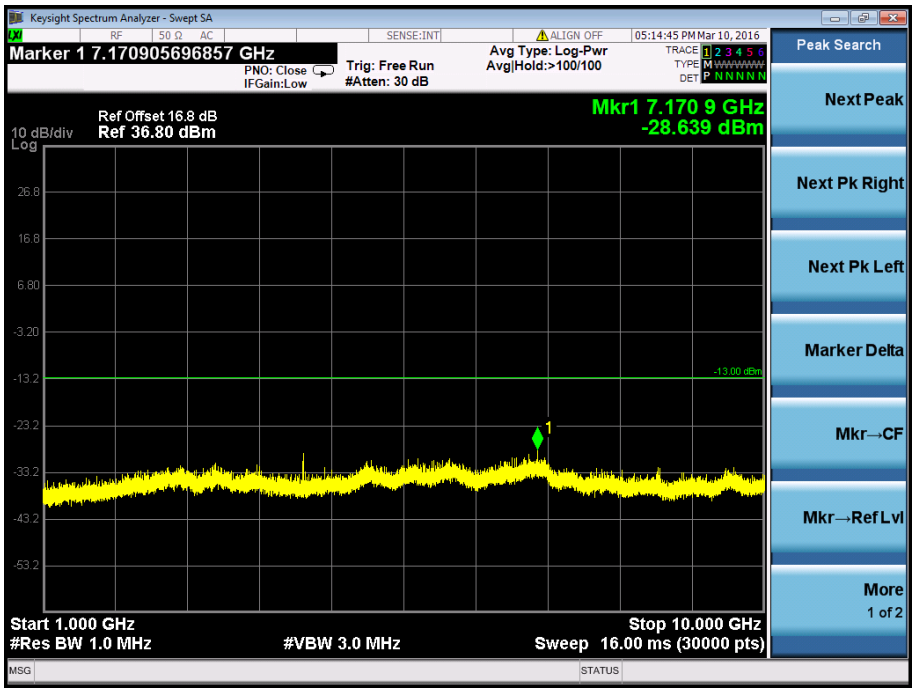

### 6.1.1.1.2 Test Channel = MCH






### 6.1.1.1.3 Test Channel = HCH

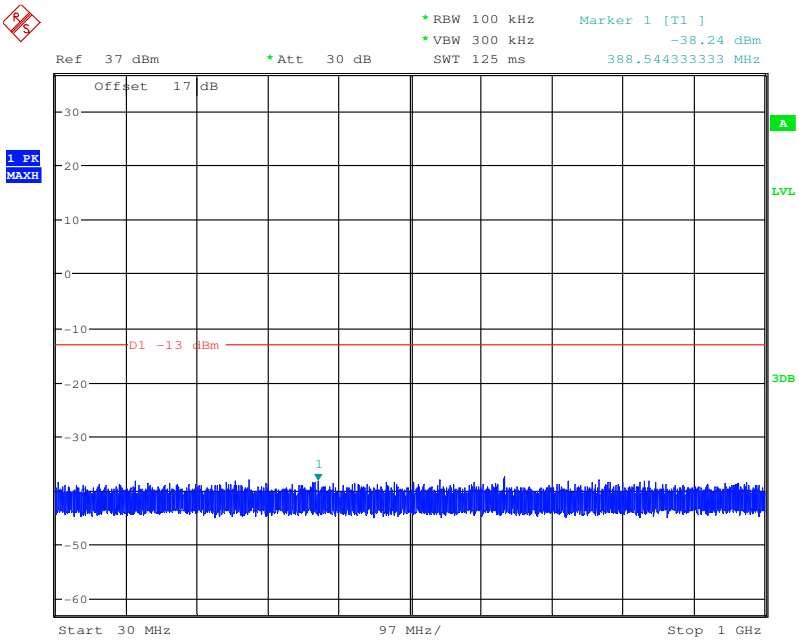




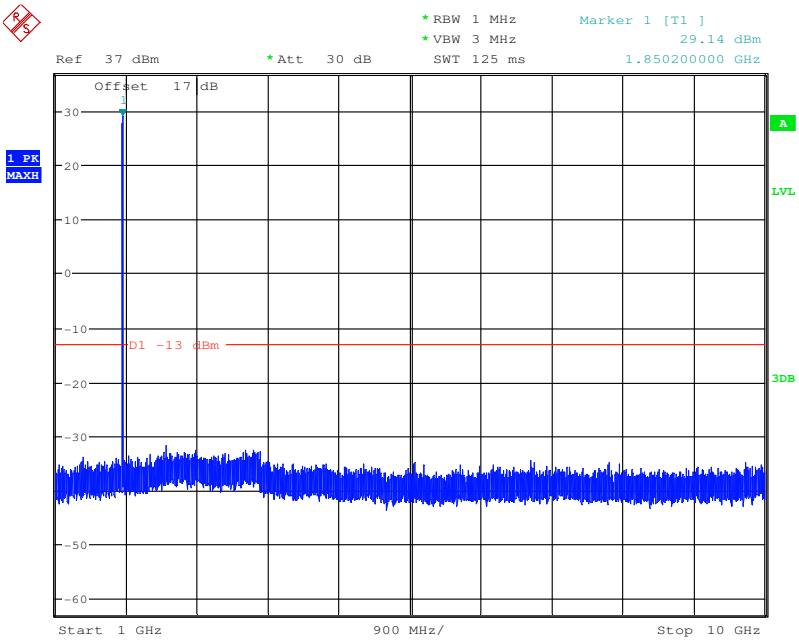
## 6.1.2 Test Band = GSM1900

### 6.1.2.1 Test Mode = GSM/TM1

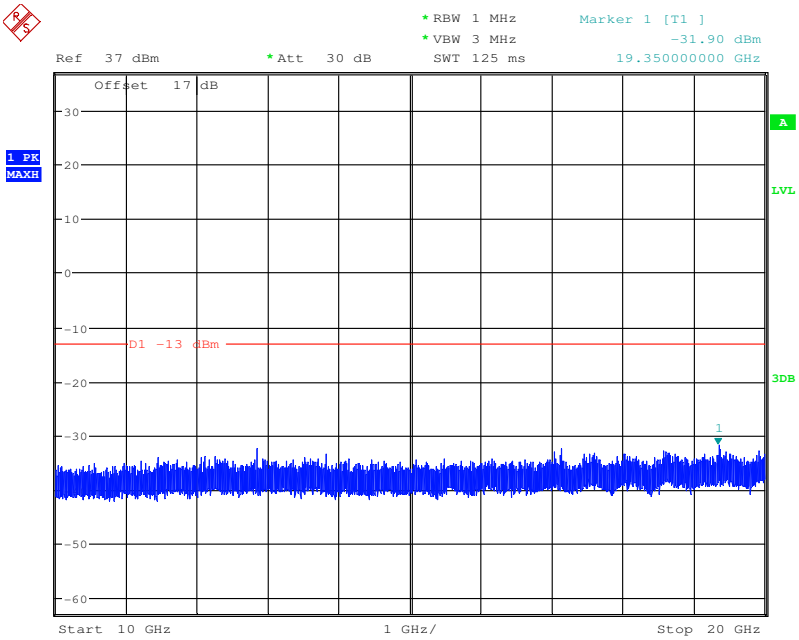
#### 6.1.2.1.1 Test Channel = LCH




Date: 21.FEB.2016 12:31:04

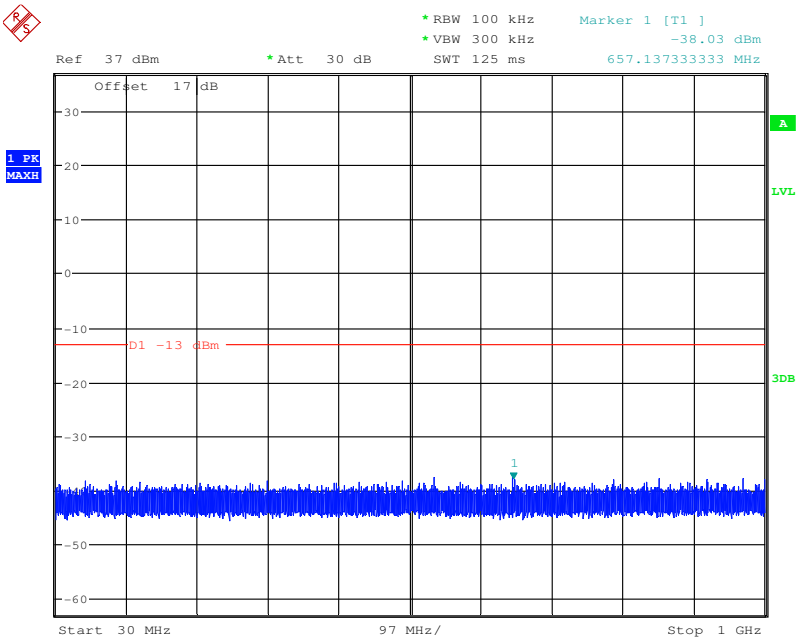



Date: 21.FEB.2016 12:31:53

