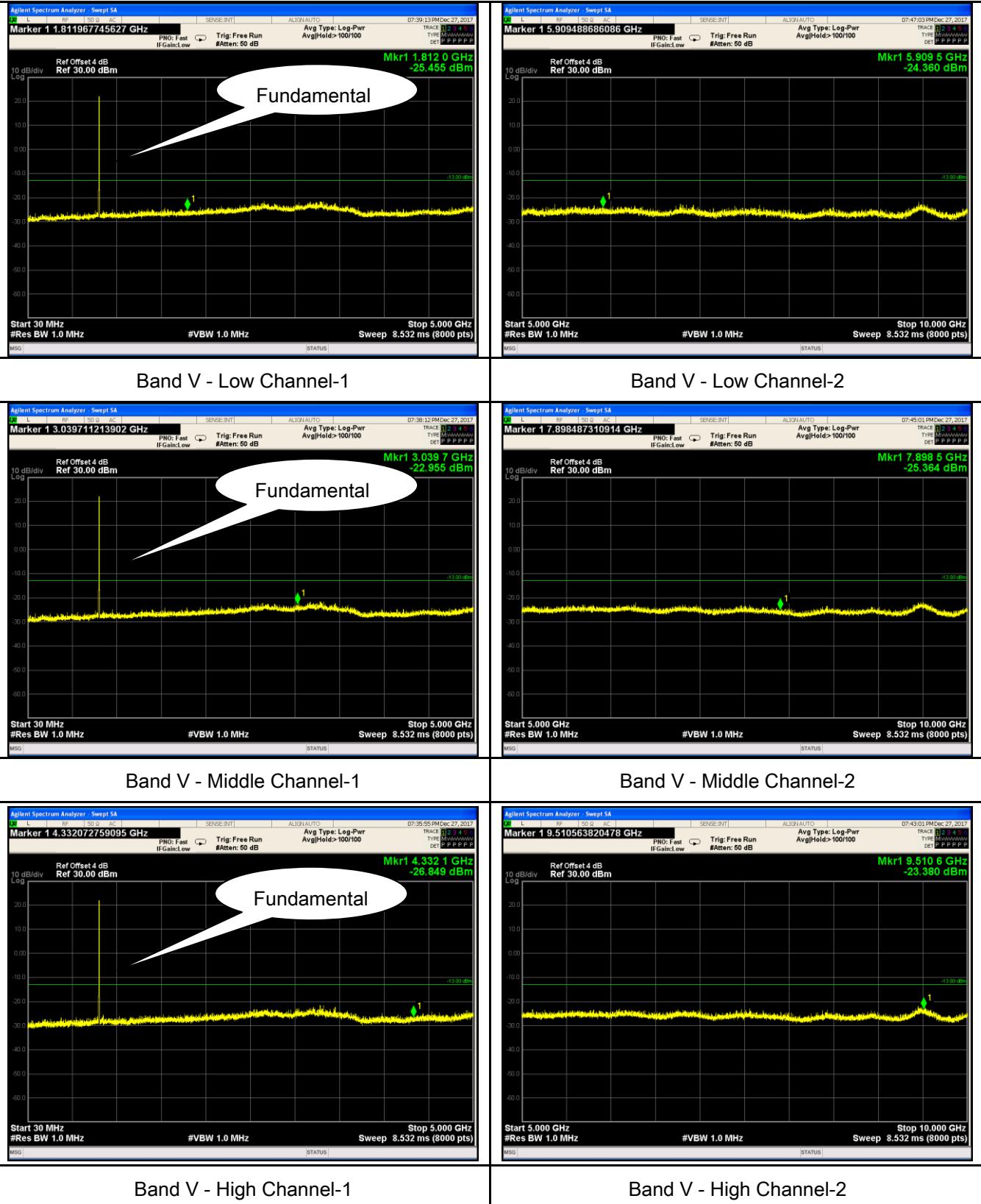
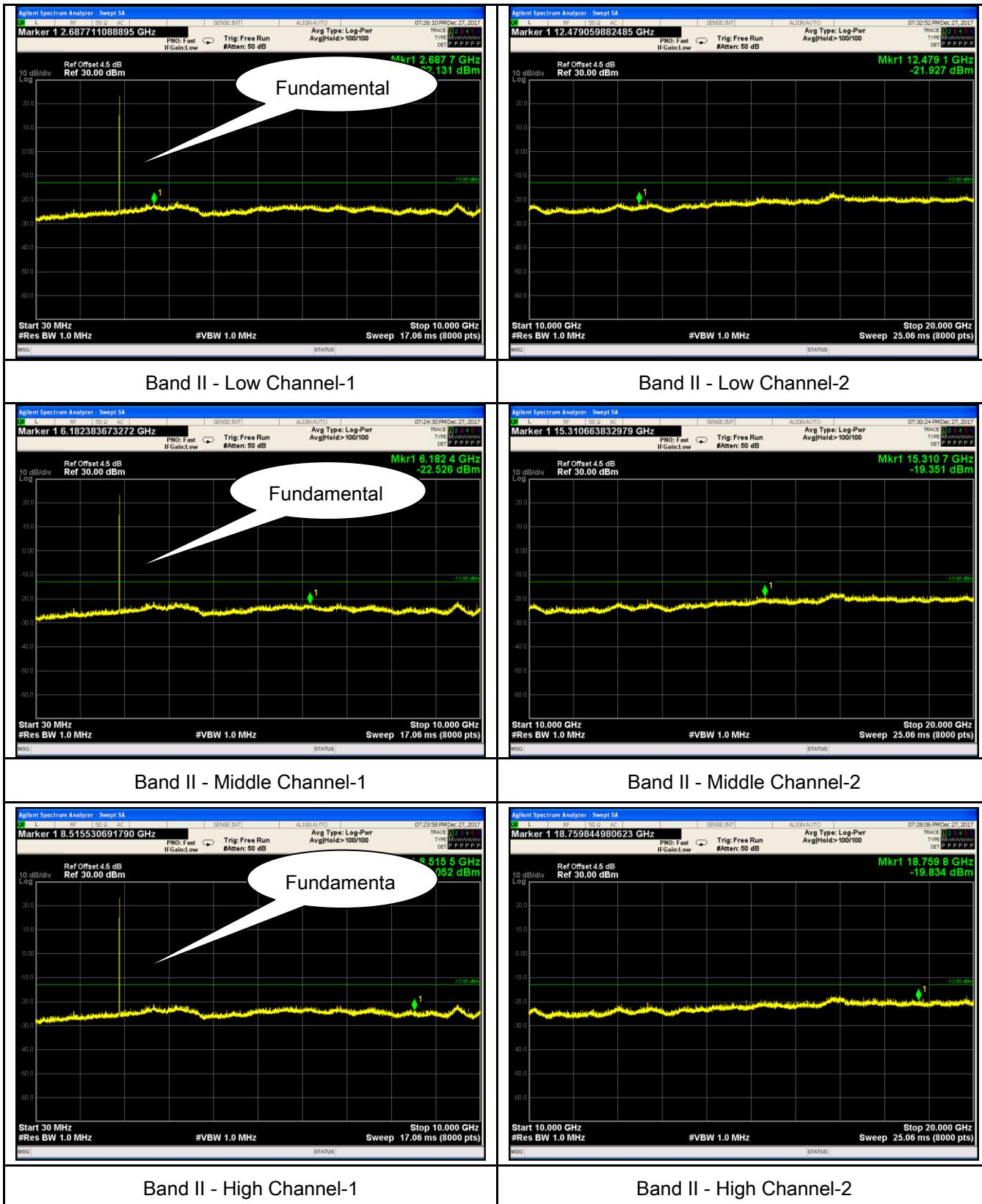


## HSUPA:

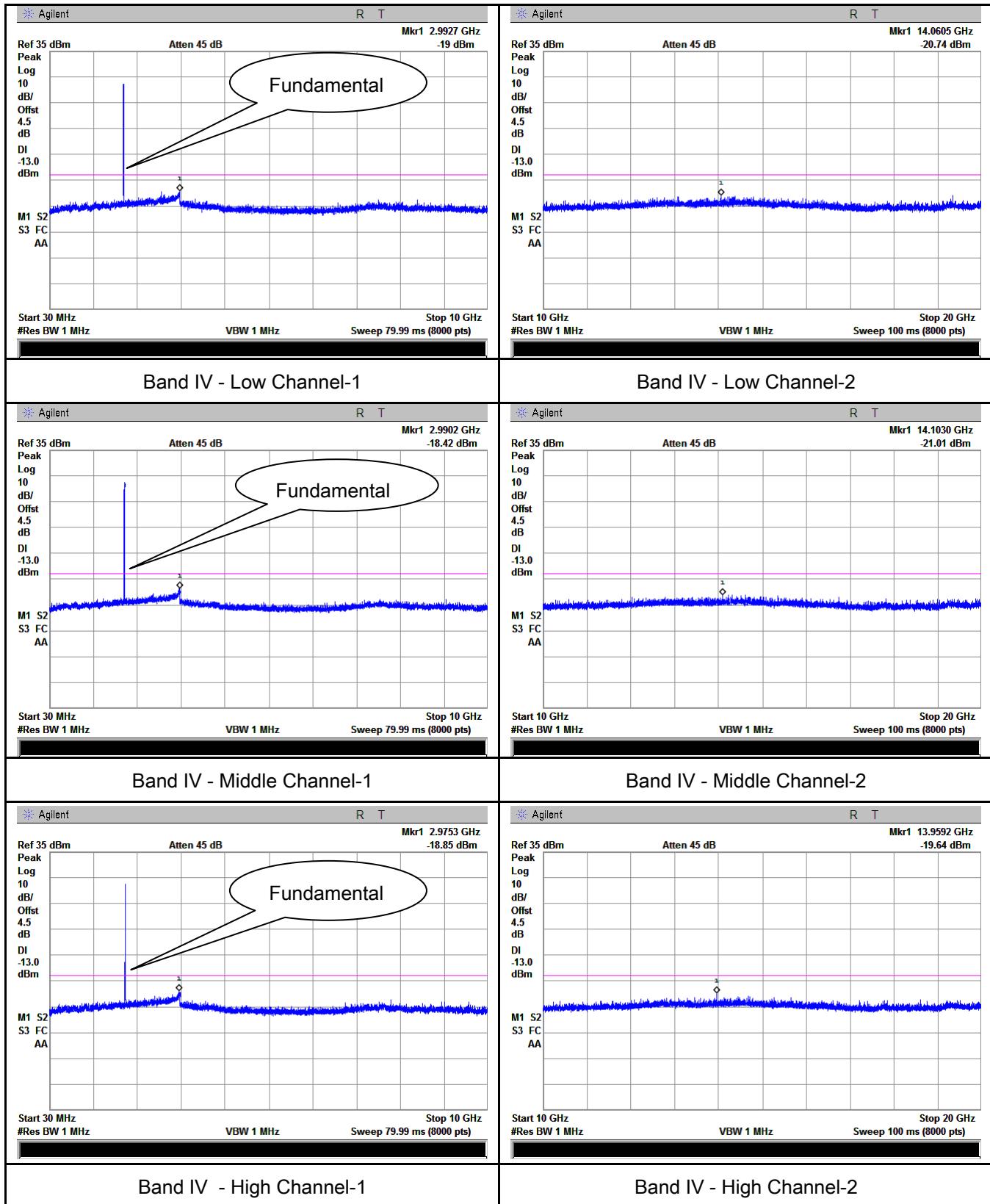
### UMTS-FDD Band V (Part 22H)



