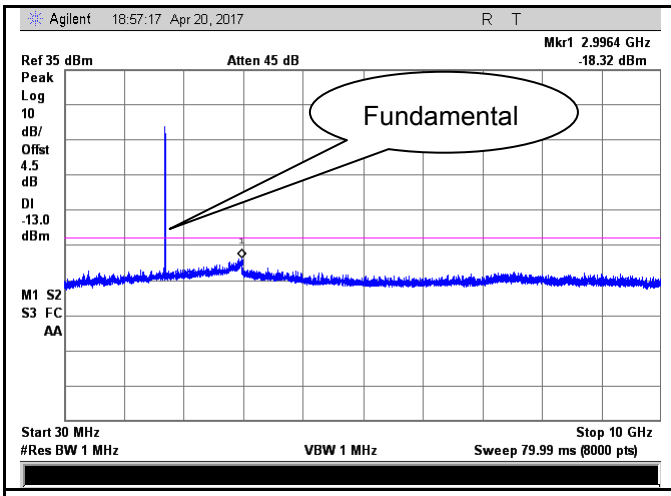
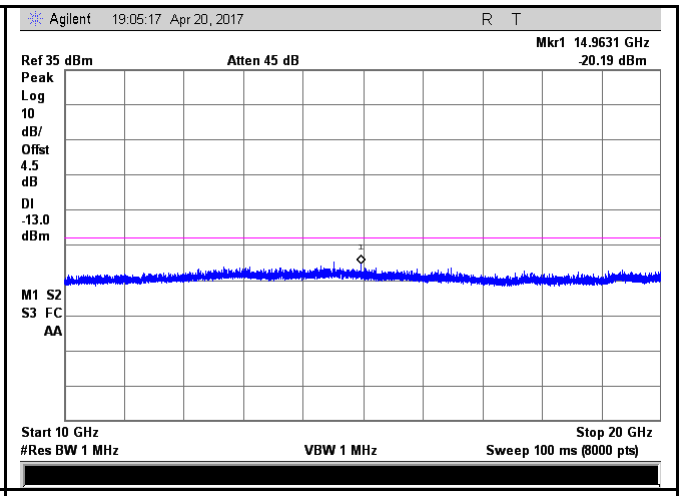
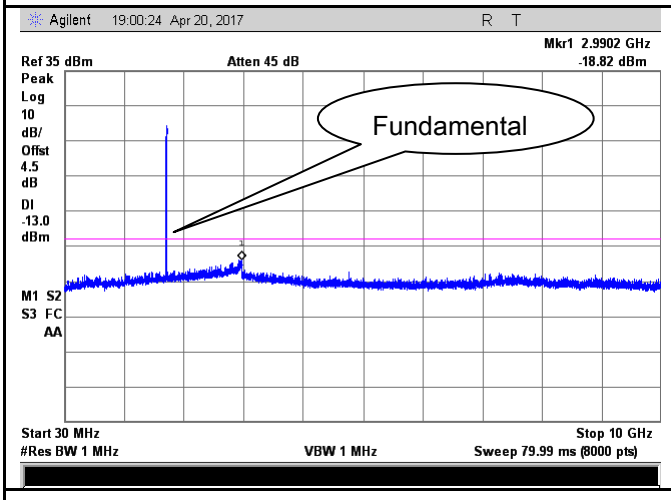
## UMTS-FDD Band IV (Part 27)



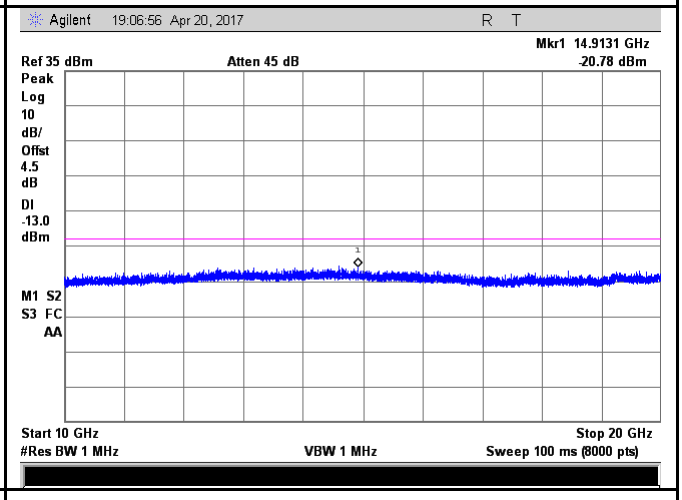

Band IV - Low Channel-1



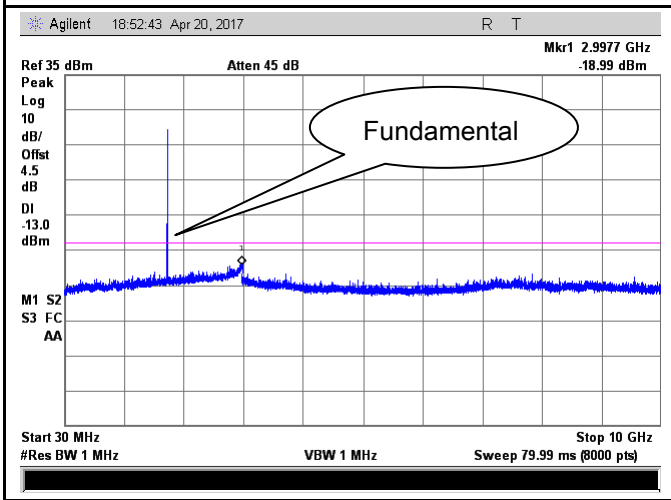

Band IV - Low Channel-2



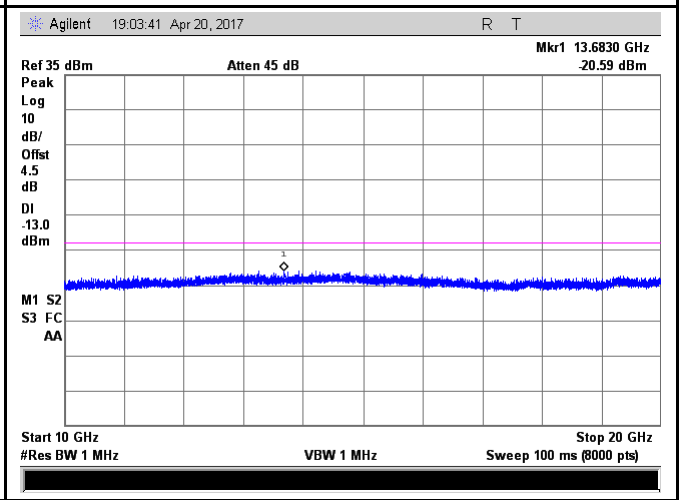

Band IV - Middle Channel-1




Band IV - Middle Channel-2



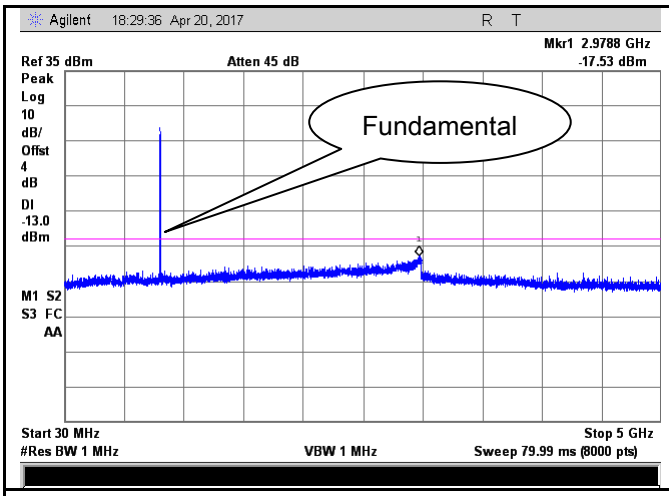

Band IV - High Channel-1



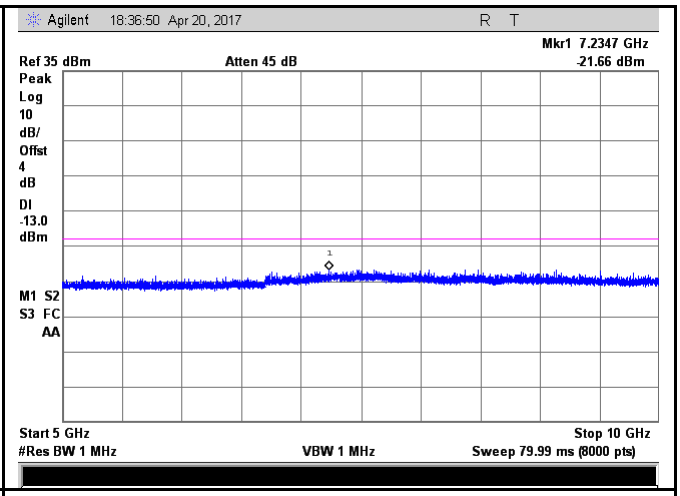

Band IV - High Channel-2

## HSDPA:

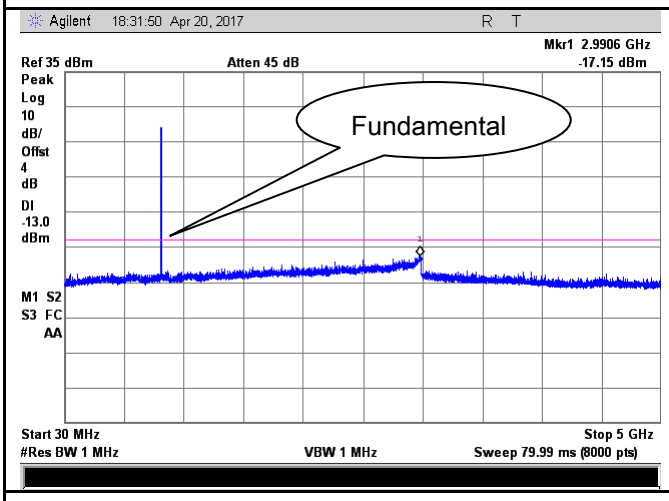
## UMTS-FDD Band V (Part 22H)