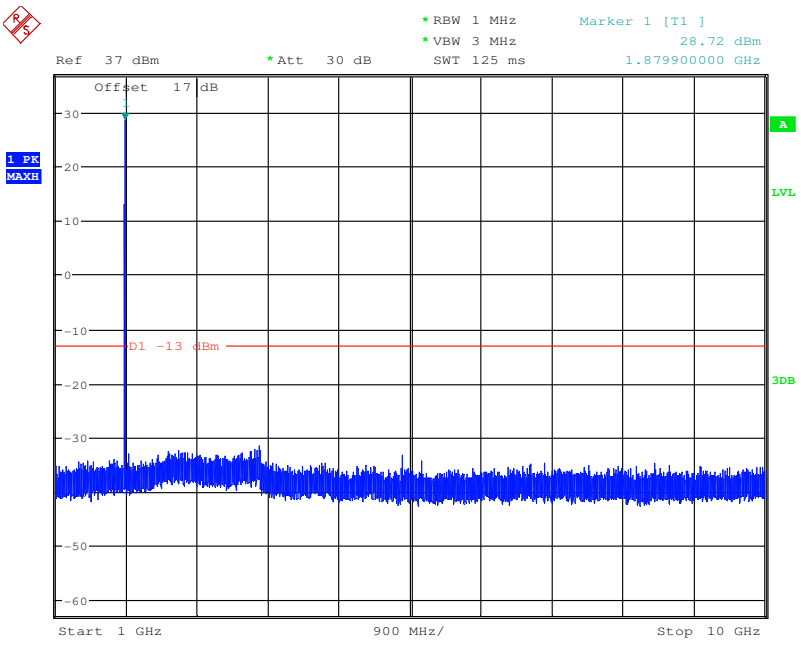



Date: 21.FEB.2016 12:32:44

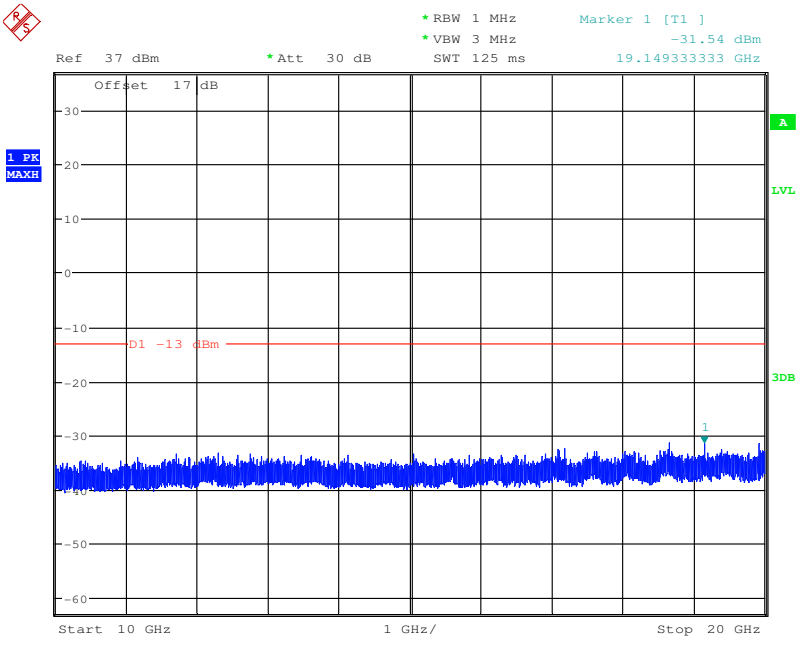
### 6.1.2.1.2 Test Channel = MCH




Date: 21.FEB.2016 12:33:25

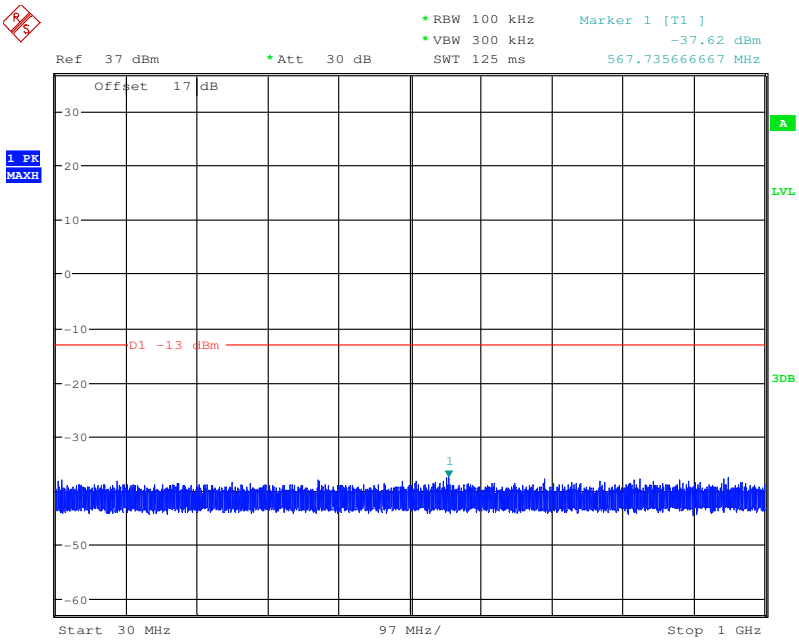



Date: 21.FEB.2016 12:34:16

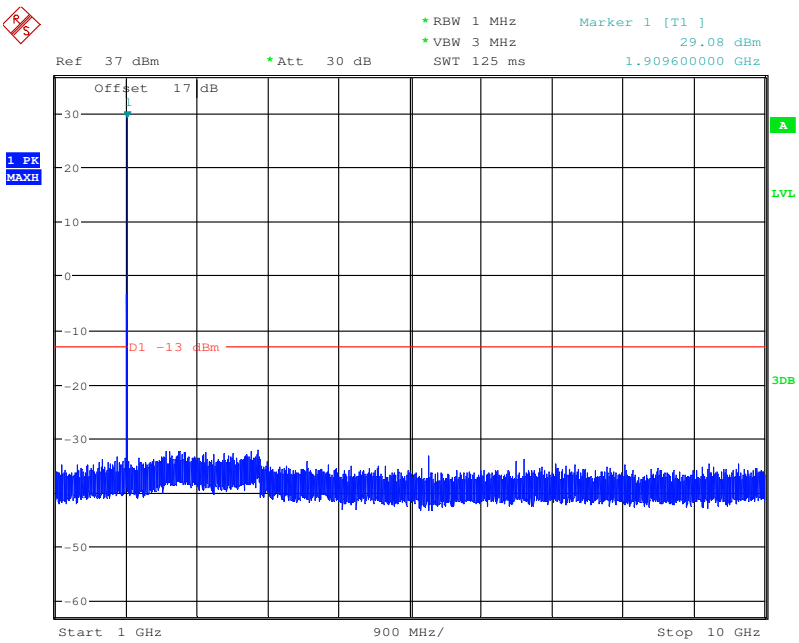



Date: 21.FEB.2016 12:36:06

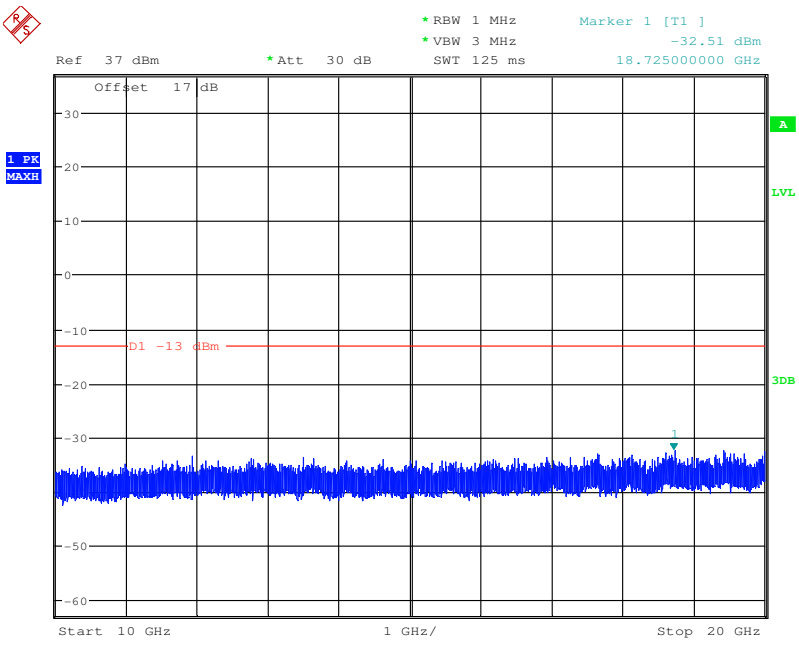
### 6.1.2.1.3 Test Channel = HCH




Date: 21.FEB.2016 12:37:13




Date: 21.FEB.2016 12:37:53




Date: 21.FEB.2016 12:38:55