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

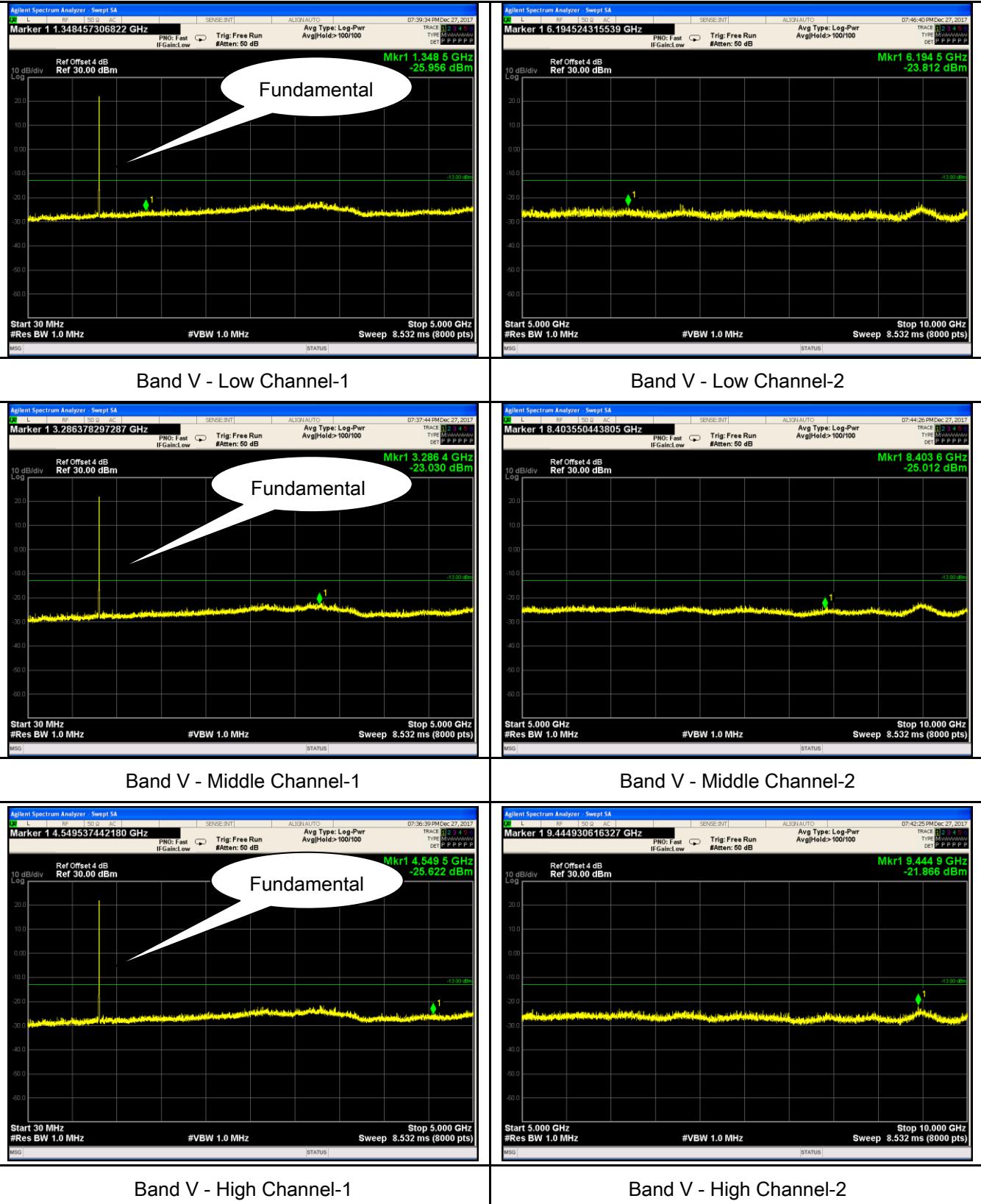


## UMTS-FDD Band IV (Part 27)

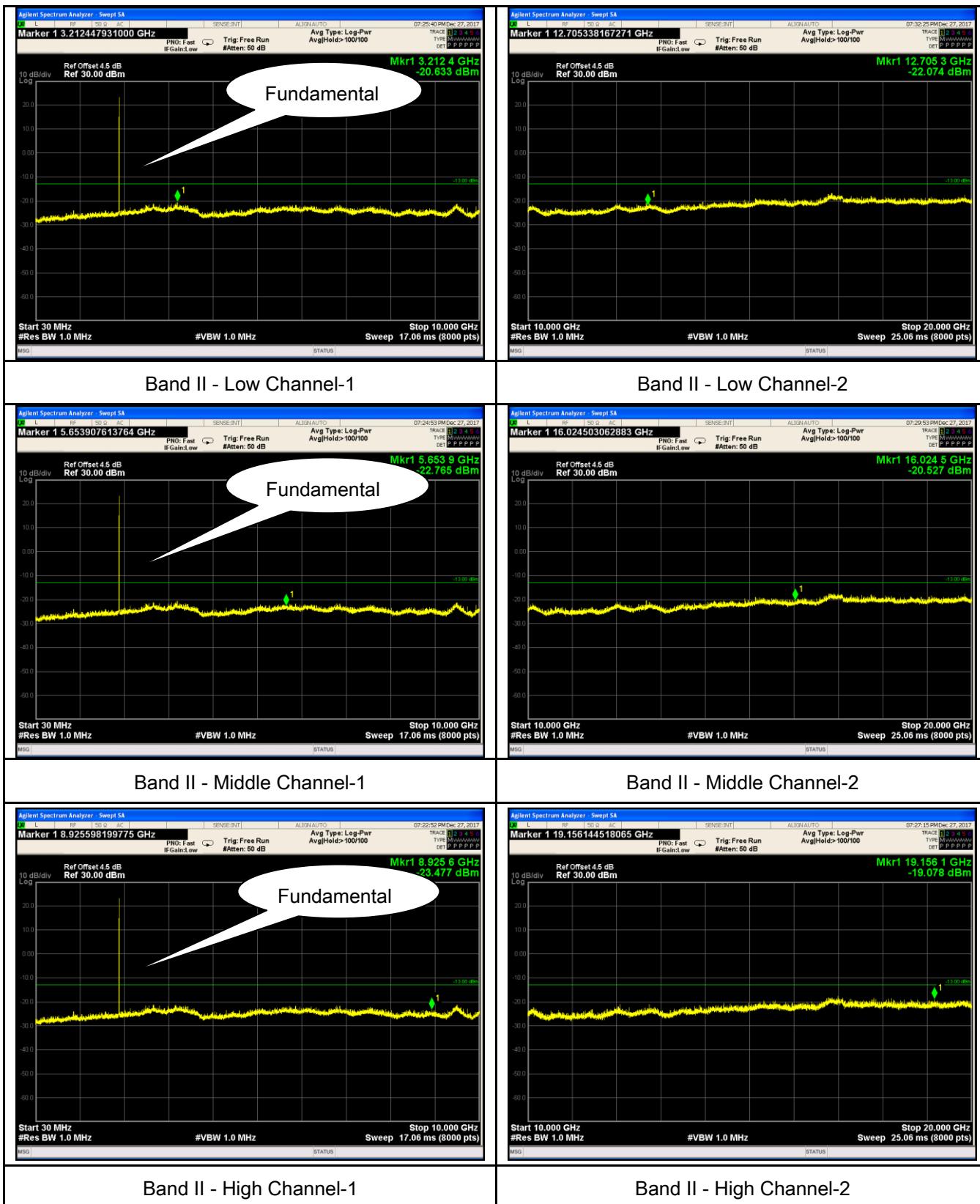


## HSDPA:

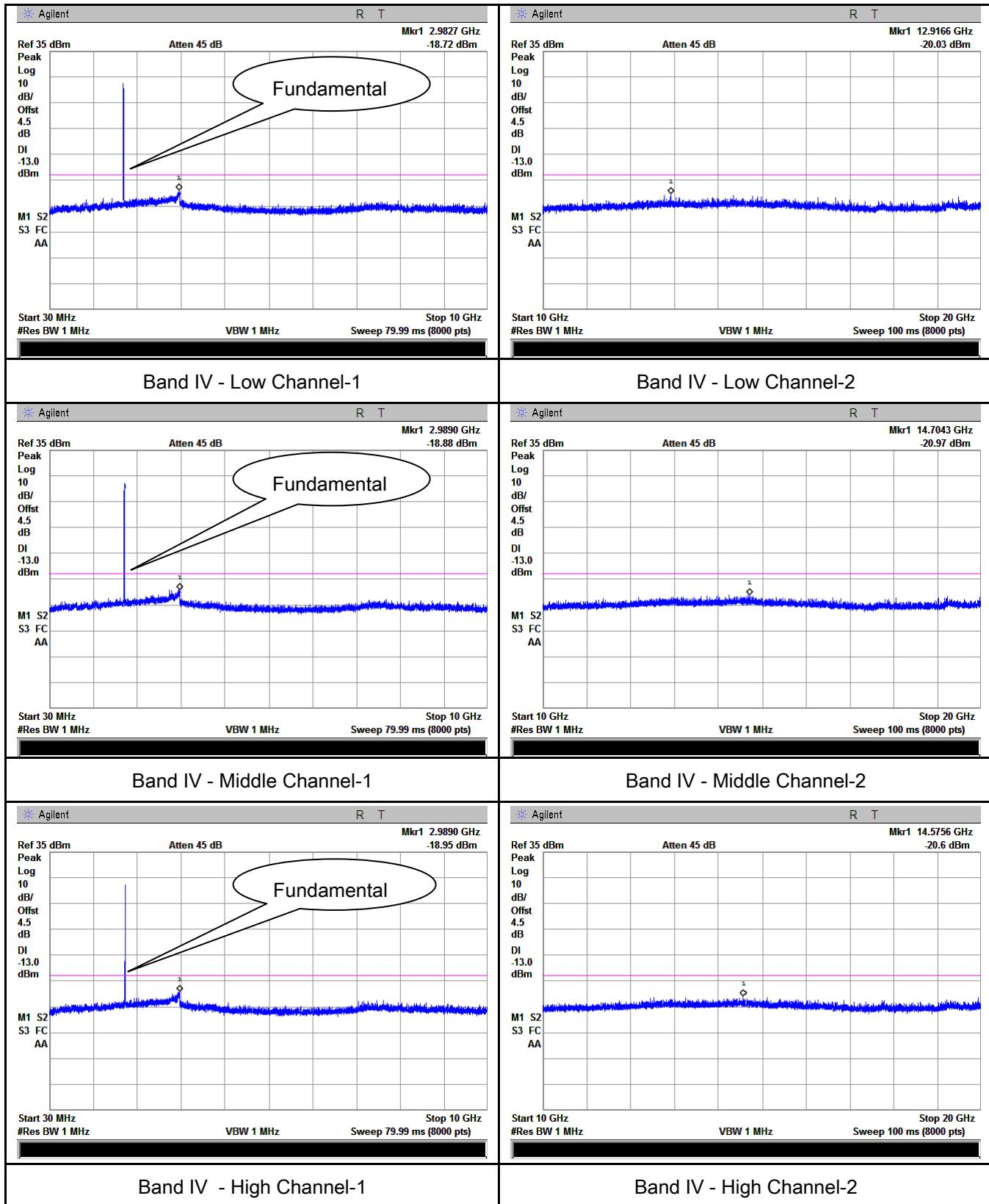
### UMTS-FDD Band V (Part 22H)



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



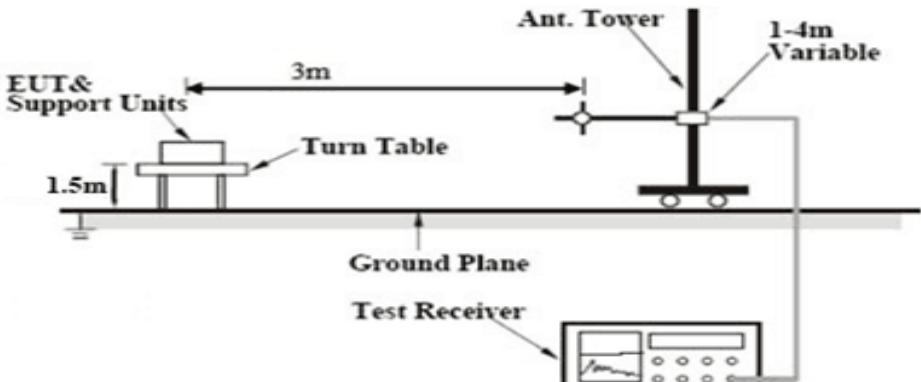
## UMTS-FDD Band IV (Part 27)



## 6.6 Spurious Radiated Emissions

Temperature	23°C
Relative Humidity	54%
Atmospheric Pressure	1020mbar
Test date :	December 28, 2017
Tested By :	Aarron Liang

### 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.	<input checked="" type="checkbox"/>
Test setup			
Test Procedure	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ol> <p>Sample Calculation:</p> <p>EUT Field Strength = Raw Amplitude (dB<math>\mu</math>V/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)</p>		

Remark		
Result	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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	-43.61	V	7.95	0.67	-36.33	-13	-23.33
1648.4	-45	H	7.95	0.67	-37.72	-13	-24.72
565.6	-53.05	V	6.37	0.38	-47.06	-13	-34.06
591.88	-52.54	H	6.36	0.35	-46.53	-13	-33.53

### 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	-43.32	V	7.95	0.67	-36.04	-13	-23.04
1673.2	-43.06	H	7.95	0.67	-35.78	-13	-22.78
686.52	-52.82	V	6.34	0.4	-46.88	-13	-33.88
308.71	-51.82	H	5.58	0.28	-46.52	-13	-33.52

### 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	-43.9	V	7.95	0.68	-36.63	-13	-23.63
1697.6	-44.41	H	7.95	0.68	-37.14	-13	-24.14
291.61	-52.18	V	5.65	0.29	-46.82	-13	-33.82
834.94	-52.11	H	6.32	0.38	-46.17	-13	-33.17

#### 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	-48.53	V	10.25	1	-39.28	-13	-26.28
3700.4	-48.34	H	10.25	1	-39.09	-13	-26.09
255.78	-52.25	V	5.55	0.24	-46.94	-13	-33.94
551.81	-53.22	H	6.42	0.35	-47.15	-13	-34.15

### 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	-47.77	V	10.25	1.01	-38.53	-13	-25.53
3760	-49.24	H	10.25	1.01	-40	-13	-27.00
274.49	-53.62	V	5.62	0.27	-48.27	-13	-35.27
752.69	-53.95	H	6.32	0.39	-48.02	-13	-35.02

### 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	-47.63	V	10.36	1.02	-38.29	-13	-25.29
3819.6	-49.91	H	10.36	1.02	-40.57	-13	-27.57
688.62	-53.93	V	6.26	0.37	-48.04	-13	-35.04
710.18	-52.49	H	6.34	0.4	-46.55	-13	-33.55