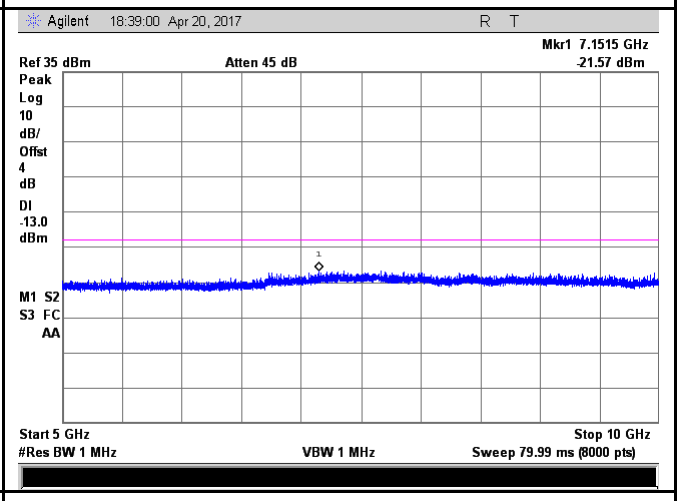

Band V - Low Channel-1



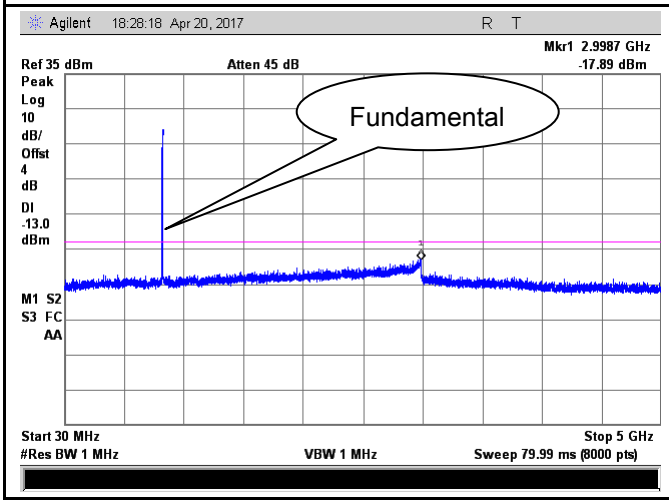

Band V - Low Channel-2



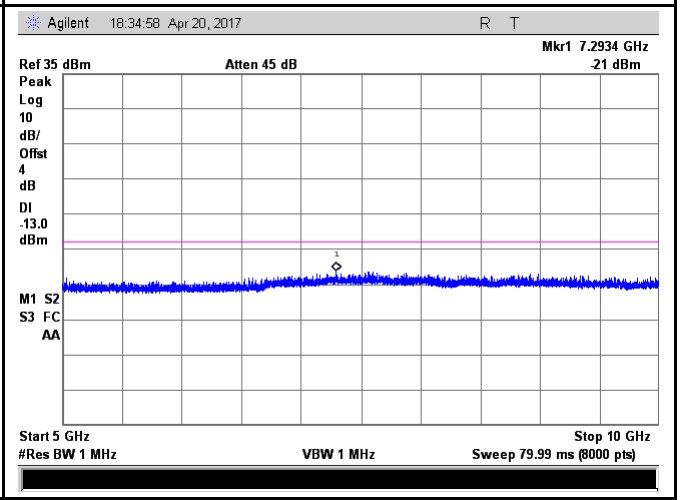

Band V - Middle Channel-1




Band V - Middle Channel-2

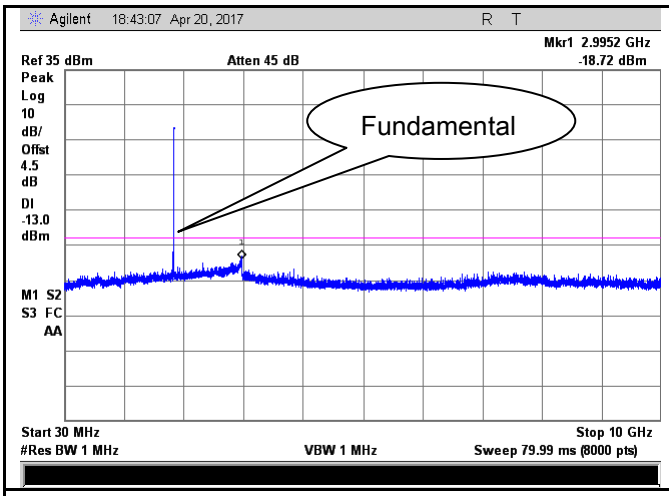



Band V - High Channel-1

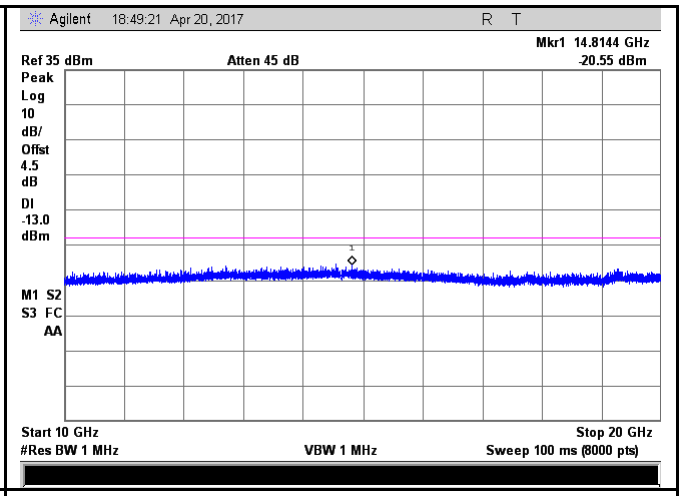



Band V - High Channel-2

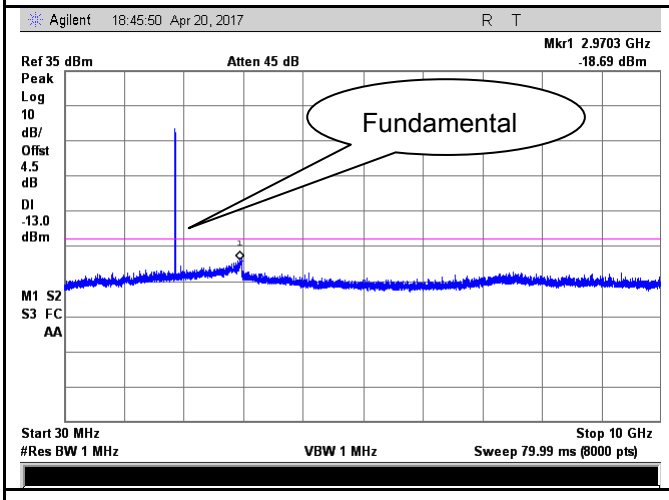
## UMTS-FDD Band II (Part 24E)



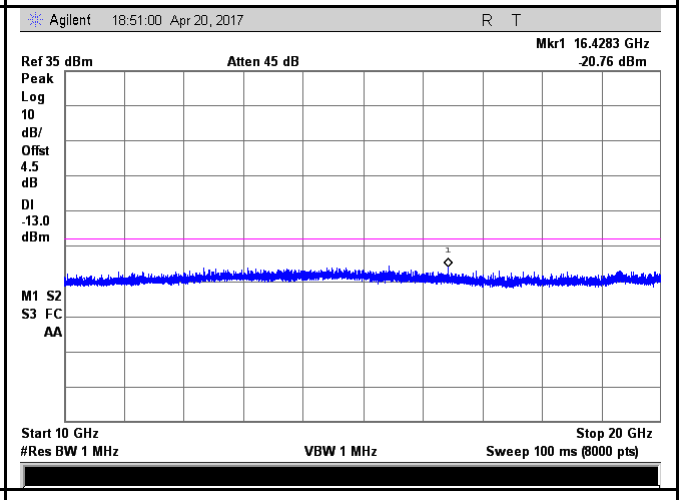

Band II - Low Channel-1



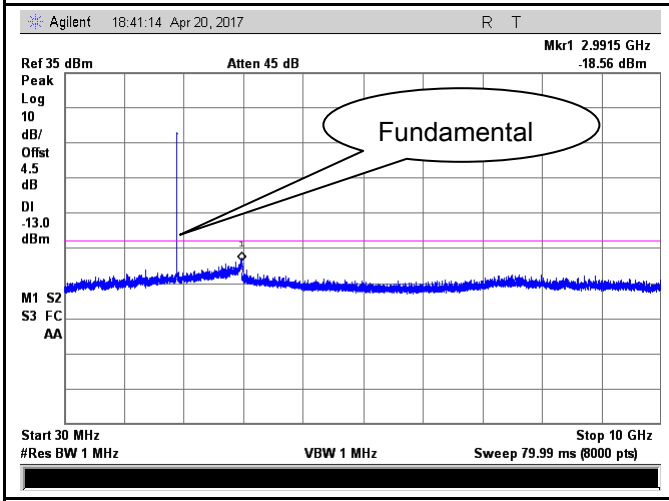

Band II - Low Channel-2



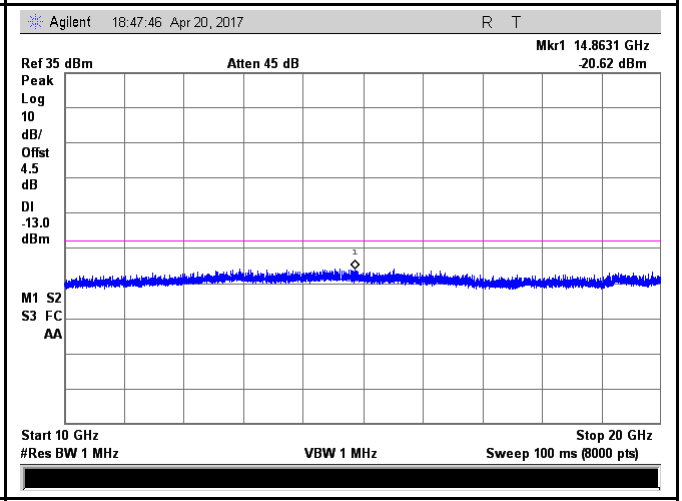

Band II - Middle Channel-1




Band II - Middle Channel-2

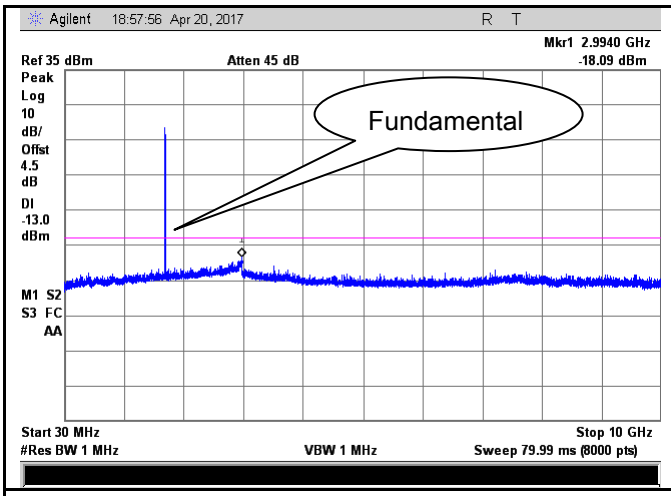



Band II - High Channel-1

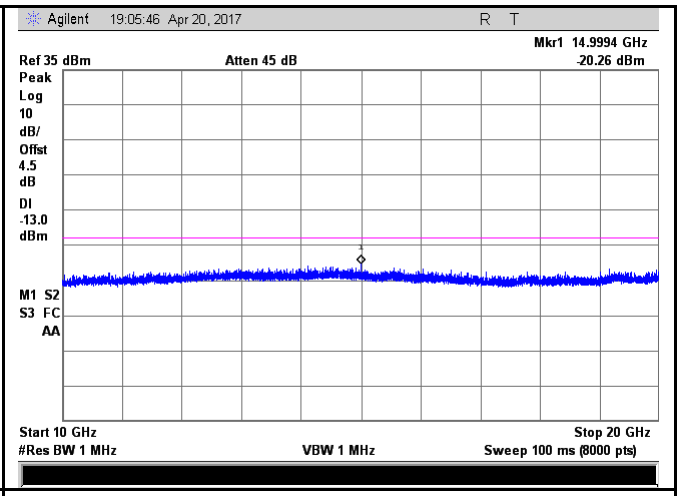



Band II - High Channel-2

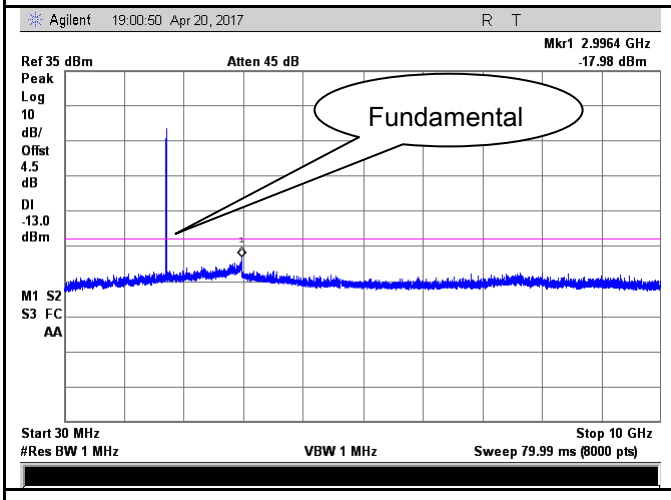
## UMTS-FDD Band IV (Part 27)



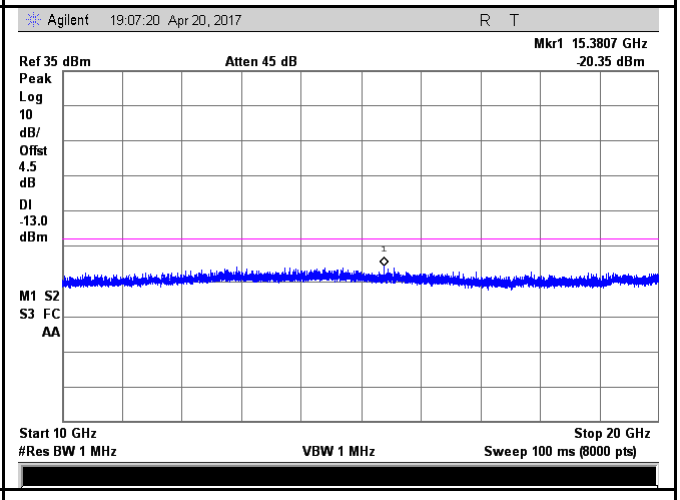

Band IV - Low Channel-1



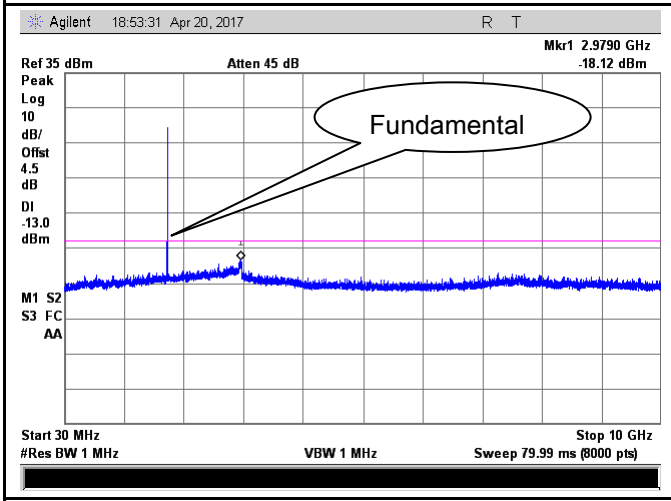

Band IV - Low Channel-2



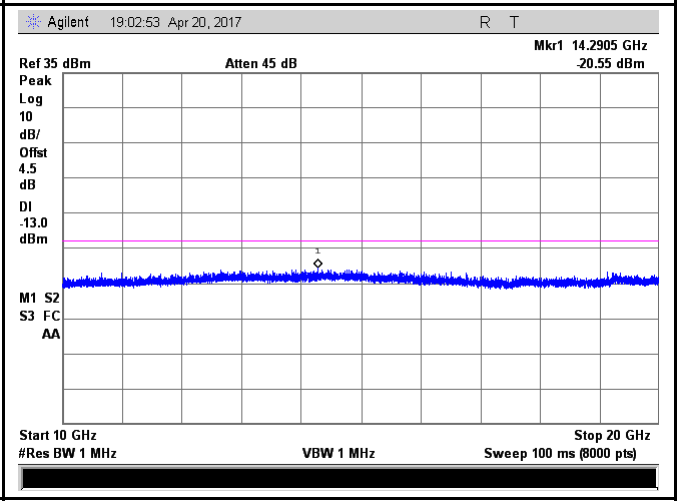

Band IV - Middle Channel-1




Band IV - Middle Channel-2




Band IV - High Channel-1

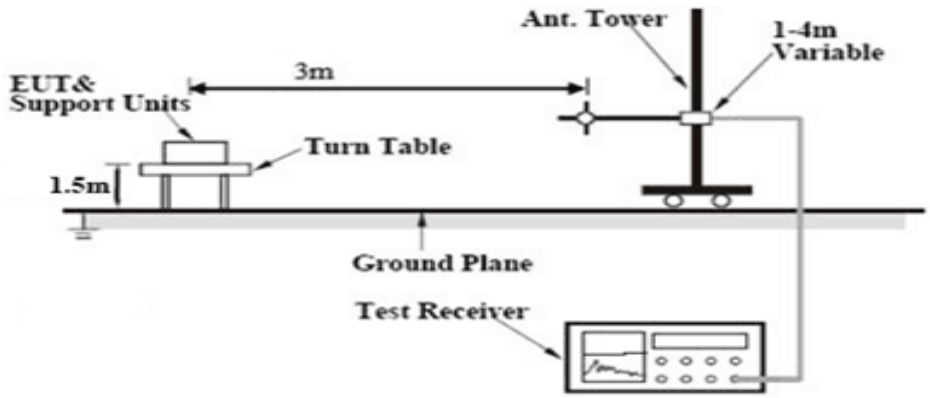



Band IV - High Channel-2

## 6.6 Spurious Radiated Emissions

| | |
|---|---|
| Temperature | 24 °C |
| Relative Humidity | 52% |
| Atmospheric Pressure | 1019mbar |
| Test date : | April 19, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1053, §22.917 & §24.238 § 27.53(h) | a) | The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic. | ☑ |
| Test setup |  | | |
| Test Procedure | 1. The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.<br>2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.<br>3. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.<br>Sample Calculation:<br>EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used) | |