# 7 Field Strength of Spurious Radiation

**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**

| Frequency | Spurious Emission Level | | Limit | Over limit |
|---|---|---|---|---|
| (MHz) | Polaxis | (dBm) | dBm | (dB) |
| 1242.500000 | H | -51.87 | -13.00 | 38.87 |
| 1584.750000 | H | -49.01 | -13.00 | 36.01 |
| 2502.750000 | H | -42.19 | -13.00 | 29.19 |
| 1275.000000 | V | -51.23 | -13.00 | 38.23 |
| 1674.000000 | V | -48.54 | -13.00 | 35.54 |
| 4879.875000 | V | -50.47 | -13.00 | 37.47 |

**7.1.1.1.2 Test Channel = MCH**

| Frequency | Spurious Emission Level | | Limit | Over limit |
|---|---|---|---|---|
| (MHz) | Polaxis | (dBm) | dBm | (dB) |
| 1186.666667 | H | -52.77 | -13.00 | 39.77 |
| 1812.000000 | H | -47.25 | -13.00 | 34.25 |
| 4459.125000 | H | -51.31 | -13.00 | 38.31 |
| 2792.250000 | V | -41.29 | -13.00 | 28.29 |
| 3550.500000 | V | -53.73 | -13.00 | 40.73 |
| 4512.000000 | V | -51.88 | -13.00 | 38.88 |

**7.1.1.1.3 Test Channel = HCH**

| Frequency | Spurious Emission Level | | Limit | Over limit |
|---|---|---|---|---|
| (MHz) | Polaxis | (dBm) | dBm | (dB) |
| 1765.500000 | H | -47.25 | -13.00 | 34.25 |
| 3608.625000 | H | -53.21 | -13.00 | 40.21 |
| 4730.625000 | H | -50.55 | -13.00 | 37.55 |
| 2649.000000 | V | -41.78 | -13.00 | 28.78 |
| 3344.250000 | V | -53.29 | -13.00 | 40.29 |
| 4006.875000 | V | -51.32 | -13.00 | 38.32 |