#### Note:

- 1, The testing has been conformed to  $10 * 1909.8 \text{ MHz} = 19,098 \text{ MHz}$
- 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.
- 5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

### 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	-46.73	V	7.95	0.67	-39.45	-13	-26.45
1652.8	-45.93	H	7.95	0.67	-38.65	-13	-25.65
387.78	-53.12	V	5.64	0.25	-47.73	-13	-34.73
392	-54	H	5.64	0.27	-48.63	-13	-35.63

#### 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	-47.22	V	7.95	0.67	-39.94	-13	-26.94
1670	-45.43	H	7.95	0.67	-38.15	-13	-25.15
217.34	-51.84	V	3.74	0.2	-48.3	-13	-35.30
264.75	-52.9	H	3.65	0.15	-49.4	-13	-36.40

#### 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	-45.9	V	7.95	0.68	-38.63	-13	-25.63
1693.2	-45.1	H	7.95	0.68	-37.83	-13	-24.83
430.16	-53.46	V	5.87	0.29	-47.88	-13	-34.88
700.85	-52.72	H	5.94	0.25	-47.03	-13	-34.03

#### Note:

- 1, The testing has been conformed to  $10 * 846.6 \text{ MHz} = 8,466 \text{ MHz}$
- 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	-50.08	V	10.25	1	-40.83	-13	-27.83
3704.8	-49.84	H	10.25	1	-40.59	-13	-27.59
664.84	-54.44	V	6.41	0.38	-48.41	-13	-35.41
338.81	-52.78	H	5.56	0.23	-47.45	-13	-34.45

#### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-49.91	V	10.25	1.01	-40.67	-13	-27.67
3760	-48.75	H	10.25	1.01	-39.51	-13	-26.51
606.99	-53.78	V	6.41	0.32	-47.69	-13	-34.69
841.94	-54.24	H	6.1	0.47	-48.61	-13	-35.61

#### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3815.2	-50.22	V	10.36	1.02	-40.88	-13	-27.88
3815.2	-49.95	H	10.36	1.02	-40.61	-13	-27.61
532.62	-52.64	V	6.45	0.35	-46.54	-13	-33.54
724.89	-53.08	H	6.06	0.42	-47.44	-13	-34.44

**Note:**

- 1, The testing has been conformed to  $10 \times 1907.6\text{MHz} = 19,076\text{MHz}$
- 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
- 5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

### 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	-44.14	V	10.07	0.96	-35.03	-13	-22.03
3424.8	-44.32	H	10.07	0.96	-35.21	-13	-22.21
345.02	-52.74	V	5.95	0.29	-47.08	-13	-34.08
588.24	-53.41	H	6.08	0.38	-47.71	-13	-34.71

#### 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	-43.45	V	10.09	0.96	-34.32	-13	-21.32
3480	-43.12	H	10.09	0.96	-33.99	-13	-20.99
786.33	-52.56	V	6.36	0.43	-46.63	-13	-33.63
771.16	-52.65	H	6.39	0.43	-46.69	-13	-33.69