| Remark | |
| --- | --- |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

## Cellular Band (Part 22H) result

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1648.4 | -44.12 | V | 7.95 | 0.78 | -36.95 | -13 | -23.95 |
| 1648.4 | -44.65 | H | 7.95 | 0.78 | -37.48 | -13 | -24.48 |
| 330.2 | -52.93 | V | 6.4 | 0.26 | -46.79 | -13 | -33.79 |
| 611.7 | -53.62 | H | 6.8 | 0.37 | -47.19 | -13 | -34.19 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1673.2 | -44.38 | V | 7.95 | 0.78 | -37.21 | -13 | -24.21 |
| 1673.2 | -44.57 | H | 7.95 | 0.78 | -37.4 | -13 | -24.4 |
| 330.8 | -53.05 | V | 6.4 | 0.26 | -46.91 | -13 | -33.91 |
| 611.3 | -53.42 | H | 6.8 | 0.37 | -46.99 | -13 | -33.99 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1697.6 | -43.95 | V | 7.95 | 0.78 | -36.78 | -13 | -23.78 |
| 1697.6 | -44.29 | H | 7.95 | 0.78 | -37.12 | -13 | -24.12 |
| 330.5 | -53.25 | V | 6.4 | 0.26 | -47.11 | -13 | -34.11 |
| 611.2 | -53.18 | H | 6.8 | 0.37 | -46.75 | -13 | -33.75 |

**Note:**

*1, The testing has been conformed to 10*848.8MHz=8,488MHz*
*2, All other emissions more than 30 dB below the limit*
*3,GSM voice , GPRS and EGPRS mode were investigated. The results above show only the worse cases*
*4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.*

## PCS Band (Part24E) result

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3700.4 | -48.11 | V | 10.25 | 2.73 | -40.59 | -13 | -27.59 |
| 3700.4 | -48.69 | H | 10.25 | 2.73 | -41.17 | -13 | -28.17 |
| 329.1 | -53.46 | V | 6.4 | 0.26 | -47.32 | -13 | -34.32 |
| 610.8 | -54.05 | H | 6.8 | 0.37 | -47.62 | -13 | -34.62 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3760 | -48.25 | V | 10.25 | 2.73 | -40.73 | -13 | -27.73 |
| 3760 | -48.98 | H | 10.25 | 2.73 | -41.46 | -13 | -28.46 |
| 329.5 | -53.42 | V | 6.4 | 0.26 | -47.28 | -13 | -34.28 |
| 610.6 | -53.91 | H | 6.8 | 0.37 | -47.48 | -13 | -34.48 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3819.6 | -48.19 | V | 10.36 | 2.73 | -40.56 | -13 | -27.56 |
| 3819.6 | -49.03 | H | 10.36 | 2.73 | -41.4 | -13 | -28.4 |
| 329.9 | -53.66 | V | 6.4 | 0.26 | -47.52 | -13 | -34.52 |
| 610.3 | -52.78 | H | 6.8 | 0.37 | -46.35 | -13 | -33.35 |

**Note:**

*1, The testing has been conformed to 10*1909.8MHz=19,098MHz*
*2, All other emissions more than 30 dB below the limit*
*3,GSM voice , GPRS and EGPRS mode were investigated. The results above show only the worse cases*
*4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.*

## UMTS-FDD Band V (Part 22H)

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 1652.8 | -47.15 | V | 7.95 | 0.78 | -39.98 | -13 | -26.98 |
| 1652.8 | -46.23 | H | 7.95 | 0.78 | -39.06 | -13 | -26.06 |
| 322.3 | -53.27 | V | 6.4 | 0.26 | -47.13 | -13 | -34.13 |
| 607.8 | -53.59 | H | 6.8 | 0.37 | -47.16 | -13 | -34.16 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 1670 | -46.95 | V | 7.95 | 0.78 | -39.78 | -13 | -26.78 |
| 1670 | -46.17 | H | 7.95 | 0.78 | -39 | -13 | -26 |
| 322.6 | -52.86 | V | 6.4 | 0.26 | -46.72 | -13 | -33.72 |
| 607.4 | -53.04 | H | 6.8 | 0.37 | -46.61 | -13 | -33.61 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 1693.2 | -46.92 | V | 7.95 | 0.78 | -39.75 | -13 | -26.75 |
| 1693.2 | -45.87 | H | 7.95 | 0.78 | -38.7 | -13 | -25.7 |
| 322.5 | -52.79 | V | 6.4 | 0.26 | -46.65 | -13 | -33.65 |
| 607.1 | -53.36 | H | 6.8 | 0.37 | -46.93 | -13 | -33.93 |

**Note:**

*1, The testing has been conformed to 10*846.6MHz=8,466MHz*
*2, All other emissions more than 30 dB below the limit*
*3,RMC , HSUPA and HSDPA mode were investigated. The results above show only the worse cases*
*4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.*

## UMTS-FDD Band II (Part 24E)

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3704.8 | -49.88 | V | 10.25 | 2.73 | -42.36 | -13 | -29.36 |
| 3704.8 | -49.71 | H | 10.25 | 2.73 | -42.19 | -13 | -29.19 |
| 327.2 | -53.65 | V | 6.4 | 0.26 | -47.51 | -13 | -34.51 |
| 606.5 | -53.55 | H | 6.8 | 0.37 | -47.12 | -13 | -34.12 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3760 | -49.67 | V | 10.25 | 2.73 | -42.15 | -13 | -29.15 |
| 3760 | -49.72 | H | 10.25 | 2.73 | -42.2 | -13 | -29.2 |
| 327.7 | -53.68 | V | 6.4 | 0.26 | -47.54 | -13 | -34.54 |
| 606.8 | -53.46 | H | 6.8 | 0.37 | -47.03 | -13 | -34.03 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3815.2 | -49.62 | V | 10.36 | 2.73 | -41.99 | -13 | -28.99 |
| 3815.2 | -49.56 | H | 10.36 | 2.73 | -41.93 | -13 | -28.93 |
| 327.5 | -53.72 | V | 6.4 | 0.26 | -47.58 | -13 | -34.58 |
| 606.3 | -53.81 | H | 6.8 | 0.37 | -47.38 | -13 | -34.38 |

**Note:**

*1, The testing has been conformed to 10*1907.6MHz=19,076MHz*
*2, All other emissions more than 30 dB below the limit*
*3,RMC , HSUPA and HSDPA mode were investigated. The results above show only the worse cases*
*4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case*

## UMTS-FDD Band IV (Part 27)

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3424.8 | -44.81 | V | 10.07 | 2.52 | -37.26 | -13 | -24.26 |
| 3424.8 | -47.95 | H | 10.07 | 2.52 | -40.4 | -13 | -27.4 |
| 326.3 | -56.54 | V | 6.4 | 0.26 | -50.4 | -13 | -37.4 |
| 740.5 | -52.13 | H | 7.1 | 0.42 | -45.45 | -13 | -32.45 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3480 | -45.47 | V | 10.09 | 2.52 | -37.9 | -13 | -24.9 |
| 3480 | -46.75 | H | 10.09 | 2.52 | -39.18 | -13 | -26.18 |
| 326.6 | -56.11 | V | 6.4 | 0.26 | -49.97 | -13 | -36.97 |
| 740.1 | -52.35 | H | 7.1 | 0.42 | -45.67 | -13 | -32.67 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3505.2 | -44.96 | V | 10.09 | 2.52 | -37.39 | -13 | -24.39 |
| 3505.2 | -46.81 | H | 10.09 | 2.52 | -39.24 | -13 | -26.24 |
| 326.9 | -56.64 | V | 6.4 | 0.26 | -50.5 | -13 | -37.5 |
| 740.7 | -52.37 | H | 7.1 | 0.42 | -45.69 | -13 | -32.69 |

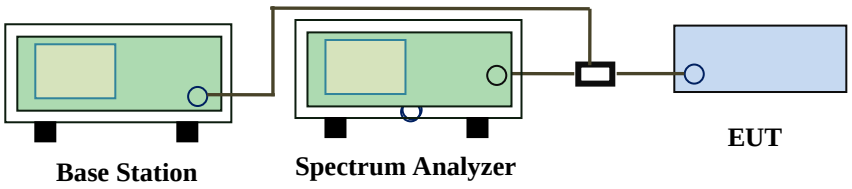
**Note:**

*1, The testing has been conformed to 10*1752.6MHz=17,526MHz*
*2, All other emissions more than 30 dB below the limit*
*3,RMC , HSUPA and HSDPA mode were investigated. The results above show only the worse cases.*
*4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.*

## 6.7 Band Edge

| | |
|---|---|
| Temperature | 25 °C |
| Relative Humidity | 53% |
| Atmospheric Pressure | 1020mbar |
| Test date : | April 20, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §22.917(a)<br>§24.238(a)<br>§ 27.53(h) | a) | The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. | ☑ |
| Test setup |  | | |
| Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

GSM Voice:

## Cellular Band (Part 22H) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.977 | -18.374 | -13 |
| 849.003 | -17.703 | -13 |

## PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.995 | -15.875 | -13 |
| 1910.004 | -14.402 | -13 |

GPRS:

## Cellular Band (Part 22H) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.997 | -18.564 | -13 |
| 849.020 | -17.499 | -13 |

## PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.994 | -16.438 | -13 |
| 1910.018 | -14.261 | -13 |

EGPRS (MCS1):

Cellular Band (Part 22H) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.996 | -17.150 | -13 |
| 849.020 | -14.978 | -13 |

PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.996 | -15.317 | -13 |
| 1910.016 | -16.181 | -13 |

RCM:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.70 | -31.482 | -13 |
| 849.06 | -30.284 | -13 |

UMTS-FDD Band II (Part 24E)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.70 | -25.636 | -13 |
| 1910.26 | -26.683 | -13 |

UMTS-FDD Band IV (Part 27)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1709.69 | -31.351 | -13 |
| 1755.27 | -31.818 | -13 |

HSUPA:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
|---|---|---|
| 823.73 | -31.604 | -13 |
| 849.27 | -31.740 | -13 |

UMTS-FDD Band II (Part 24E)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
|---|---|---|
| 1849.88 | -26.321 | -13 |
| 1910.27 | -30.552 | -13 |

UMTS-FDD Band IV (Part 27)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
|---|---|---|
| 1708.71 | -30.921 | -13 |
| 1755.22 | -30.003 | -13 |

HSDPA:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
|---|---|---|
| 823.67 | -32.231 | -13 |
| 849.27 | -32.293 | -13 |

UMTS-FDD Band II (Part 24E)

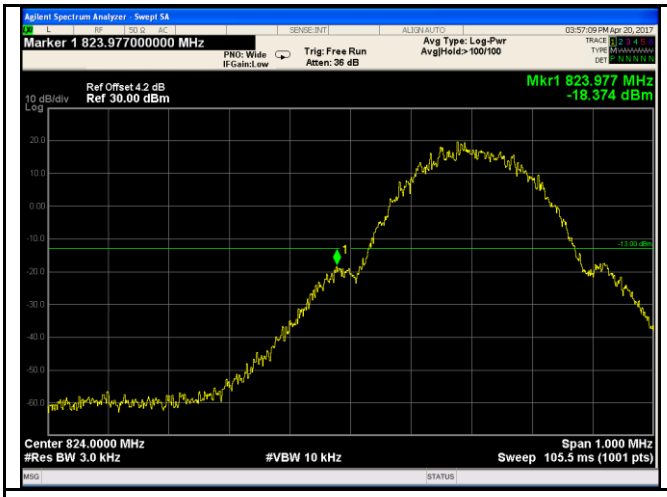
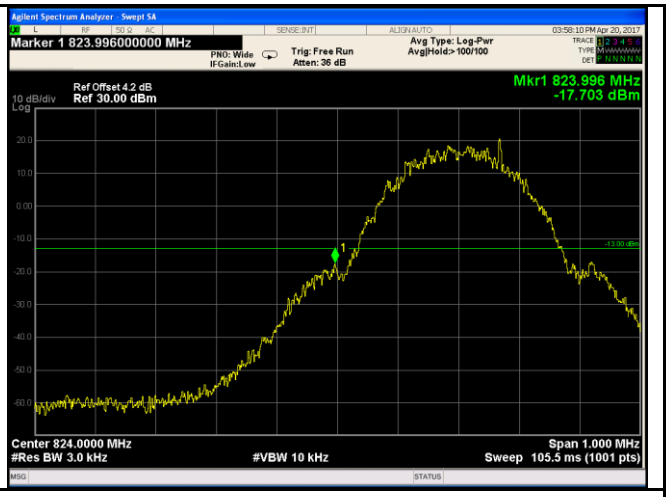
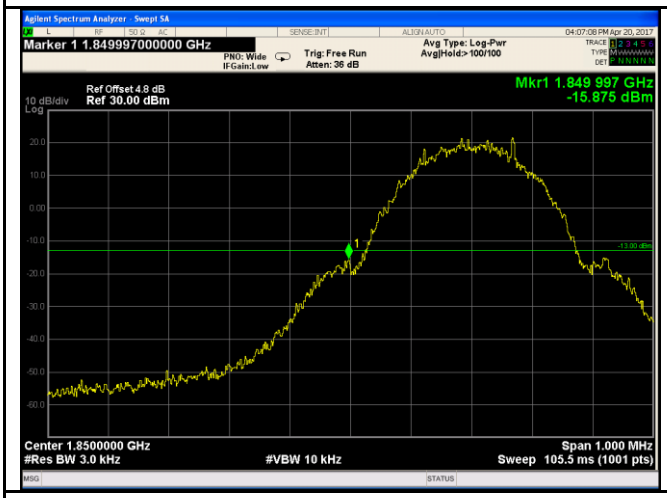
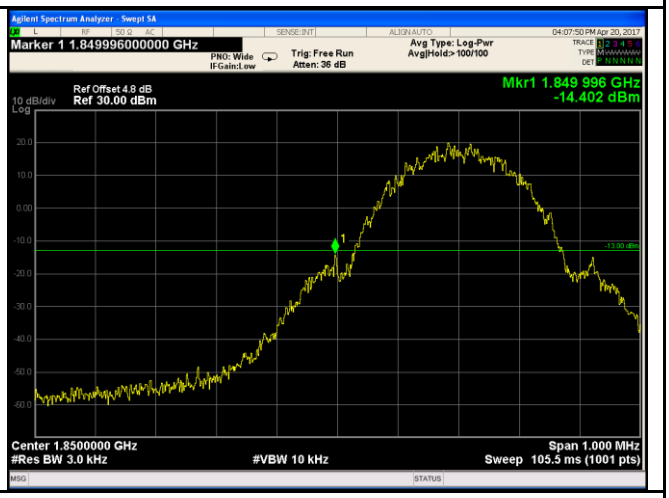
| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
|---|---|---|
| 1849.69 | -31.026 | -13 |
| 1910.51 | -30.794 | -13 |