## 7.1.2 Test Band = GSM1900

### 7.1.2.1 Test Mode = GSM/TM1

#### 7.1.2.1.1 Test Channel = LCH

| Frequency | Spurious Emission Level | | Limit | Over limit |
|---|---|---|---|---|
| (MHz) | Polaxis | (dBm) | dBm | (dB) |
| 1434.066667 | H | -50.65 | -13.00 | 37.65 |
| 3957.750000 | H | -51.61 | -13.00 | 38.61 |
| 4647.375000 | H | -51.03 | -13.00 | 38.03 |
| 1548.533333 | V | -50.87 | -13.00 | 37.87 |
| 2842.395000 | V | -42.32 | -13.00 | 29.32 |
| 3656.625000 | V | -51.95 | -13.00 | 38.95 |

#### 7.1.2.1.2 Test Channel = MCH

| Frequency | Spurious Emission Level | | Limit | Over limit |
|---|---|---|---|---|
| (MHz) | Polaxis | (dBm) | dBm | (dB) |
| 1970.235000 | H | -47.01 | -13.00 | 34.01 |
| 3402.750000 | H | -52.95 | -13.00 | 39.95 |
| 3899.625000 | H | -51.47 | -13.00 | 38.47 |
| 2099.400000 | V | -46.37 | -13.00 | 33.37 |
| 3394.125000 | V | -52.77 | -13.00 | 39.77 |
| 4290.000000 | V | -50.25 | -13.00 | 37.25 |

#### 7.1.2.1.3 Test Channel = HCH

| Frequency | Spurious Emission Level | | Limit | Over limit |
|---|---|---|---|---|
| (MHz) | Polaxis | (dBm) | dBm | (dB) |
| 2213.160000 | H | -44.85 | -13.00 | 31.85 |
| 3116.250000 | H | -52.68 | -13.00 | 39.68 |
| 5547.375000 | H | -50.62 | -13.00 | 37.62 |
| 2216.715000 | V | -44.85 | -13.00 | 31.85 |
| 4648.125000 | V | -50.87 | -13.00 | 37.87 |
| 5244.750000 | V | -50.71 | -13.00 | 37.71 |

NOTE:

1) The disturbance above 10GHz 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.

# 8 Frequency Stability

## 8.1 For GSM

### 8.1.1 Frequency Error VS. Voltage

| Test Band | Test Mode | Test Channel | Test Temp. | Test Volt. | Freq. Error [Hz] | Freq. vs. rated [ppm] | Verdict |
|---|---|---|---|---|---|---|---|
| GSM850 | GSM/TM1 | LCH | TN | VL | -8.65 | -0.00468 | PASS |
| | | | | VN | -10.20 | -0.00551 | PASS |
| | | | | VH | -12.85 | -0.00695 | PASS |
| | | MCH | TN | VL | -1.80 | -0.00096 | PASS |
| | | | | VN | -2.51 | -0.00134 | PASS |
| | | | | VH | -7.49 | -0.00398 | PASS |
| | | HCH | TN | VL | -19.04 | -0.00997 | PASS |
| | | | | VN | -8.39 | -0.00439 | PASS |
| | | | | VH | -1.16 | -0.00061 | PASS |

| Test Band | Test Mode | Test Channel | Test Temp. | Test Volt. | Freq. Error [Hz] | Freq. vs. rated [ppm] | Verdict |
|---|---|---|---|---|---|---|---|
| GSM1900 | GSM/TM1 | LCH | TN | VL | -10.20 | -0.00551 | PASS |
| | | | | VN | -12.85 | -0.00695 | PASS |
| | | | | VH | -8.65 | -0.00468 | PASS |
| | | MCH | TN | VL | -2.51 | -0.00134 | PASS |
| | | | | VN | -7.49 | -0.00398 | PASS |
| | | | | VH | -1.80 | -0.00096 | PASS |
| | | HCH | TN | VL | -1.16 | -0.00061 | PASS |
| | | | | VN | -19.04 | -0.00997 | PASS |
| | | | | VH | -8.39 | -0.00439 | PASS |