#### 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	-42.99	V	10.09	0.97	-33.87	-13	-20.87
3505.2	-43.29	H	10.09	0.97	-34.17	-13	-21.17
797.68	-52.31	V	6.41	0.42	-46.32	-13	-33.32
289.21	-52.22	H	5.87	0.26	-46.61	-13	-33.61

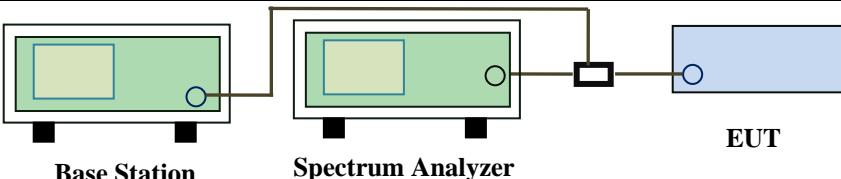
**Note:**

- 1, The testing has been conformed to  $10 \times 1752.6 \text{ MHz} = 17,526 \text{ MHz}$
- 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	23°C
Relative Humidity	54%
Atmospheric Pressure	1020mbar
Test date :	December 28, 2017
Tested By :	Aarron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a) § 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.	<input checked="" type="checkbox"/>
Test setup		 <p style="text-align: center;"><b>Base Station</b>      <b>Spectrum Analyzer</b>      <b>EUT</b></p>	
Procedure		<ul style="list-style-type: none"> <li>- The EUT was connected to Spectrum Analyzer and Base Station via power divider.</li> <li>- The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.</li> </ul>	
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> 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)
823.996	-9.358	-13
849.020	-10.972	-13

**PCS Band (Part24E) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.996	-16.078	-13
1910.020	-17.960	-13

**GPRS:**

**Cellular Band (Part 22H) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.975	-12.397	-13
849.031	-13.875	-13

**PCS Band (Part24E) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.982	-17.473	-13
1910.031	-19.474	-13

### EGPRS (MCS5):

#### Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.982	-10.173	-13
849.039	-13.597	-13

#### PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.980	-16.073	-13
1910.005	-15.104	-13

### RCM:

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

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.98	-26.417	-13
849.12	-29.334	-13

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

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.99	-24.399	-13
1910.02	-23.757	-13

#### UMTS-FDD Band IV (Part 27)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1709.925	-22.66	-13
1755.750	-23.54	-13

### HSUPA:

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

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.89	-27.082	-13
849.12	-29.334	-13

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

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.93	-26.519	-13
1910.09	-24.727	-13

#### UMTS-FDD Band IV (Part 27)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1709.925	-23.49	-13
1756.200	-23.41	-13

### HSDPA:

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

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.93	-26.596	-13
849.12	-29.334	-13

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

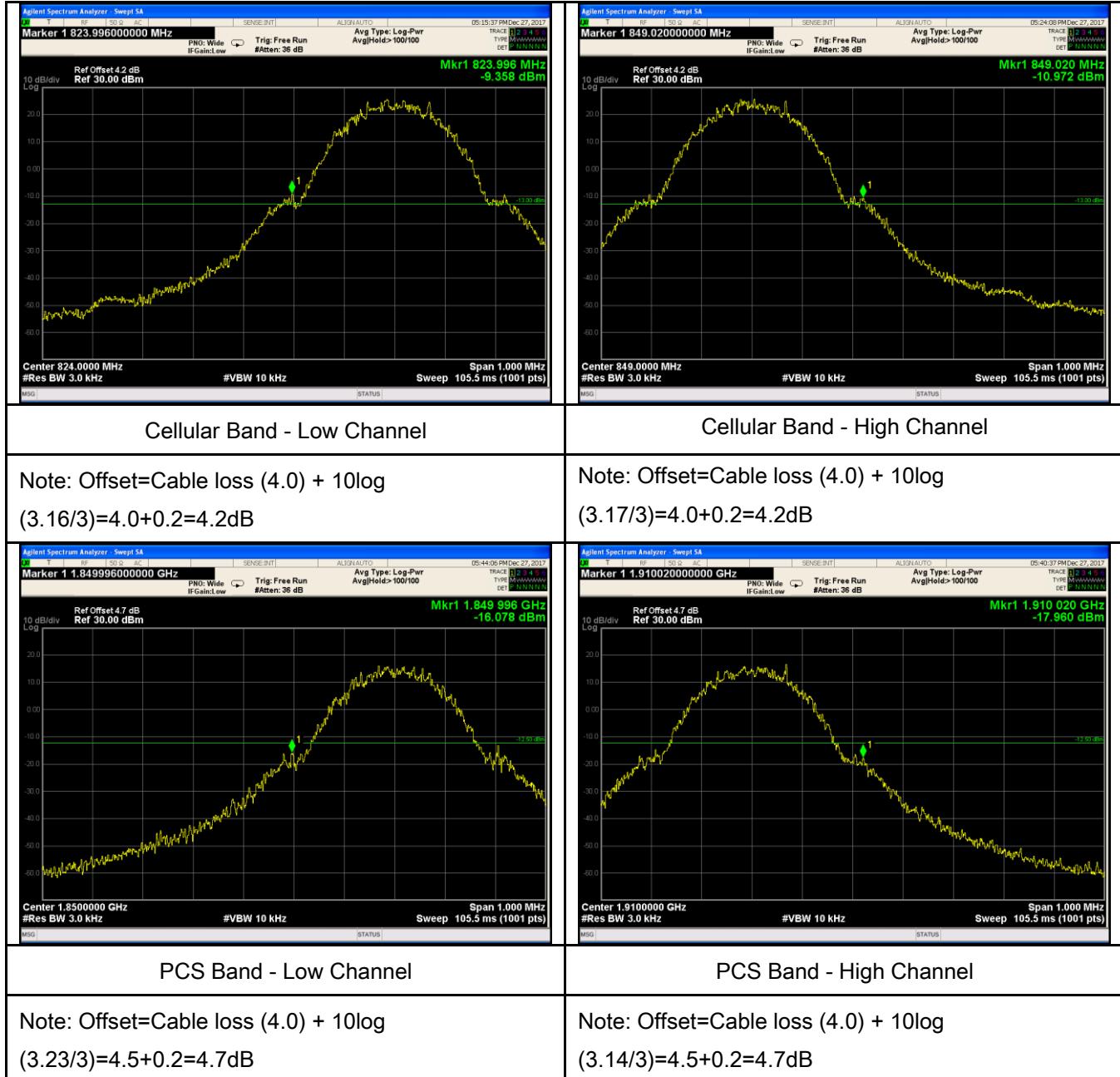
Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.96	-25.583	-13
1910.07	-24.866	-13

### UMTS-FDD Band IV (Part 27)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1709.325	-23.67	-13
1755.950	-22.66	-13

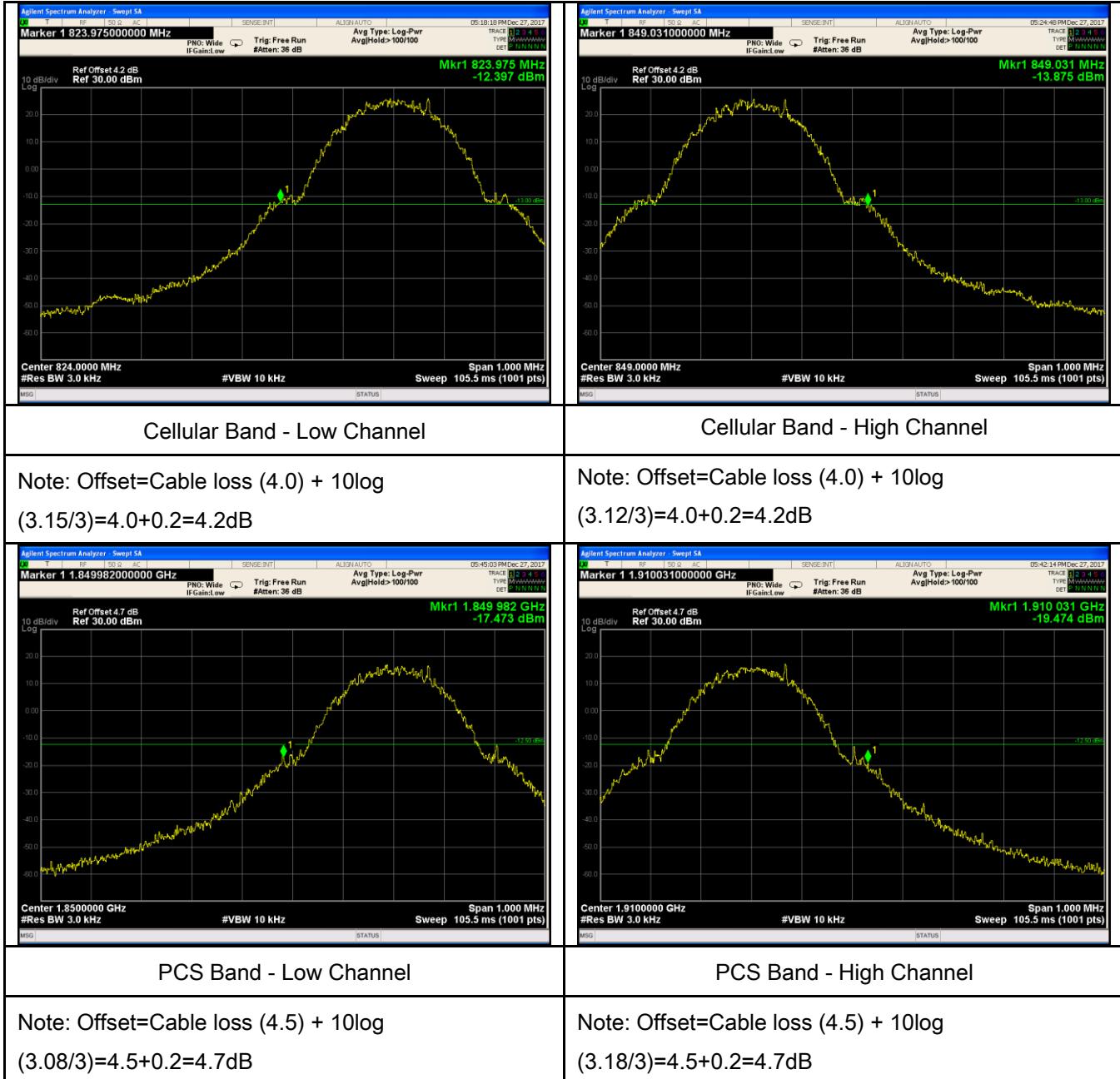
## GSM Voice:

### Test Plots



## GPRS:

### Test Plots

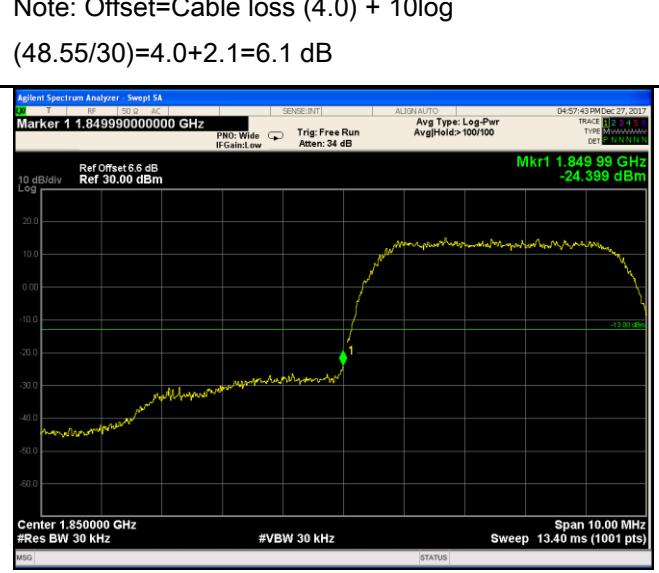
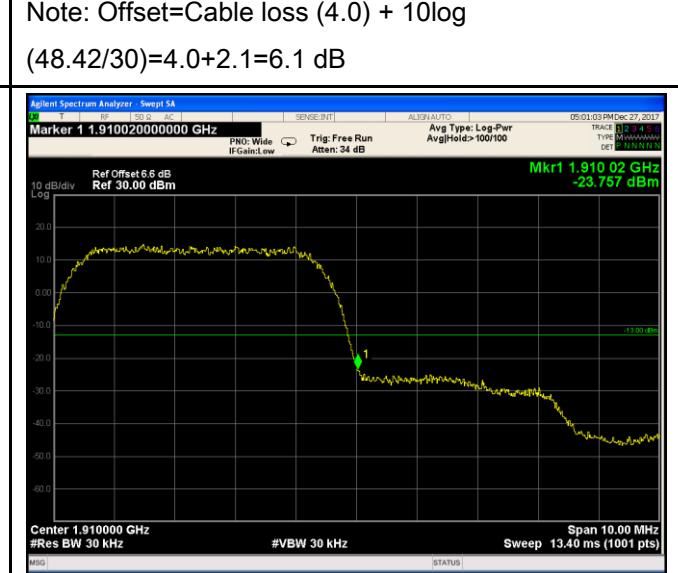


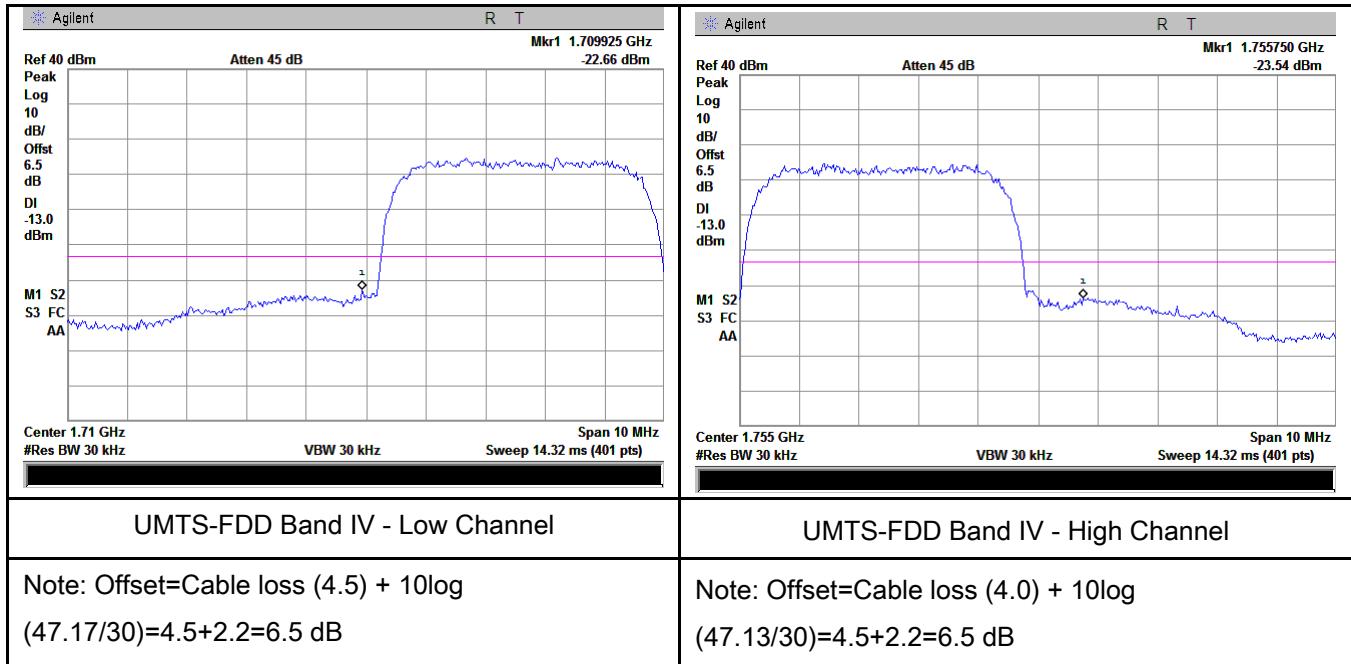
## EGPRS (MCS5):

### Test Plots

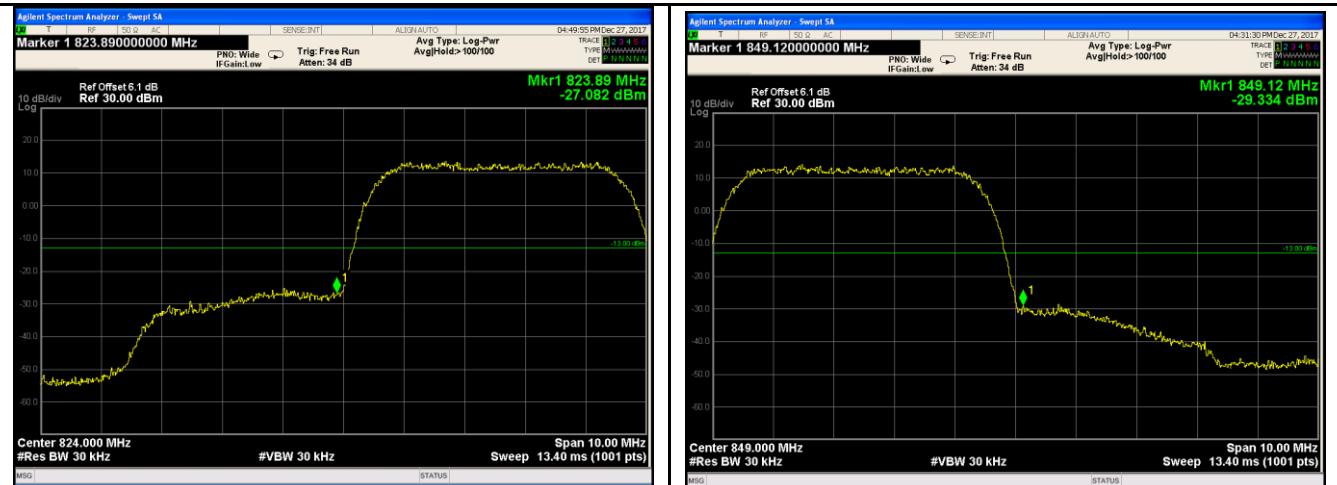
 <p>Marker 1 823.982000000 MHz PNC: Wide IF-Gain:Low Trig: Free Run #Atten: 36 dB Avg Type: Log-Pwr AvgHold&gt;100/100</p> <p>Mkr1 823.982 MHz -10.173 dBm</p> <p>10 dB/div Ref Offset 4.2 dB Ref 30.00 dBm</p> <p>Center 824.0000 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 1.000 MHz Span 1.000 ms (1001 pts)</p>	 <p>Marker 1 849.039000000 MHz PNC: Wide IF-Gain:Low Trig: Free Run #Atten: 36 dB Avg Type: Log-Pwr AvgHold&gt;100/100</p> <p>Mkr1 849.039 MHz -13.597 dBm</p> <p>10 dB/div Ref Offset 4.2 dB Ref 30.00 dBm</p> <p>Center 849.0000 MHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 1.000 MHz Span 1.000 ms (1001 pts)</p>
<p>Cellular Band - Low Channel</p>	<p>Cellular Band - High Channel</p>
<p>Note: Offset=Cable loss (4.0) + 10log (3.22/3)=4.0+0.2=4.2dB</p>	<p>Note: Offset=Cable loss (4.0) + 10log (3.16/3)=4.0+0.2=4.2dB</p>
 <p>Marker 1 1.849980000000000 GHz PNC: Wide IF-Gain:Low Trig: Free Run #Atten: 36 dB Avg Type: Log-Pwr AvgHold&gt;100/100</p> <p>Mkr1 1.849 980 GHz -16.073 dBm</p> <p>10 dB/div Ref Offset 4.7 dB Ref 30.00 dBm</p> <p>Center 1.8500000 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 1.000 MHz Span 1.000 ms (1001 pts)</p>	 <p>Marker 1 1.910005000000000 GHz PNC: Wide IF-Gain:Low Trig: Free Run #Atten: 36 dB Avg Type: Log-Pwr AvgHold&gt;100/100</p> <p>Mkr1 1.910 005 GHz -15.104 dBm</p> <p>10 dB/div Ref Offset 4.7 dB Ref 30.00 dBm</p> <p>Center 1.9100000 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 1.000 MHz Span 1.000 ms (1001 pts)</p>
<p>PCS Band - Low Channel</p>	<p>PCS Band - High Channel</p>
<p>Note: Offset=Cable loss (4.5) + 10log (3.23/3)=4.5+0.2=4.7dB</p>	<p>Note: Offset=Cable loss (4.5) + 10log (3.18/3)=4.5+0.2=4.7dB</p>