## UMTS-FDD Band IV (Part 27)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1709.99 | -31.777 | -13 |
| 1756.19 | -30.596 | -13 |

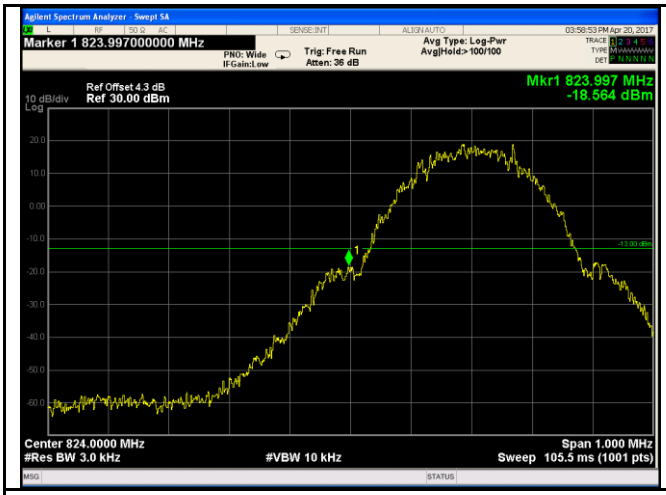
## GSM Voice:

## Test Plots

| | |
|---|---|
|  |  |
| Cellular Band - Low Channel | Cellular Band - High Channel |
| Note: Offset=Cable loss (4.0) + 10log (3.16/3)=4.0+0.2=4.2dB | Note: Offset=Cable loss (4.0) + 10log (3.18/3)=4.0+0.2=4.2dB |
|  |  |
| PCS Band - Low Channel | PCS Band - High Channel |
| Note: Offset=Cable loss (4.0) + 10log (3.17/3)=4.5+0.3=4.8dB | Note: Offset=Cable loss (4.0) + 10log (3.18/3)=4.5+0.3=4.8dB |

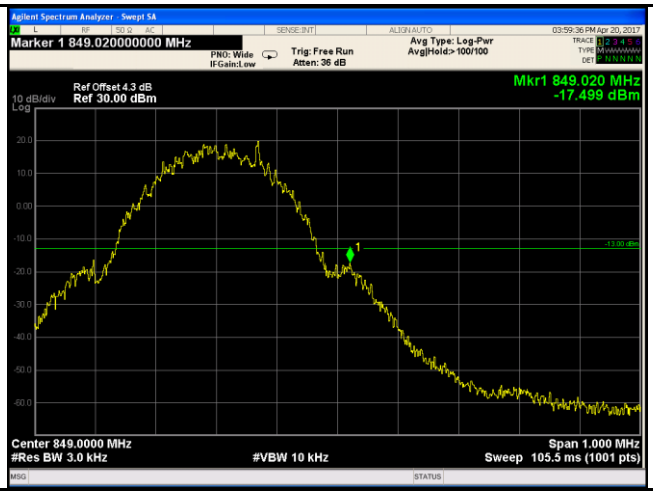
## GPRS:

### Test Plots



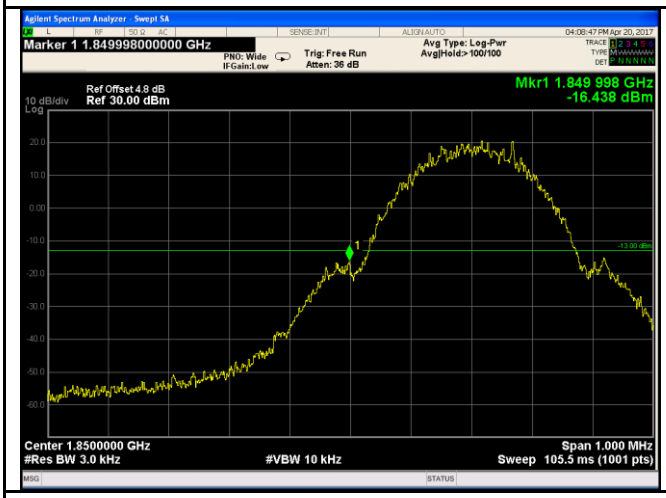

Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.15/3)=4.0+0.3=4.3dB



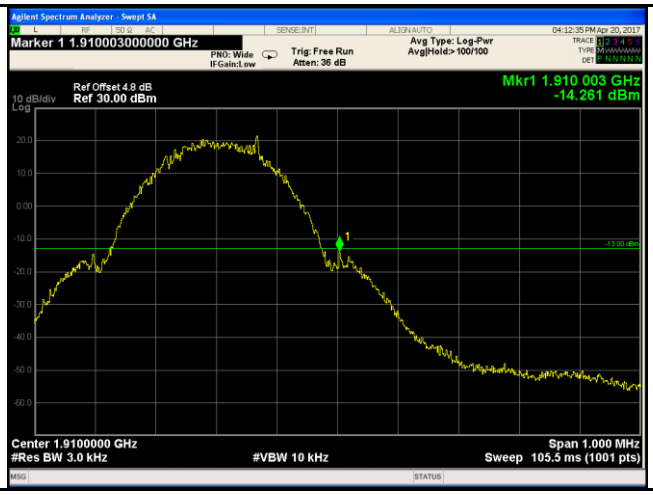

Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.15/3)=4.0+0.3=4.3dB




PCS Band - Low Channel

Note: Offset=Cable loss (4.5) + 10log (3.18/3)=4.5+0.3=4.8dB

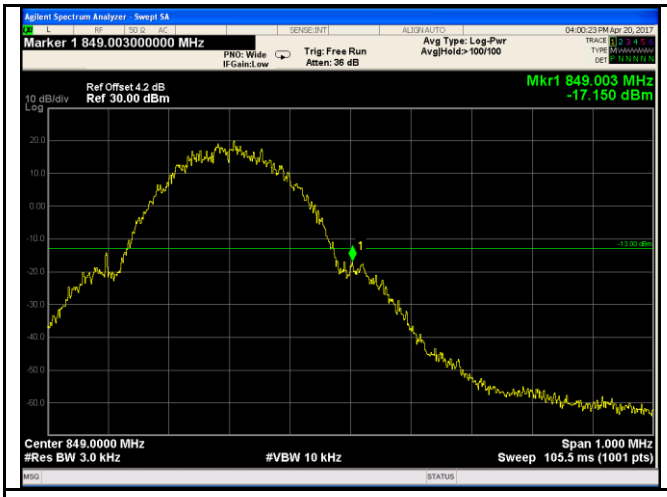
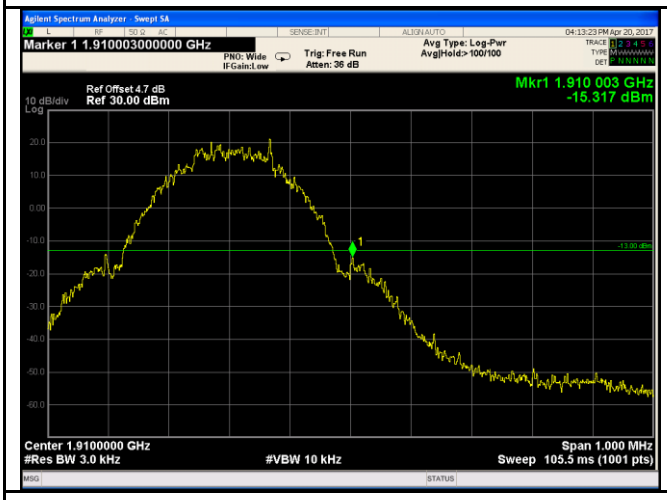



PCS Band - High Channel

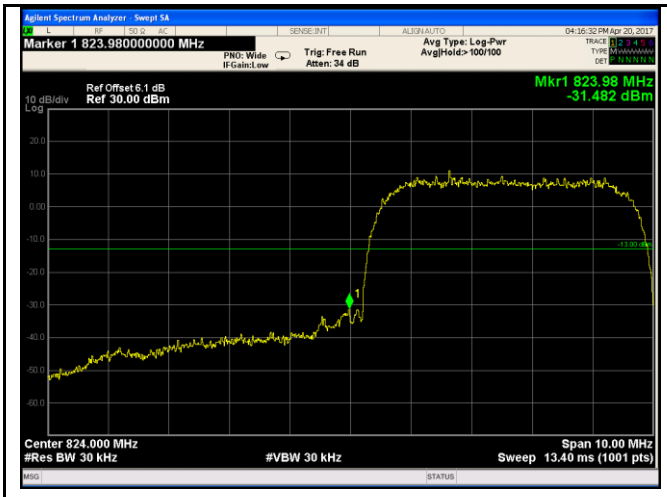
Note: Offset=Cable loss (4.5) + 10log (3.17/3)=4.5+0.3=4.8dB

## EGPRS (MCS5):

### Test Plots

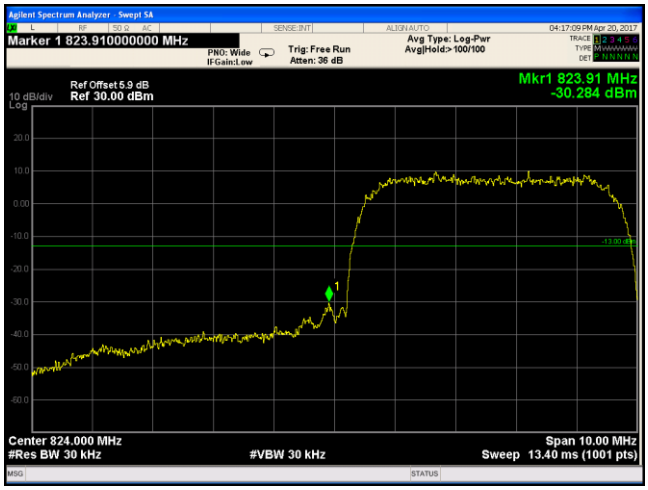
| | |
|---|---|
|  |  |
| Cellular Band - Low Channel | Cellular Band - High Channel |
| Note: Offset=Cable loss (4.0) + 10log (3.17/3)=4.0+0.2=4.2dB | Note: Offset=Cable loss (4.0) + 10log (3.14/3)=4.0+0.2=4.2dB |
|  |  |
| PCS Band - Low Channel | PCS Band - High Channel |
| Note: Offset=Cable loss (4.5) + 10log (3.18/3)=4.5+0.2=4.7dB | Note: Offset=Cable loss (4.5) + 10log (3.19/3)=4.5+0.3=4.8dB |