### 8.1.2 Frequency Error VS. Temperature

| Test Band | Test Mode | Test Channel | Test Volt. | Test Temp. | Freq. Error [Hz] | Freq. vs. rated [ppm] | Verdict |
|---|---|---|---|---|---|---|---|
| GSM850 | GSM/TM1 | LCH | VN | -30 | -4.64 | -0.00563 | PASS |
| | | | | -20 | -1.38 | -0.00167 | PASS |
| | | | | -10 | -5.38 | -0.00653 | PASS |
| | | | | 0 | -4.19 | -0.00508 | PASS |
| | | | | 10 | -3.35 | -0.00406 | PASS |
| | | | | 20 | -2.05 | -0.00249 | PASS |
| | | | | 30 | -10.19 | -0.01236 | PASS |
| | | | | 40 | 0.66 | 0.00080 | PASS |
| | | | | 50 | 0.88 | 0.00107 | PASS |
| | | MCH | VN | -30 | 0.14 | 0.00017 | PASS |
| | | | | -20 | -0.51 | -0.00061 | PASS |
| | | | | -10 | -8.67 | -0.01036 | PASS |
| | | | | 0 | -2.28 | -0.00273 | PASS |
| | | | | 10 | -2.02 | -0.00241 | PASS |
| | | | | 20 | -3.83 | -0.00458 | PASS |
| | | | | 30 | 0.04 | 0.00005 | PASS |
| | | | | 40 | -5.70 | -0.00681 | PASS |
| | | | | 50 | -6.41 | -0.00766 | PASS |
| | | HCH | VN | -30 | -5.74 | -0.00676 | PASS |
| | | | | -20 | -7.22 | -0.00851 | PASS |
| | | | | -10 | -5.09 | -0.00600 | PASS |
| | | | | 0 | -3.83 | -0.00451 | PASS |
| | | | | 10 | -10.26 | -0.01209 | PASS |
| | | | | 20 | -9.67 | -0.01139 | PASS |
| | | | | 30 | -1.54 | -0.00181 | PASS |
| | | | | 40 | -8.61 | -0.01014 | PASS |
| | | | | 50 | -3.67 | -0.00432 | PASS |

| Test Band | Test Mode | Test Channel | Test Volt. | Test Temp. | Freq. Error [Hz] | Freq. vs. rated [ppm] | Verdict |
|---|---|---|---|---|---|---|---|
| GSM1900 | GSM/TM1 | LCH | VN | -30 | -15.00 | -0.00811 | PASS |
| | | | | -20 | -8.93 | -0.00483 | PASS |
| | | | | -10 | -14.10 | -0.00762 | PASS |
| | | | | 0 | -2.28 | -0.00123 | PASS |
| | | | | 10 | 1.59 | 0.00086 | PASS |
| | | | | 20 | -5.12 | -0.00277 | PASS |
| | | | | 30 | -13.90 | -0.00751 | PASS |
| | | | | 40 | -10.48 | -0.00566 | PASS |
| | | | | 50 | 1.27 | 0.00069 | PASS |
| | | MCH | VN | -30 | -5.83 | -0.00310 | PASS |
| | | | | -20 | -7.45 | -0.00396 | PASS |
| | | | | -10 | -13.19 | -0.00702 | PASS |
| | | | | 0 | -0.73 | -0.00039 | PASS |
| | | | | 10 | -15.39 | -0.00819 | PASS |
| | | | | 20 | -7.70 | -0.00410 | PASS |
| | | | | 30 | 2.37 | 0.00126 | PASS |
| | | | | 40 | -8.93 | -0.00475 | PASS |
| | | | | 50 | -11.97 | -0.00637 | PASS |
| | | HCH | VN | -30 | -14.74 | -0.00772 | PASS |
| | | | | -20 | -5.25 | -0.00275 | PASS |
| | | | | -10 | -6.80 | -0.00356 | PASS |
| | | | | 0 | -11.77 | -0.00616 | PASS |
| | | | | 10 | 1.01 | 0.00053 | PASS |
| | | | | 20 | 2.56 | 0.00134 | PASS |
| | | | | 30 | -6.35 | -0.00332 | PASS |
| | | | | 40 | -13.65 | -0.00715 | PASS |
| | | | | 50 | -2.22 | -0.00116 | PASS |

The End