## RMC:

 <p>Agilent Spectrum Analyzer - Swept SA Marker 1 823.98 MHz -26.417 dBm</p> <p>Ref Offset 6.1 dB Ref 30.00 dBm</p> <p>Center 824.000 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>	 <p>Agilent Spectrum Analyzer - Swept SA Marker 1 849.12 MHz -29.334 dBm</p> <p>Ref Offset 6.1 dB Ref 30.00 dBm</p> <p>Center 849.000 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>
<p>UMTS-FDD Band V - Low Channel</p> <p>Note: Offset=Cable loss (4.0) + 10log (48.55/30)=4.0+2.1=6.1 dB</p>	<p>UMTS-FDD Band V - High Channel</p> <p>Note: Offset=Cable loss (4.0) + 10log (48.42/30)=4.0+2.1=6.1 dB</p>
 <p>Agilent Spectrum Analyzer - Swept SA Marker 1 1.8499999999999999 GHz -24.399 dBm</p> <p>Ref Offset 6.6 dB Ref 30.00 dBm</p> <p>Center 1.850000 GHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>	 <p>Agilent Spectrum Analyzer - Swept SA Marker 1 1.9100200000000001 GHz -23.757 dBm</p> <p>Ref Offset 6.6 dB Ref 30.00 dBm</p> <p>Center 1.910000 GHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>
<p>UMTS-FDD Band II - Low Channel</p> <p>Note: Offset=Cable loss (4.5) + 10log (48.72/30)=4.5+2.1=6.6 dB</p>	<p>UMTS-FDD Band II - High Channel</p> <p>Note: Offset=Cable loss (4.5) + 10log (48.93/30)=4.5+2.1=6.6 dB</p>



## HSUPA:

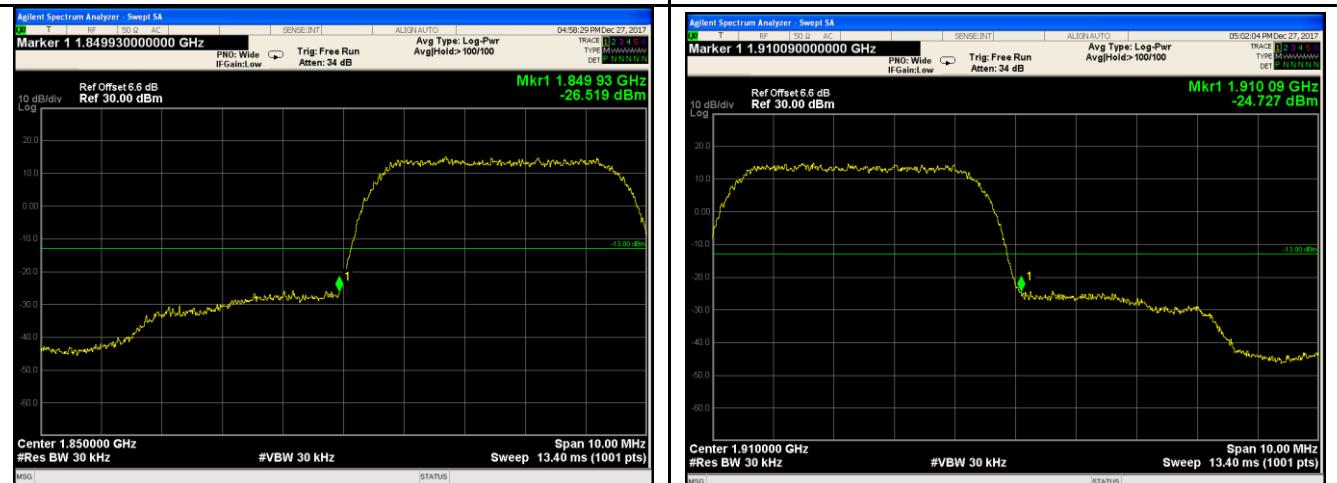


UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log  
(48.33/30)=4.0+2.1=6.1 dB

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log  
(48.33/30)=4.0+2.1=6.1 dB

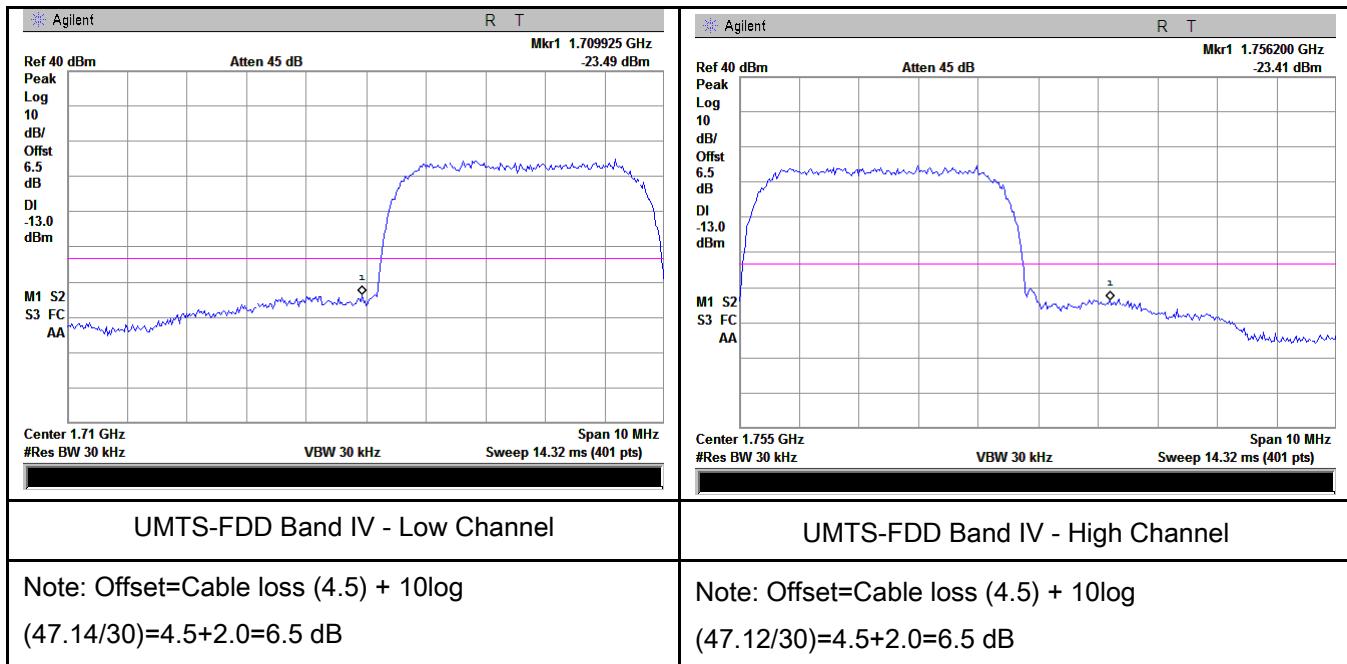


UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
(48.93/30)=4.5+2.1=6.6 dB

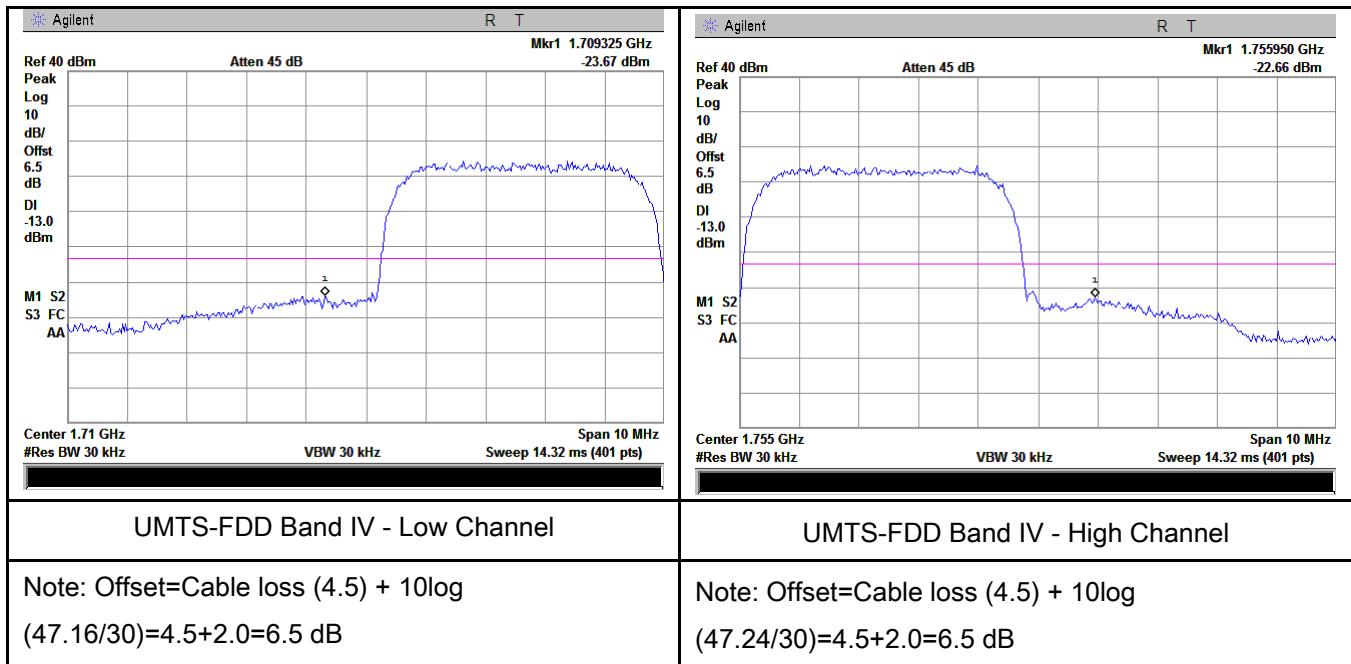
UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log  
(48.96/30)=4.5+2.1=6.6 dB