**RMC:**



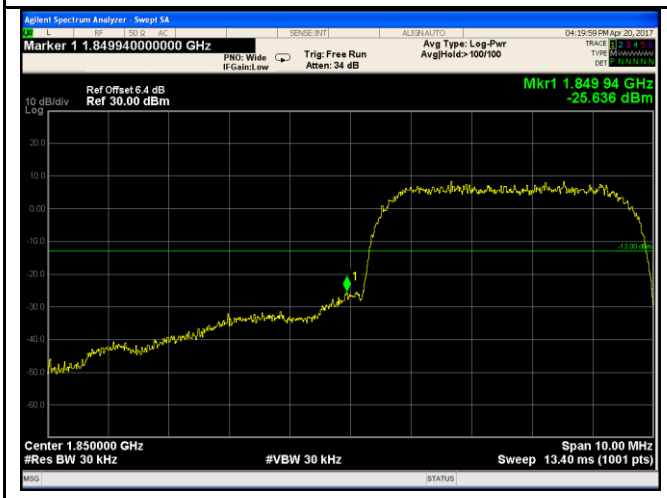

UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (48.54/30)=4.0+2.1=6.1 dB



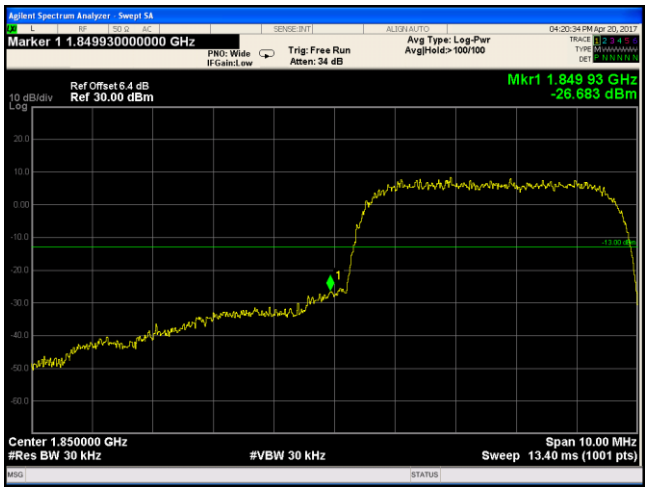

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (46.64/30)=4.0+1.9=5.9 dB



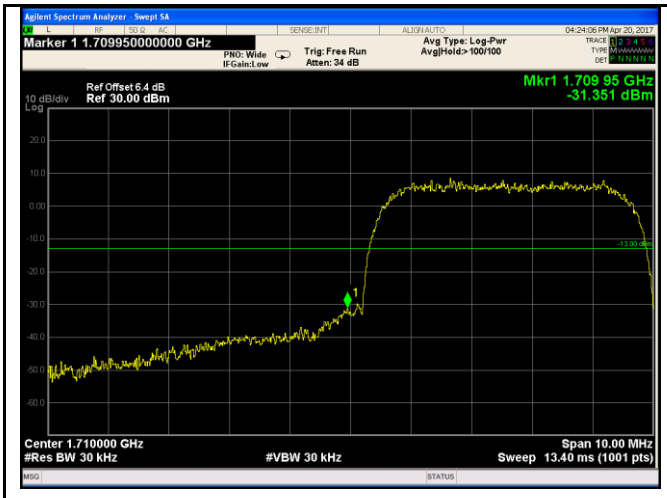
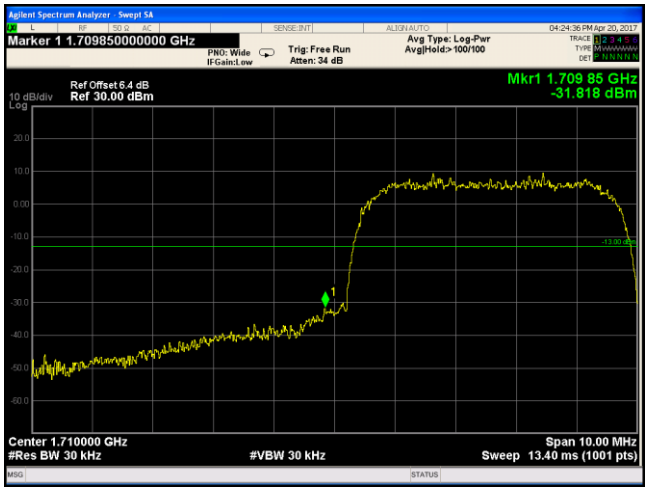

UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log (46.99/30)=4.5+1.9=6.4 dB

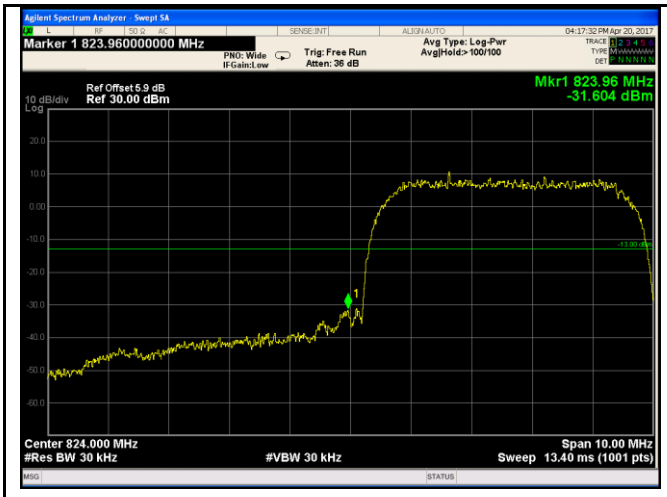
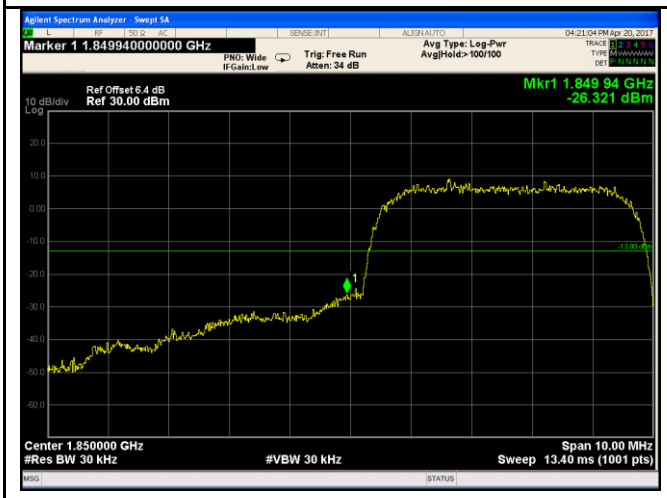
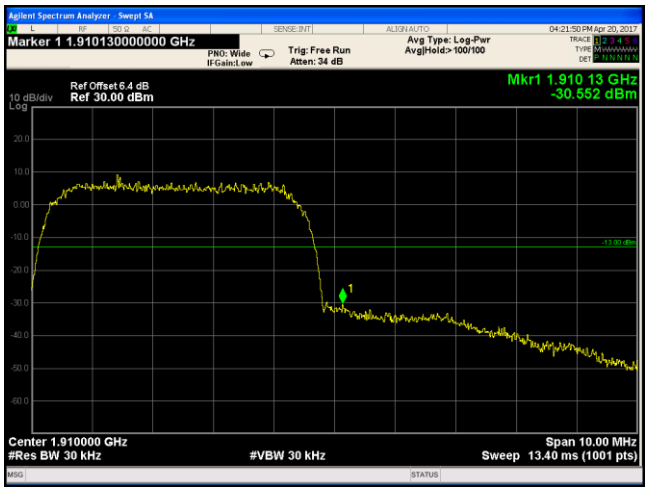


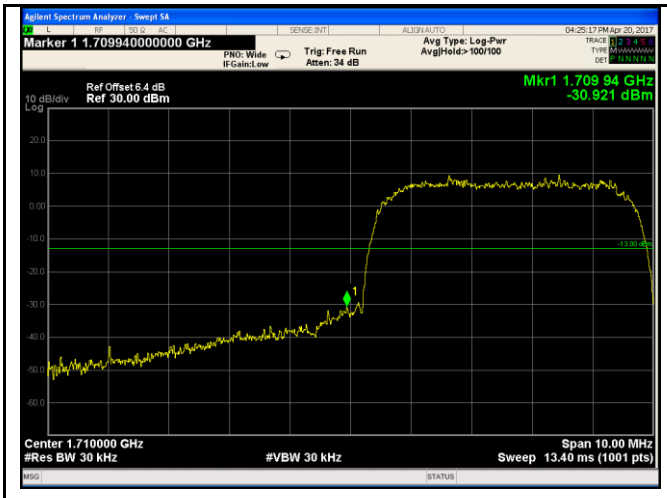

UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log (46.85/30)=4.5+1.9=6.4 dB

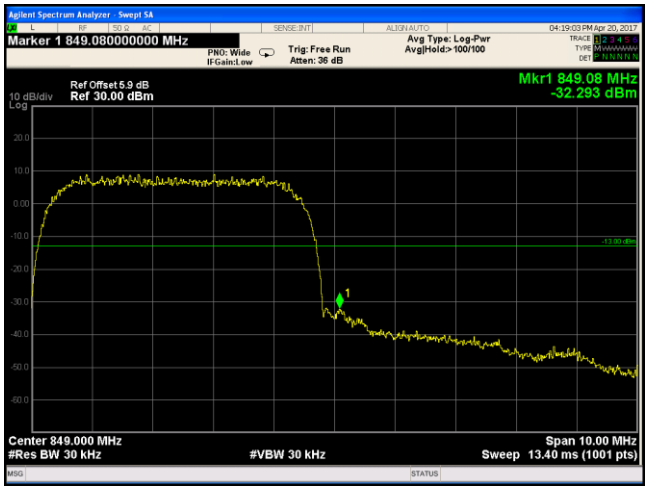
| | |
|---|---|
|  |  |
| UMTS-FDD Band IV - Low Channel | UMTS-FDD Band IV - High Channel |
| Note: Offset=Cable loss (4.5) + 10log (46.84/30)=4.5+1.9=6.4 dB | Note: Offset=Cable loss (4.0) + 10log (46.76/30)=4.5+1.9=6.4 dB |

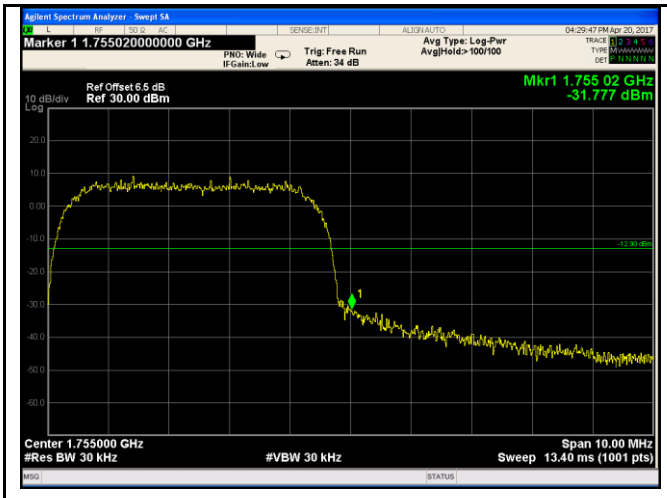
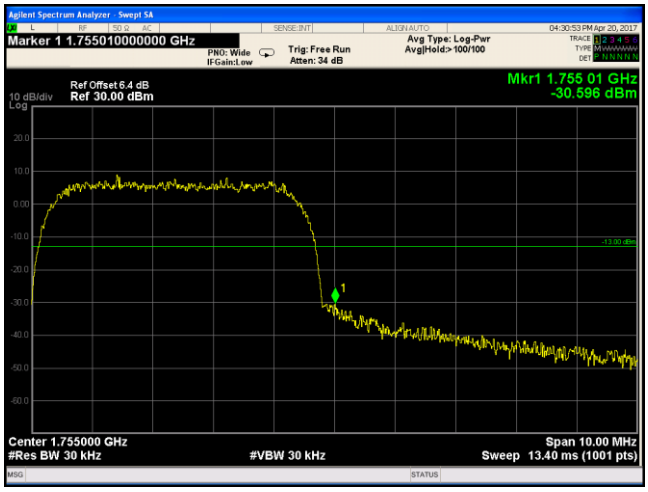
**HSUPA:**

| | |
|---|---|
|  |  |
| UMTS-FDD Band V - Low Channel | UMTS-FDD Band V - High Channel |
| Note: Offset=Cable loss (4.0) + 10log (46.83/30)=4.0+1.9=5.9 dB | Note: Offset=Cable loss (4.0) + 10log (46.77/30)=4.0+1.9=5.9 dB |
|  |  |
| UMTS-FDD Band II - Low Channel | UMTS-FDD Band II - High Channel |
| Note: Offset=Cable loss (4.5) + 10log (46.65/30)=4.5+1.9=6.4 dB | Note: Offset=Cable loss (4.5) + 10log (46.80/30)=4.5+1.9=6.4 dB |

| | |
|---|---|
|  |  |
| UMTS-FDD Band IV - Low Channel | UMTS-FDD Band IV - High Channel |
| Note: Offset=Cable loss (4.5) + 10log (46.73/30)=4.5+1.9=6.4 dB | Note: Offset=Cable loss (4.5) + 10log (47.16/30)=4.5+1.9=6.4 dB |

**HSDPA:**

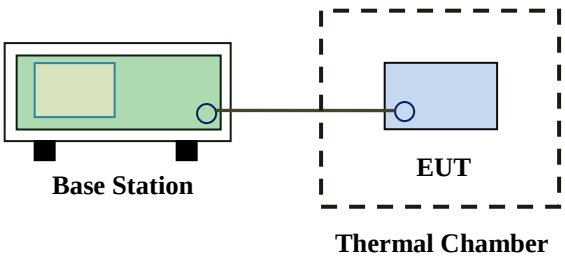
| | |
|---|---|
|  |  |
| UMTS-FDD Band V - Low Channel | UMTS-FDD Band V - High Channel |
| Note: Offset=Cable loss (4.0) + 10log (46.87/30)=4.0+1.9=5.9 dB | Note: Offset=Cable loss (4.0) + 10log (46.87/30)=4.0+1.9=5.9 dB |
|  |  |
| UMTS-FDD Band II - Low Channel | UMTS-FDD Band II - High Channel |
| Note: Offset=Cable loss (4.5) + 10log (46.81/30)=4.5+1.9=6.4 dB | Note: Offset=Cable loss (4.5) + 10log (46.83/30)=4.5+1.9=6.4 dB |

| | |
|---|---|
|  |  |
| UMTS-FDD Band IV - Low Channel | UMTS-FDD Band IV - High Channel |
| Note: Offset=Cable loss (4.5) + 10log (46.74/30)=4.5+2.0=6.5 dB | Note: Offset=Cable loss (4.5) + 10log (46.70/30)=4.5+1.9=6.4 dB |

## 6.8 Frequency Stability

| | |
|---|---|
| Temperature | 24 °C |
| Relative Humidity | 52% |
| Atmospheric Pressure | 1019mbar |
| Test date : | April 19, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54</td><td>a)</td><td>According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:<br>Frequency Tolerance for Transmitters in the Public Mobile Services
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr>
<tr><td>50 to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr>
<tr><td>45□to 512</td><td>2.5</td><td>5.0</td><td>□0</td></tr>
<tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr>
<tr><td>928 to □29.</td><td>5.0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.</td><td>☑</td></tr>
<tr><td>Test setup</td><td colspan="3"> 
</td></tr>
</table>

| | |
| --- | --- |
| Procedure | A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage.<br>Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency. |
| Remark | |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

GSM Voice:

## Cellular Band (Part 22H) result

| Middle Channel, $f_o$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 20 | 0.0239 | 2.5 |
| 0 | | 16 | 0.0191 | 2.5 |
| 10 | | 15 | 0.0179 | 2.5 |
| 20 | | 18 | 0.0215 | 2.5 |
| 30 | | 19 | 0.0227 | 2.5 |
| 40 | | 17 | 0.0203 | 2.5 |
| 50 | | 15 | 0.0179 | 2.5 |
| 55 | | 20 | 0.0239 | 2.5 |
| 25 | 4.2 | 16 | 0.0191 | 2.5 |
| | 3.5 | 18 | 0.0215 | 2.5 |

## PCS Band (Part 24E) result

| Middle Channel, $f_o$ = 1880 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 14 | 0.0074 | 2.5 |
| 0 | | 16 | 0.0085 | 2.5 |
| 10 | | 13 | 0.0069 | 2.5 |
| 20 | | 18 | 0.0096 | 2.5 |
| 30 | | 17 | 0.0090 | 2.5 |
| 40 | | 15 | 0.0080 | 2.5 |
| 50 | | 12 | 0.0064 | 2.5 |
| 55 | | 14 | 0.0074 | 2.5 |
| 25 | 4.2 | 19 | 0.0101 | 2.5 |
| | 3.5 | 15 | 0.0080 | 2.5 |

RMC:

UMTS-FDD Band V (Part 22H)

| Middle Channel, $f_o$ = 835 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 16 | 0.0192 | 2.5 |
| 0 | | 15 | 0.0180 | 2.5 |
| 10 | | 14 | 0.0168 | 2.5 |
| 20 | | 19 | 0.0228 | 2.5 |
| 30 | | 12 | 0.0144 | 2.5 |
| 40 | | 18 | 0.0216 | 2.5 |
| 50 | | 17 | 0.0204 | 2.5 |
| 55 | | 11 | 0.0132 | 2.5 |
| 25 | 4.2 | 16 | 0.0192 | 2.5 |
| | 3.5 | 13 | 0.0156 | 2.5 |

UMTS-FDD Band II (Part 24E)

| Middle Channel, $f_o$ = 1880 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 16 | 0.0085 | 2.5 |
| 0 | | 12 | 0.0064 | 2.5 |
| 10 | | 15 | 0.0080 | 2.5 |
| 20 | | 11 | 0.0059 | 2.5 |
| 30 | | 12 | 0.0064 | 2.5 |
| 40 | | 15 | 0.0080 | 2.5 |
| 50 | | 11 | 0.0059 | 2.5 |
| 55 | | 13 | 0.0069 | 2.5 |
| 25 | 4.2 | 16 | 0.0085 | 2.5 |
| | 3.5 | 14 | 0.0074 | 2.5 |

UMTS-FDD Band IV (Part 27)

| Middle Channel, $f_o$ = 1733 MHz | | | | |
| --- | --- | --- | --- | --- |
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 16 | 0.0192 | 2.5 |
| 0 | | 18 | 0.0216 | 2.5 |
| 10 | | 19 | 0.0228 | 2.5 |
| 20 | | 17 | 0.0204 | 2.5 |
| 30 | | 13 | 0.0156 | 2.5 |
| 40 | | 17 | 0.0204 | 2.5 |
| 50 | | 15 | 0.0180 | 2.5 |
| 55 | | 14 | 0.0168 | 2.5 |
| 25 | 4.2 | 19 | 0.0228 | 2.5 |
| | 3.5 | 15 | 0.0180 | 2.5 |

# Annex A. TEST INSTRUMENT

| Instrument | Model | Serial # | Cal Date | Cal Due | In use |
|---|---|---|---|---|---|
| **RF Conducted Test** | | | | | |
| Agilent ESA-E SERIES SPECTRUM ANALYZER | E4407B | MY45108319 | 09/15/2016 | 09/14/2017 | ☑ |
| Power Splitter | 1# | 1# | 08/31/2016 | 08/30/2017 | ☑ |
| Universal Radio Communication Tester | CMU200 | 121393 | 09/24/2016 | 09/23/2017 | ☑ |
| Temperature/Humidity Chamber | UHL-270 | 001 | 10/08/2016 | 10/07/2017 | ☑ |
| DC Power Supply | E3640A | MY40004013 | 09/16/2016 | 09/15/2017 | ☑ |
| RF Power Sensor | Dare RPR3006C/P/W | AY554013 | 09/16/2016 | 09/15/2017 | ☑ |
| **Radiated Emissions** | | | | | |
| EMI test receiver | ESL6 | 100262 | 09/16/2016 | 09/15/2017 | ☑ |
| OPT 010 AMPLIFIER (0.1-1300MHz) | 8447E | 2727A02430 | 08/31/2016 | 08/30/2017 | ☑ |
| Microwave Preamplifier (1 ~ 26.5GHz) | 8449B | 3008A02402 | 03/23/2017 | 03/22/2018 | ☑ |
| Bilog Antenna (30MHz~6GHz) | JB6 | A110712 | 09/20/2016 | 09/19/2017 | ☑ |
| Bilog Antenna (30MHz~2GHz) | JB1 | A112017 | 09/20/2016 | 09/19/2017 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71259 | 09/23/2016 | 09/22/2017 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71283 | 09/23/2016 | 09/22/2017 | ☑ |
| SYNTHESIZED SIGNAL GENERATOR | 8665B | 3744A01293 | 09/16/2016 | 09/15/2017 | ☑ |
| Power Amplifier | SMC150D | R1553-0313 | 03/08/2017 | 03/07/2018 | ☑ |
| Power Amplifier | S41-25D | R1553-0314 | 05/27/2016 | 05/26/2017 | ☑ |
| Tunable Notch Filter | 3NF-800/1000-S | AA4 | 08/31/2016 | 08/30/2017 | ☑ |

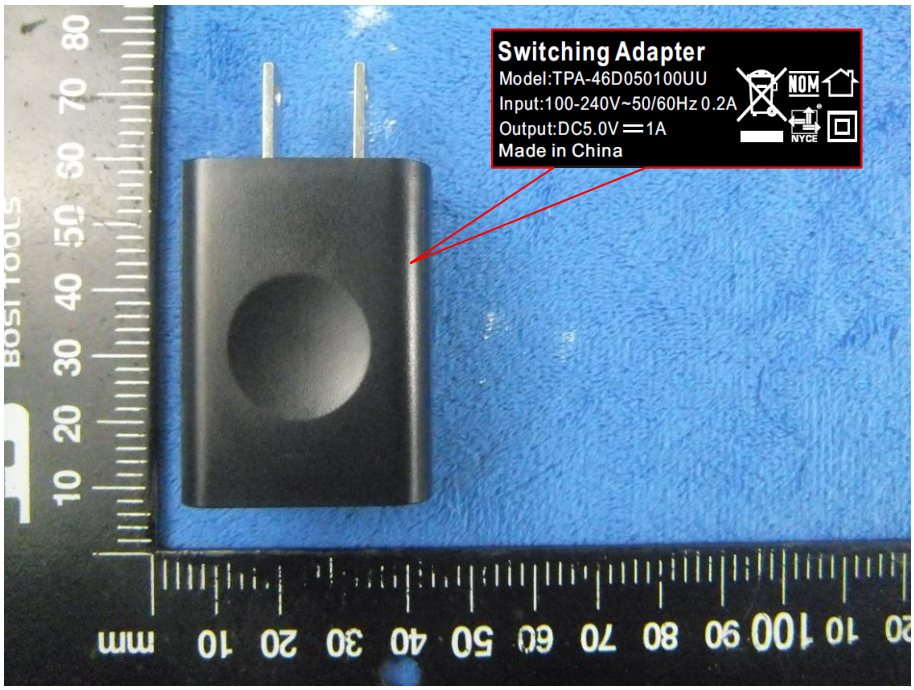
| | | | | | |
| --- | --- | --- | --- | --- | --- |
| Tunable Notch Filter | 3NF-1000/2000-S | AM 4 | 08/31/2016 | 08/30/2017 | ☑ |

# Annex B. EUT And Test Setup Photographs

## Annex B.i. Photograph: EUT External Photo

Whole Package View

Adapter - Front View

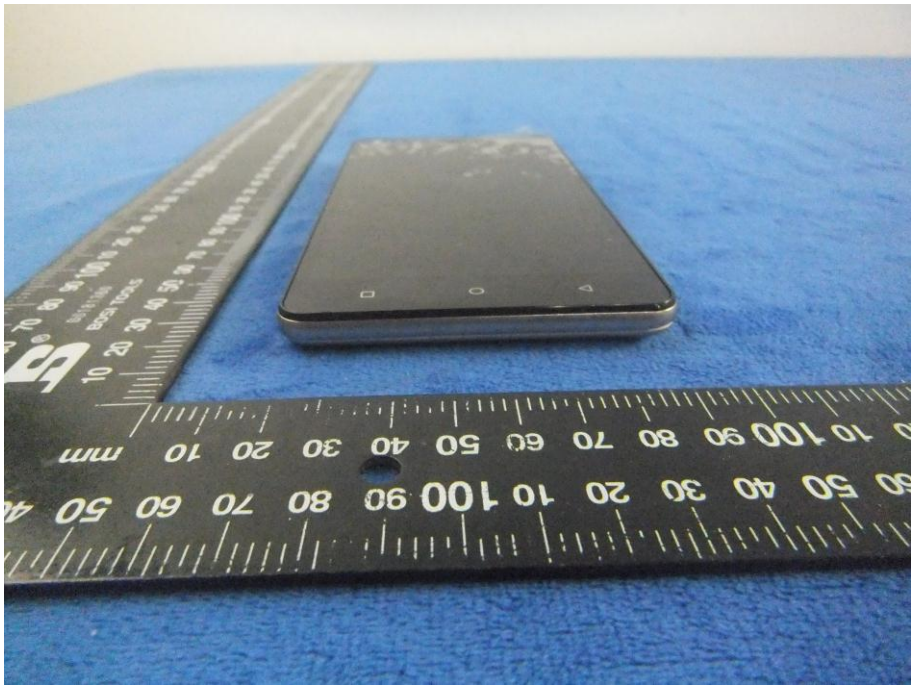


EUT - Front View

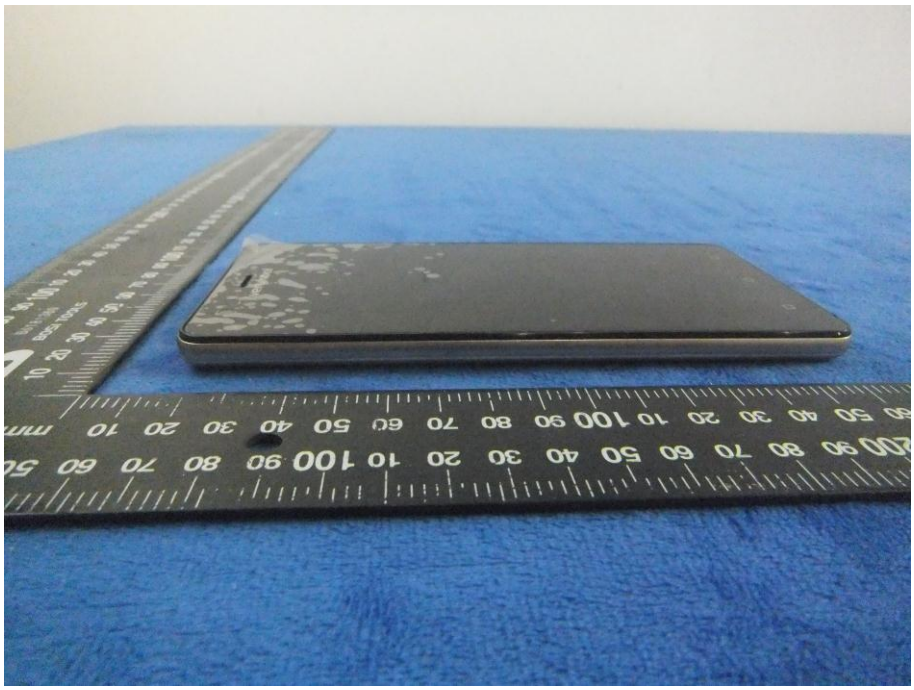

EUT - Rear View

EUT - Top View

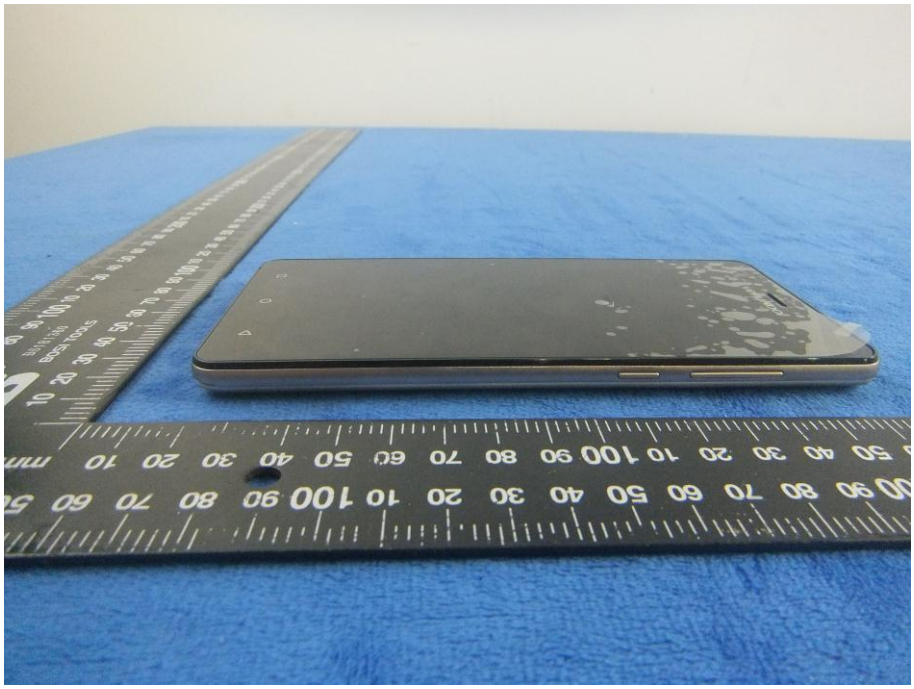
EUT - Bottom View



EUT - Left View



EUT - Right View



## Annex B.ii. Photograph: EUT Internal Photo

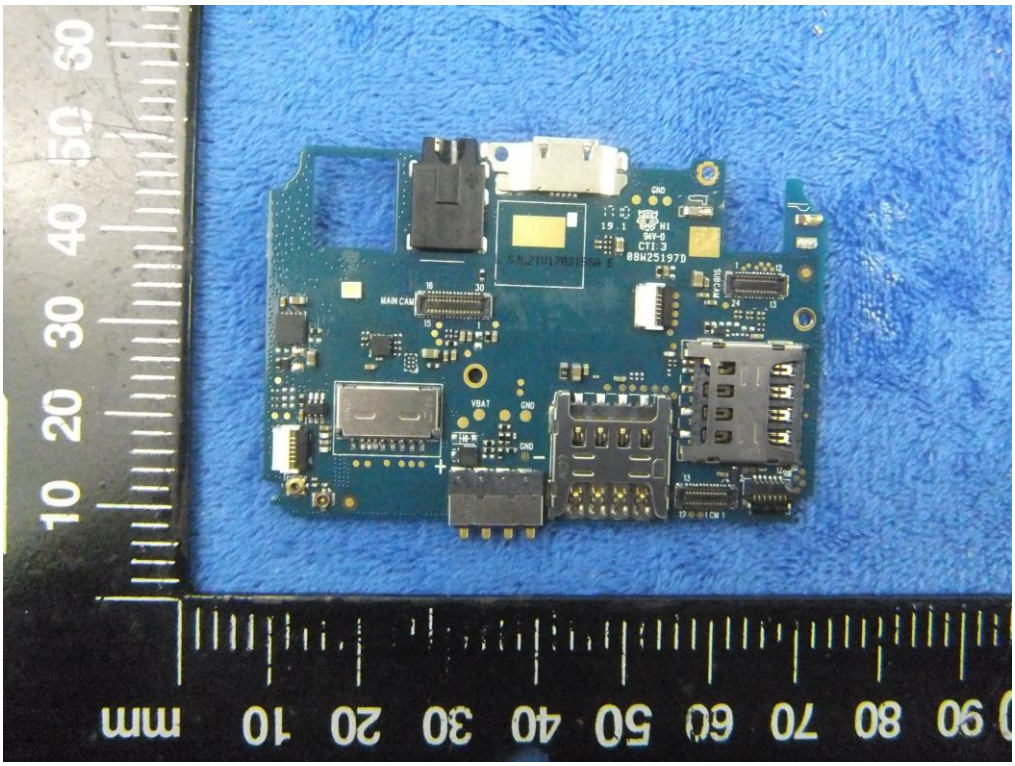
Cover Off - Top View 1


Cover Off - Top View 2

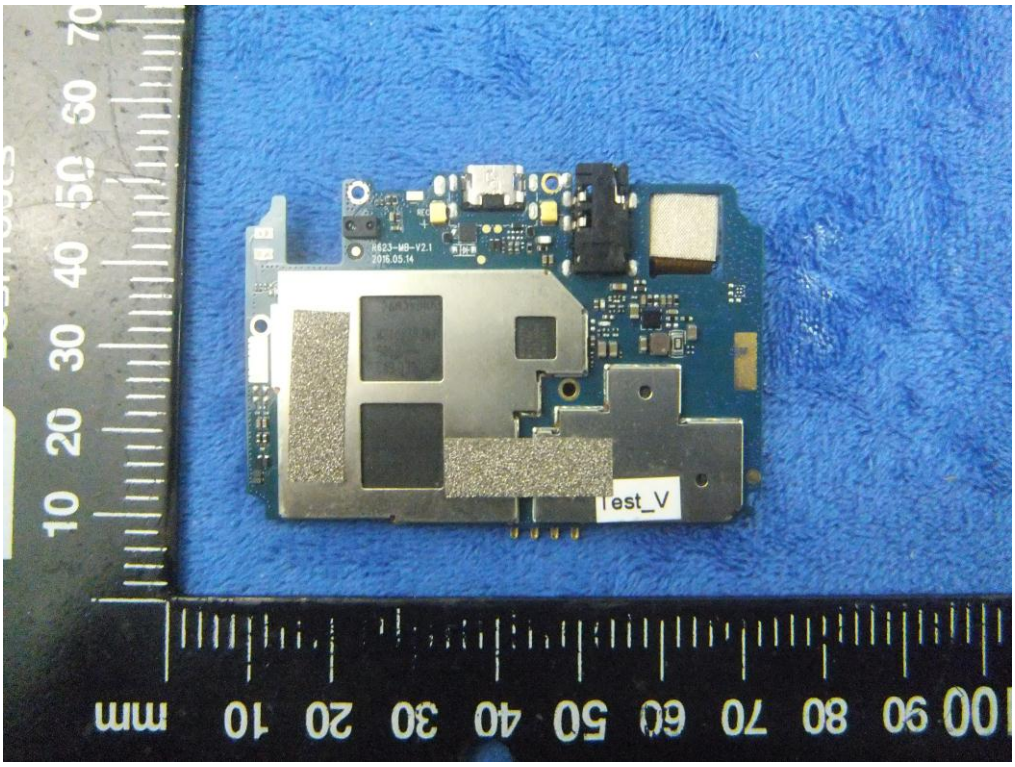
Battery - Front View


Battery - Rear View

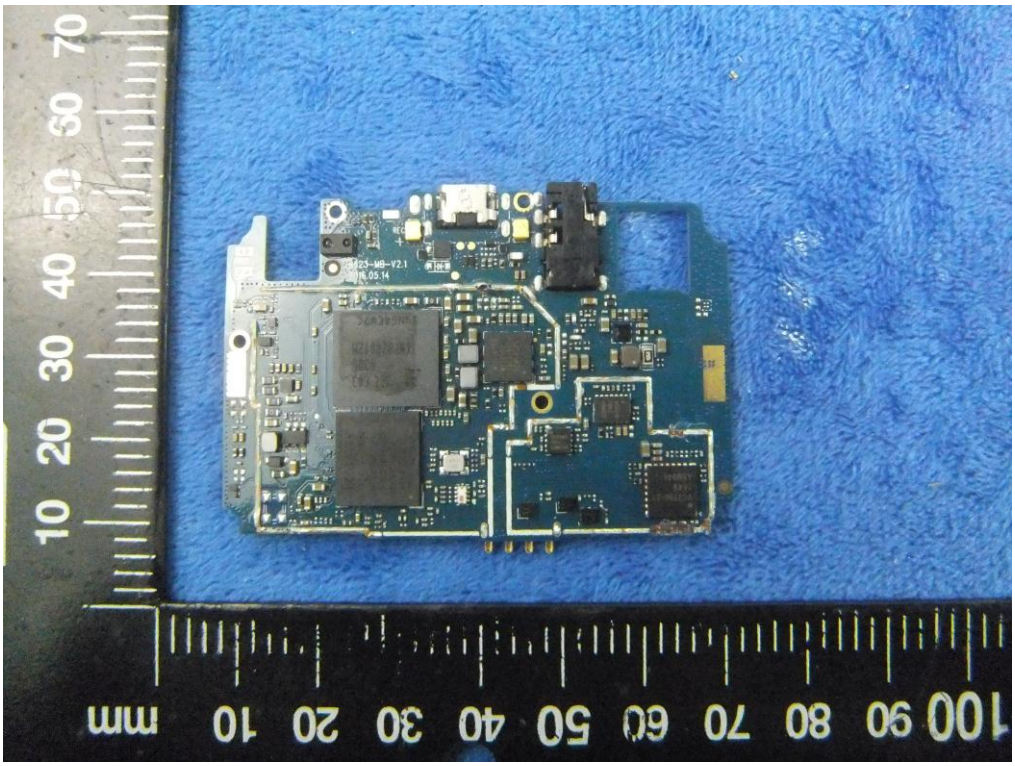
Mainboard – Front View



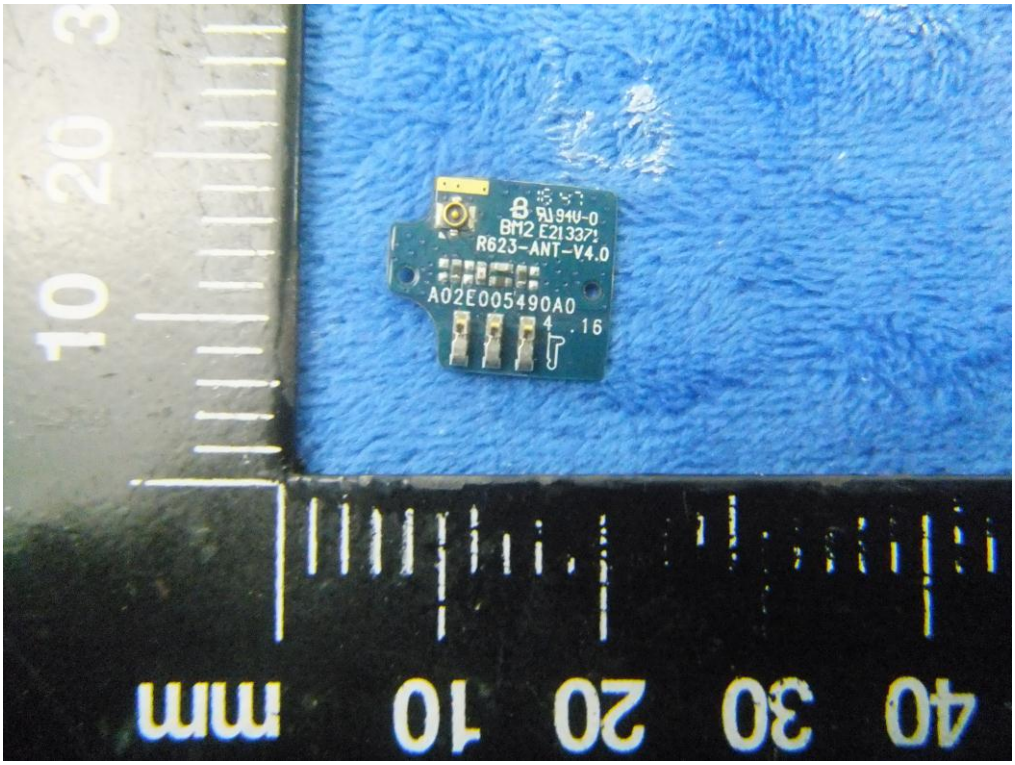
Mainboard with Shielding - Rear View



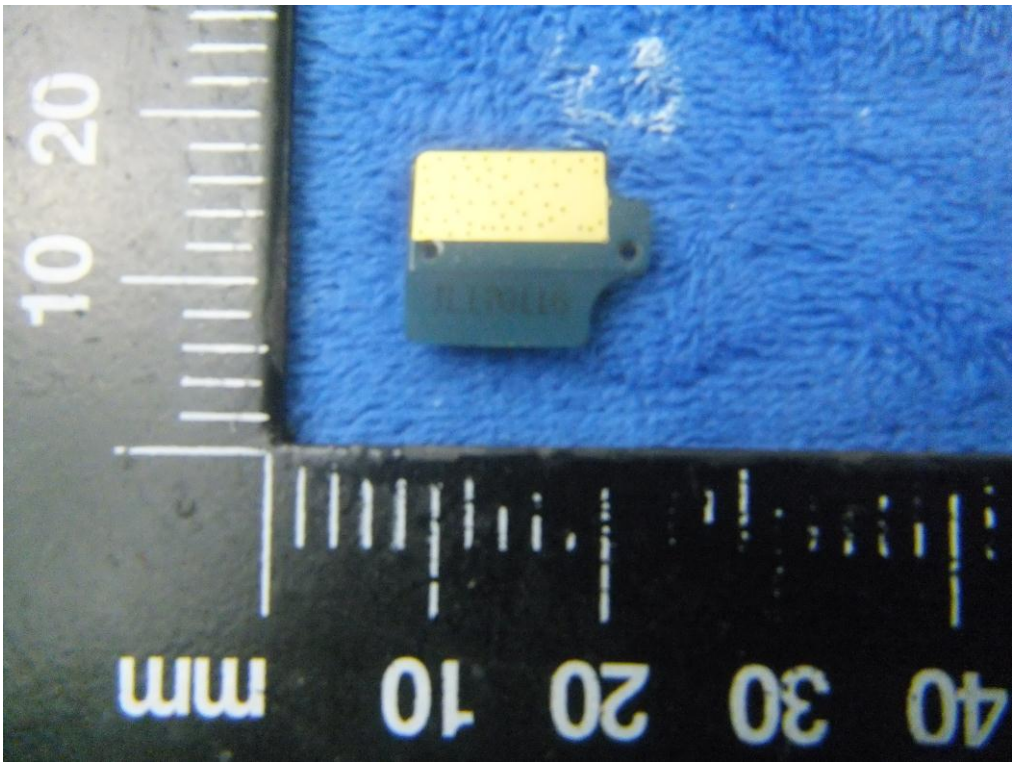
Mainboard without Shielding - Rear View



Small Mainboard – Front View

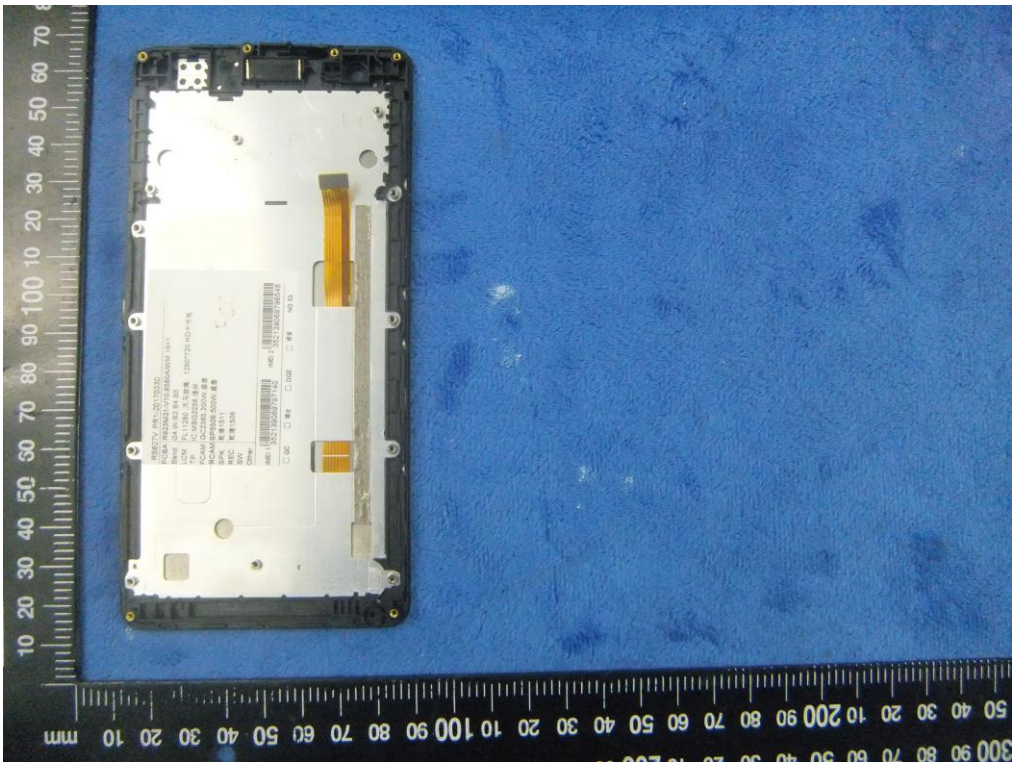


Small Mainboard - Rear View

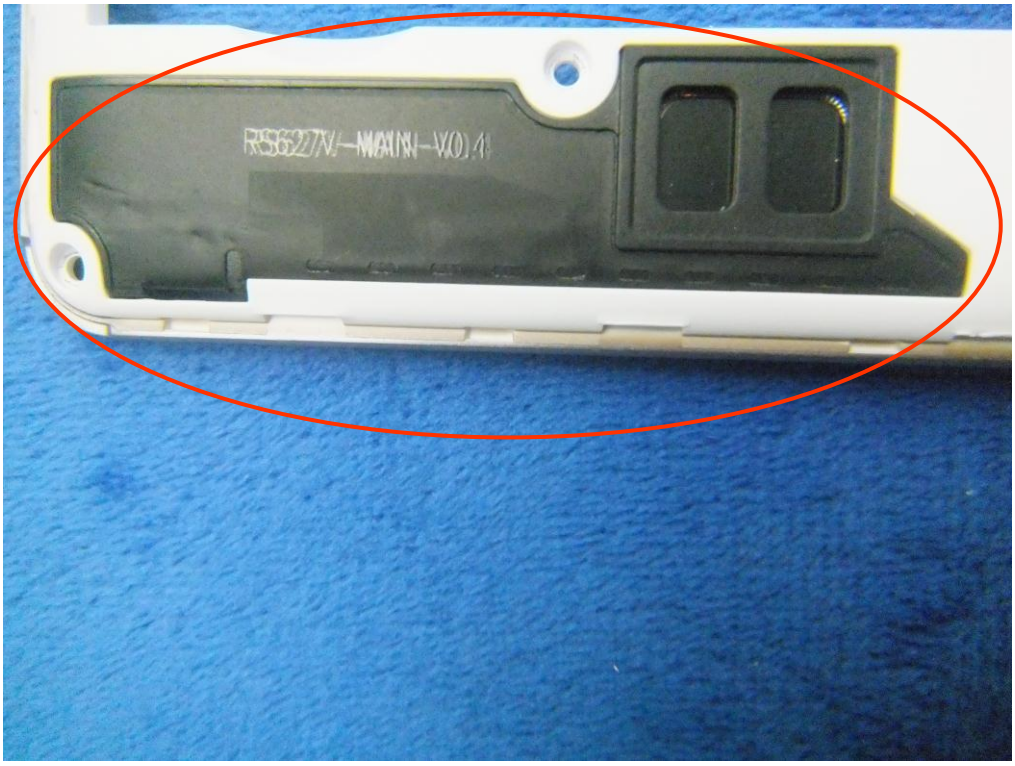


LCD – Front View

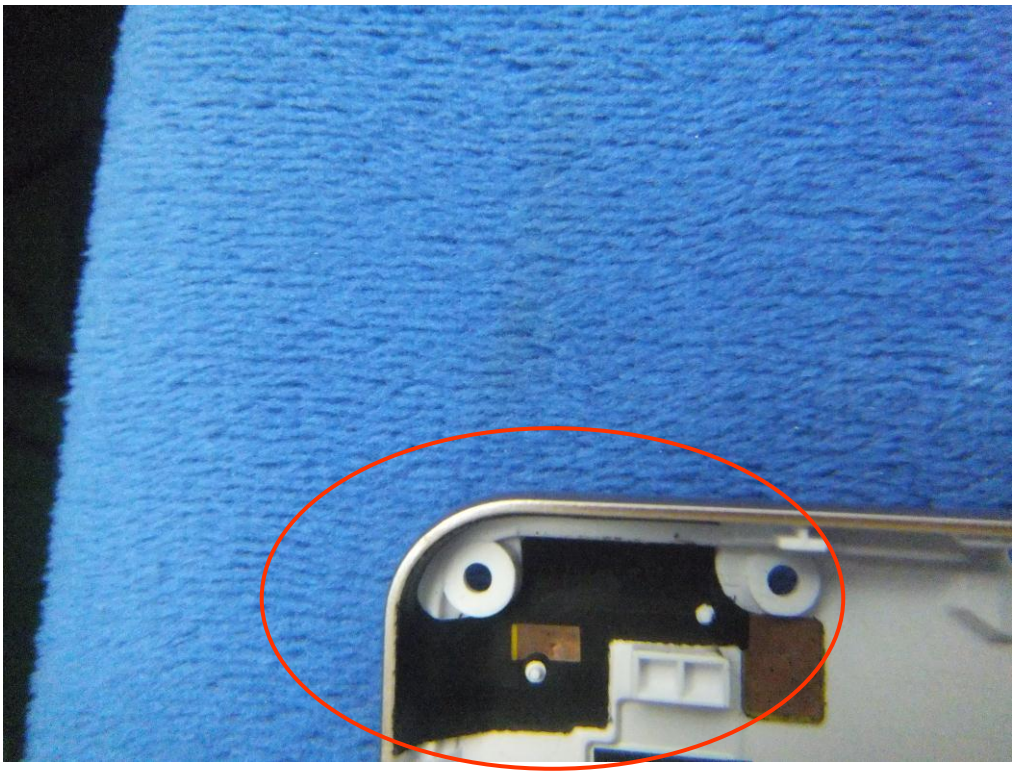
LCD – Rear View