## HSDPA:

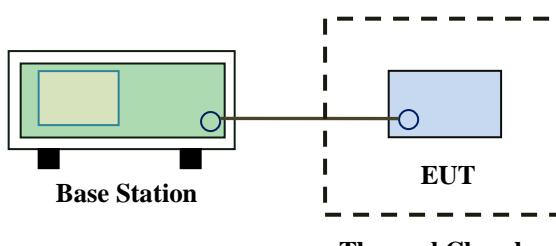
 <p>Marker 1 823.930000000 MHz PNO: Wide IF-Gain:Low Trig: Free Run Atten: 34 dB Avg Type: Log-Pwr Avg Hold&gt;100/100</p> <p>Mkr1 823.93 MHz -26.596 dBm</p> <p>Ref Offset 6.1 dB Ref 30.00 dBm</p> <p>10 dB/div Log</p> <p>Center 824.000 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>	 <p>Marker 1 849.120000000 MHz PNO: Wide IF-Gain:Low Trig: Free Run Atten: 34 dB Avg Type: Log-Pwr Avg Hold&gt;100/100</p> <p>Mkr1 849.12 MHz -29.334 dBm</p> <p>Ref Offset 6.1 dB Ref 30.00 dBm</p> <p>10 dB/div Log</p> <p>Center 849.000 MHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>
<p>UMTS-FDD Band V - Low Channel</p>	<p>UMTS-FDD Band V - High Channel</p>
<p>Note: Offset=Cable loss (4.0) + 10log <math>(48.81/30)=4.0+2.1=6.1</math> dB</p>	<p>Note: Offset=Cable loss (4.0) + 10log <math>(48.48/30)=4.0+2.1=6.1</math> dB</p>
 <p>Marker 1 1.849960000000 GHz PNO: Wide IF-Gain:Low Trig: Free Run Atten: 34 dB Avg Type: Log-Pwr Avg Hold&gt;100/100</p> <p>Mkr1 1.849.96 GHz -25.583 dBm</p> <p>Ref Offset 6.6 dB Ref 30.00 dBm</p> <p>10 dB/div Log</p> <p>Center 1.850000 GHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>	 <p>Marker 1 1.910070000000 GHz PNO: Wide IF-Gain:Low Trig: Free Run Atten: 34 dB Avg Type: Log-Pwr Avg Hold&gt;100/100</p> <p>Mkr1 1.910.07 GHz -24.866 dBm</p> <p>Ref Offset 6.6 dB Ref 30.00 dBm</p> <p>10 dB/div Log</p> <p>Center 1.910000 GHz #Res BW 30 kHz #VBW 30 kHz Sweep 13.40 ms (1001 pts)</p>
<p>UMTS-FDD Band II - Low Channel</p>	<p>UMTS-FDD Band II - High Channel</p>
<p>Note: Offset=Cable loss (4.5) + 10log <math>(48.98/30)=4.5+2.1=6.6</math> dB</p>	<p>Note: Offset=Cable loss (4.5) + 10log <math>(48.81/30)=4.5+2.1=6.6</math> dB</p>



## 6.8 Frequency Stability

Temperature	23°C
Relative Humidity	54%
Atmospheric Pressure	1020mbar
Test date :	December 28, 2017
Tested By :	Aarron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable																																
§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54	a)	<p>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:</p> <p>Frequency Tolerance for Transmitters in the Public Mobile Services</p> <table border="1"> <thead> <tr> <th>Frequency Range (MHz)</th> <th>Base, fixed (ppm)</th> <th>Mobile ≤ 3 watts (ppm)</th> <th>Mobile ≤ 3 watts (ppm)</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.</p>	Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)	25 to 50	20.0	20.0	50.0	50 to 450	5.0	5.0	50.0	45□to 512	2.5	5.0	□0	821 to 896	1.5	2.5	2.5	928 to □29.	5.0	N/A	N/A	929 to 960.	1.5	N/A	N/A	2110 to 2220	10.0	N/A	N/A	<input checked="" type="checkbox"/>
Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)																																
25 to 50	20.0	20.0	50.0																																
50 to 450	5.0	5.0	50.0																																
45□to 512	2.5	5.0	□0																																
821 to 896	1.5	2.5	2.5																																
928 to □29.	5.0	N/A	N/A																																
929 to 960.	1.5	N/A	N/A																																
2110 to 2220	10.0	N/A	N/A																																
Test setup		 <p>The diagram illustrates the test setup. A green rectangular box labeled "Base Station" is connected by a horizontal line to a blue rectangular box labeled "EUT". This connection line passes through a dashed rectangular boundary labeled "Thermal Chamber".</p>																																	

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. Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% ( $\pm 2.5\text{ppm}$ ) of the center frequency.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A

Test Plot  Yes (See below)  N/A

GSM Voice:

Cellular Band (Part 22H) result

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.85	18	0.0215	2.5
0		18	0.0215	2.5
10		17	0.0203	2.5
20		13	0.0155	2.5
30		14	0.0167	2.5
40		17	0.0203	2.5
50		19	0.0227	2.5
55		21	0.0251	2.5
25		21	0.0251	2.5
	4.4	19	0.0227	2.5
	3.6			

PCS Band (Part 24E) result

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.85	14	0.0074	2.5
0		15	0.0080	2.5
10		11	0.0059	2.5
20		14	0.0074	2.5
30		17	0.0090	2.5
40		14	0.0074	2.5
50		15	0.0080	2.5
55		16	0.0085	2.5
25		19	0.0101	2.5
	4.4	18	0.0096	2.5
	3.6			

RMC:

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

Middle Channel, $f_o = 835$ MHz				
Temperature (°C)	Power Supplied (V <sub>dc</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.85	13	0.0156	2.5
0		15	0.0180	2.5
10		14	0.0168	2.5
20		17	0.0204	2.5
30		13	0.0156	2.5
40		8	0.0096	2.5
50		21	0.0251	2.5
55		16	0.0192	2.5
25		16	0.0192	2.5
	4.4	16	0.0192	2.5
	3.6	16	0.0192	2.5

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

Middle Channel, $f_o = 1880$ MHz				
Temperature (°C)	Power Supplied (V <sub>dc</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.85	18	0.0096	2.5
0		15	0.0080	2.5
10		16	0.0085	2.5
20		17	0.0090	2.5
30		13	0.0069	2.5
40		16	0.0085	2.5
50		22	0.0117	2.5
55		17	0.0090	2.5
25		19	0.0101	2.5
	4.4	19	0.0101	2.5
	3.6	20	0.0106	2.5

### UMTS-FDD Band IV (Part 27)

Middle Channel, $f_0 = 1733$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.85	19	0.0228	2.5
0		17	0.0204	2.5
10		15	0.0180	2.5
20		13	0.0156	2.5
30		13	0.0156	2.5
40		15	0.0180	2.5
50		22	0.0263	2.5
55		19	0.0228	2.5
25		20	0.0240	2.5
	3.6	16	0.0192	2.5

## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
<b>RF Conducted Test</b>					
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/14/2017	09/13/2018	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/23/2017	09/22/2018	<input checked="" type="checkbox"/>
Temperature/Humidity Chamber	UHL-270	001	10/07/2017	10/06/2018	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
RF Power Sensor	Dare RPR3006C/P/W	AY554013	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
EMI test receiver	ESL6	100262	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
Horn Antenna	BBHA9170	3145226D1	09/27/2017	09/26/2018	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/23/2017	03/22/2018	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/19/2017	09/18/2018	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~2GHz)	JB1	A112017	09/19/2017	09/18/2018	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71259	09/22/2017	09/21/2018	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/22/2017	09/21/2018	<input checked="" type="checkbox"/>
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	09/15/2017	09/14/2018	<input checked="" type="checkbox"/>
Power Amplifier	SMC150D	R1553-0313	03/08/2017	03/07/2018	<input checked="" type="checkbox"/>
Power Amplifier	S61-25	R1553-0516	05/26/2017	05/25/2018	<input checked="" type="checkbox"/>
Power Amplifier	S41-25D	R1553-0314	05/26/2017	05/25/2018	<input checked="" type="checkbox"/>