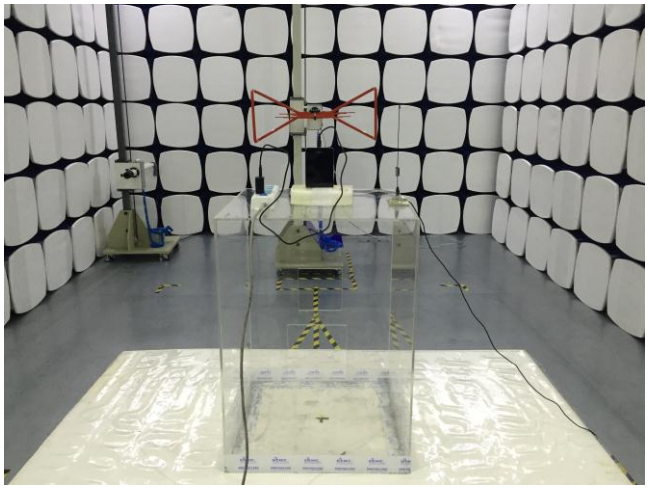
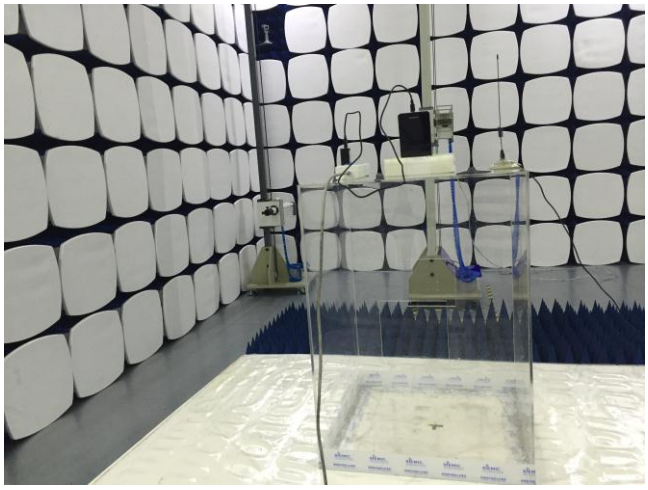
GSM/PCS/UMTS - Antenna View



WIFI/BT/BLE/GPS - Antenna View



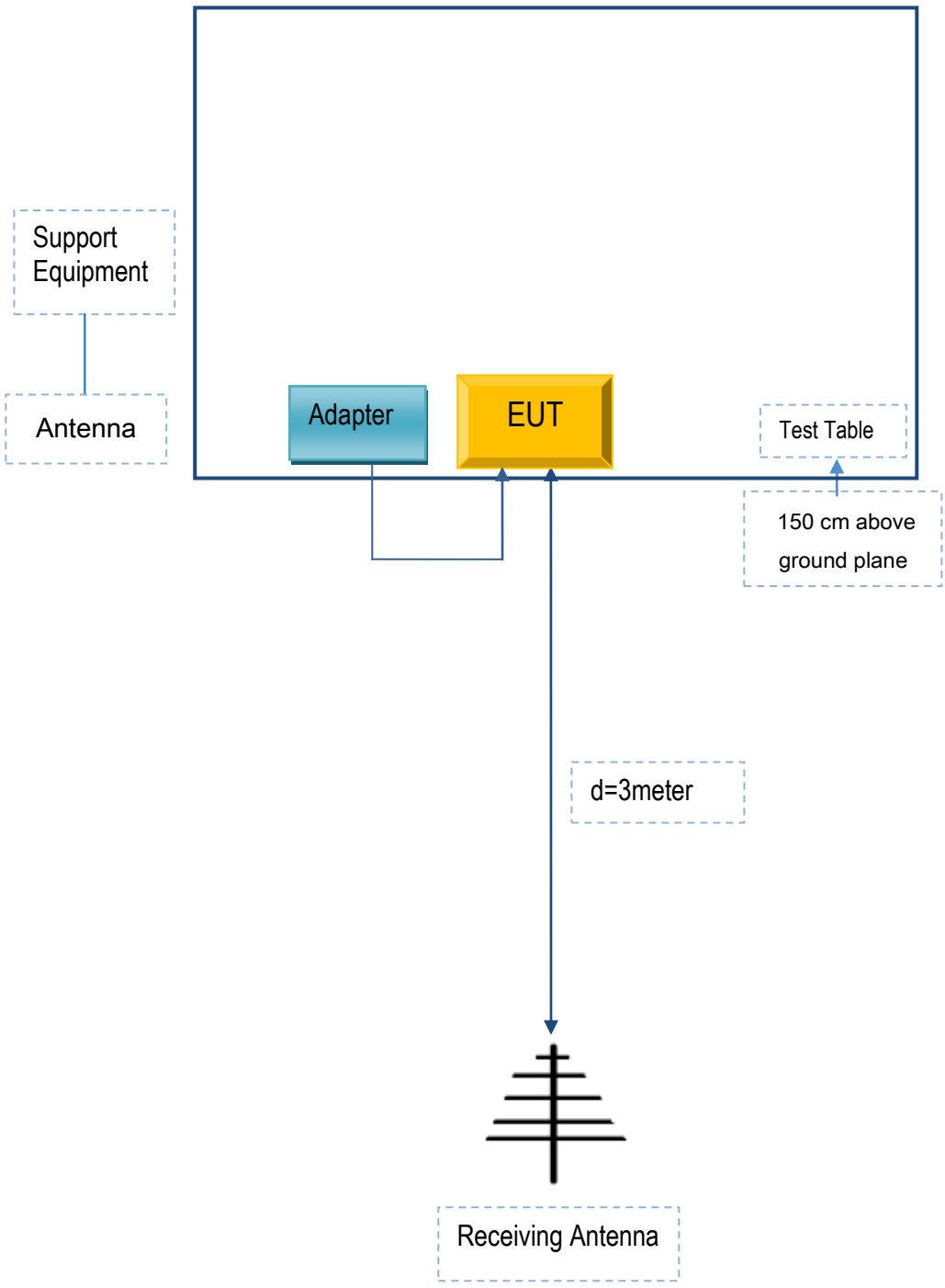
## Annex B.iii. Photograph: Test Setup Photo

| | |
|---|---|
|  |  |
| Radiated Spurious Emissions Test Setup Below 1GHz | Radiated Spurious Emissions Test Setup Above 1GHz |

# Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

## Annex C.ii. TEST SET UP BLOCK

### Block Configuration Diagram for Radiated Emissions



## Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

**Supporting Equipment:**

| Manufacturer | Equipment Description | Model | Serial No |
| --- | --- | --- | --- |
| Verykool USA Inc | Adapter | TPA-46D050100UU | SA020 |

**Supporting Cable:**

| Cable type | Shield Type | Ferrite Core | Length | Serial No |
| --- | --- | --- | --- | --- |
| USB Cable | Un-shielding | No | 0.8m | SA020 |

# Annex C.ii. EUT OPERATING CONKITIONS

N/A

# Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see the attachment

# Annex E. DECLARATION OF SIMILARITY

N/A