Test Report	17071325-FCC-R1
Page	89 of 105

Tunable Notch Filter	3NF-800/1000-S	AA4	08/30/2017	08/29/2018	<input checked="" type="checkbox"/>
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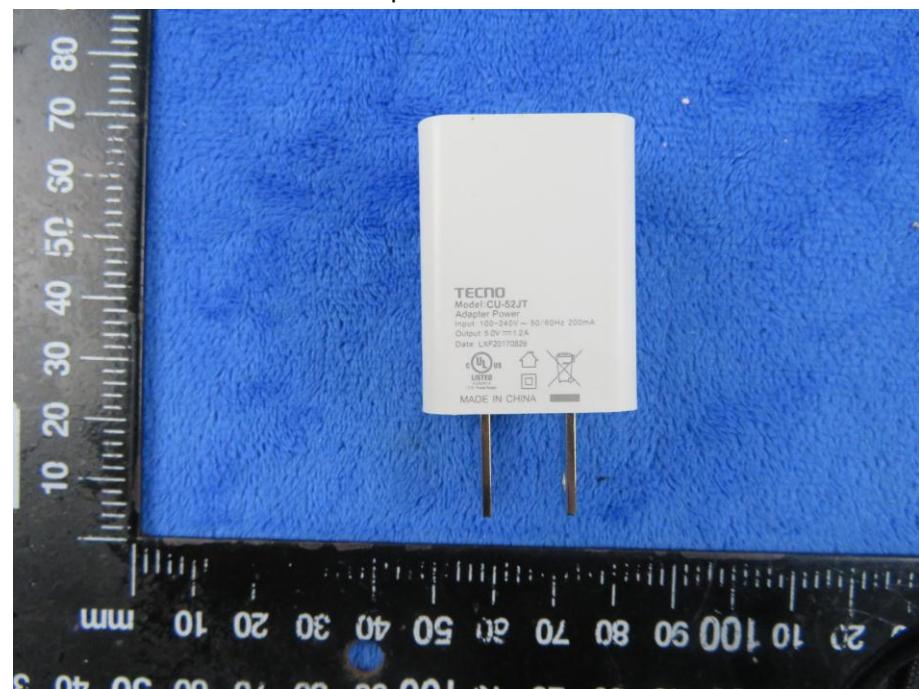
## Annex B. EUT And Test Setup Photographs

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

Whole Package View



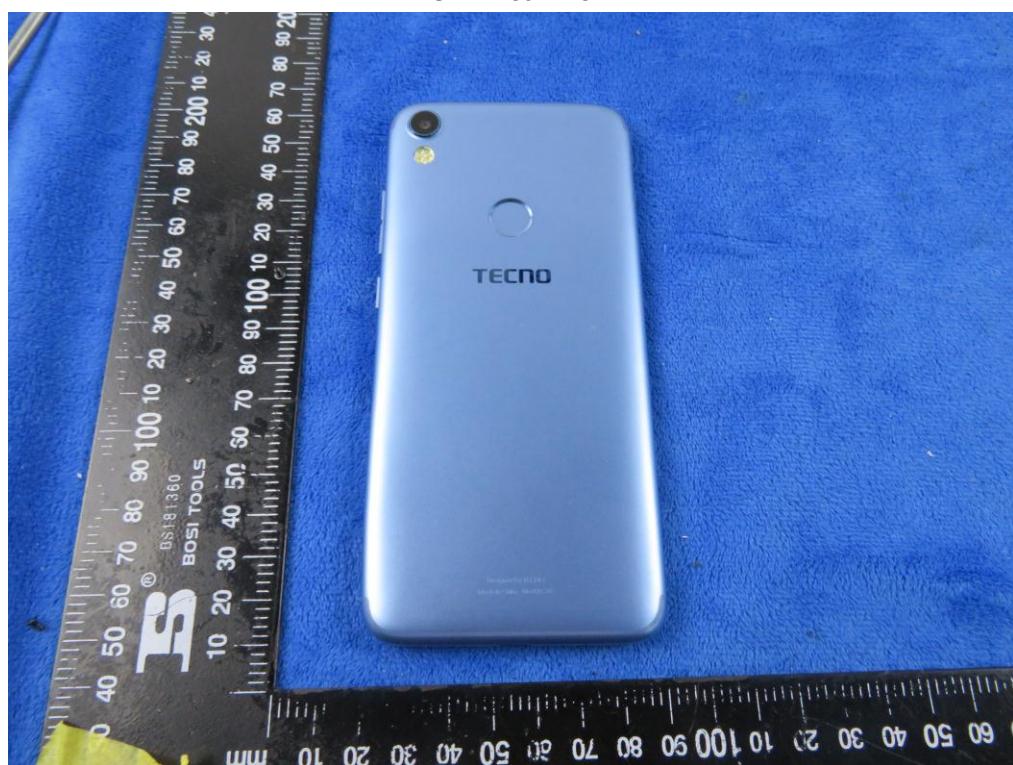
Adapter - Lable View



EUT - Front View



EUT - Rear View



EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View

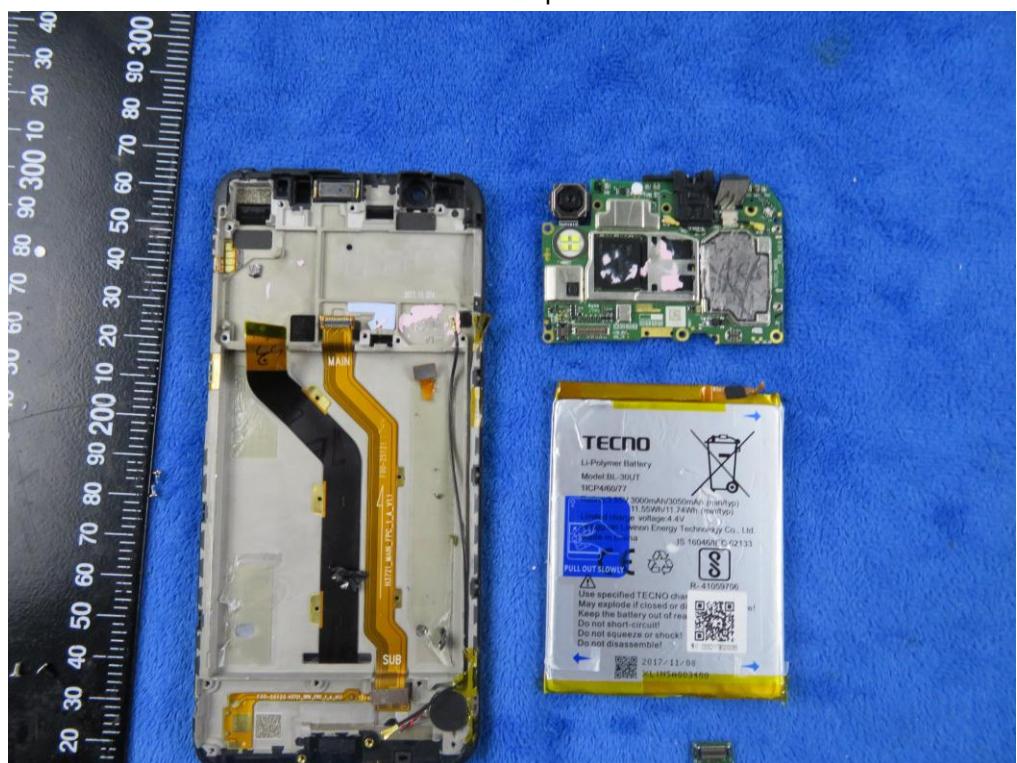


### Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1



Cover Off - Top View 2



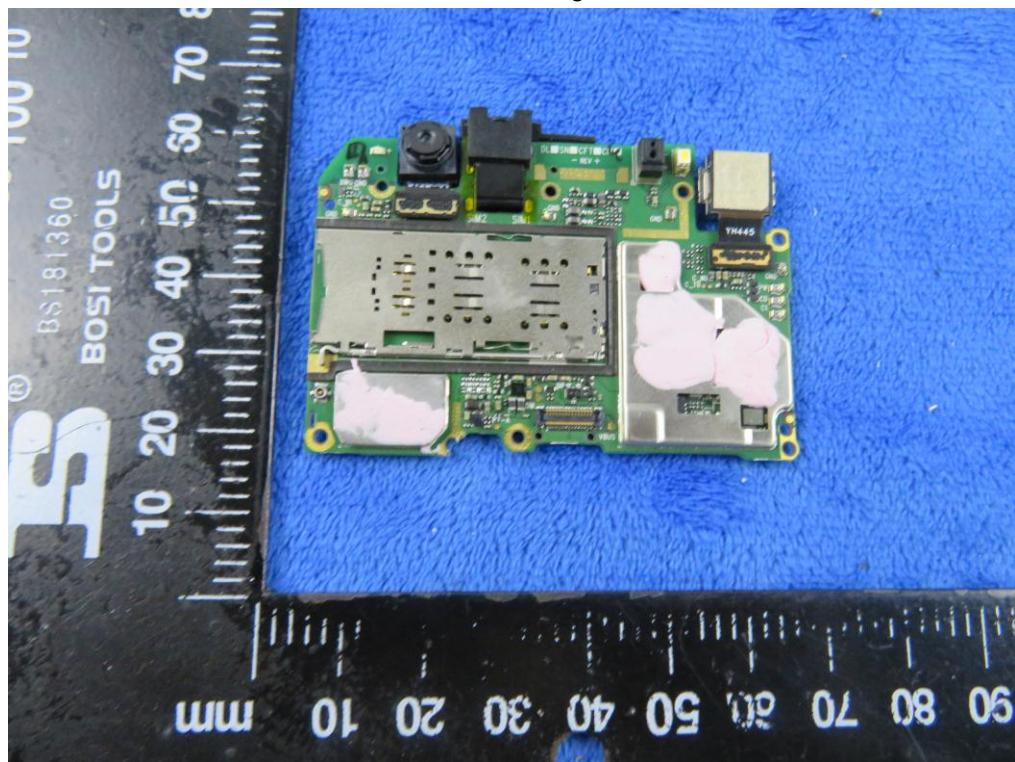
Battery - Front View



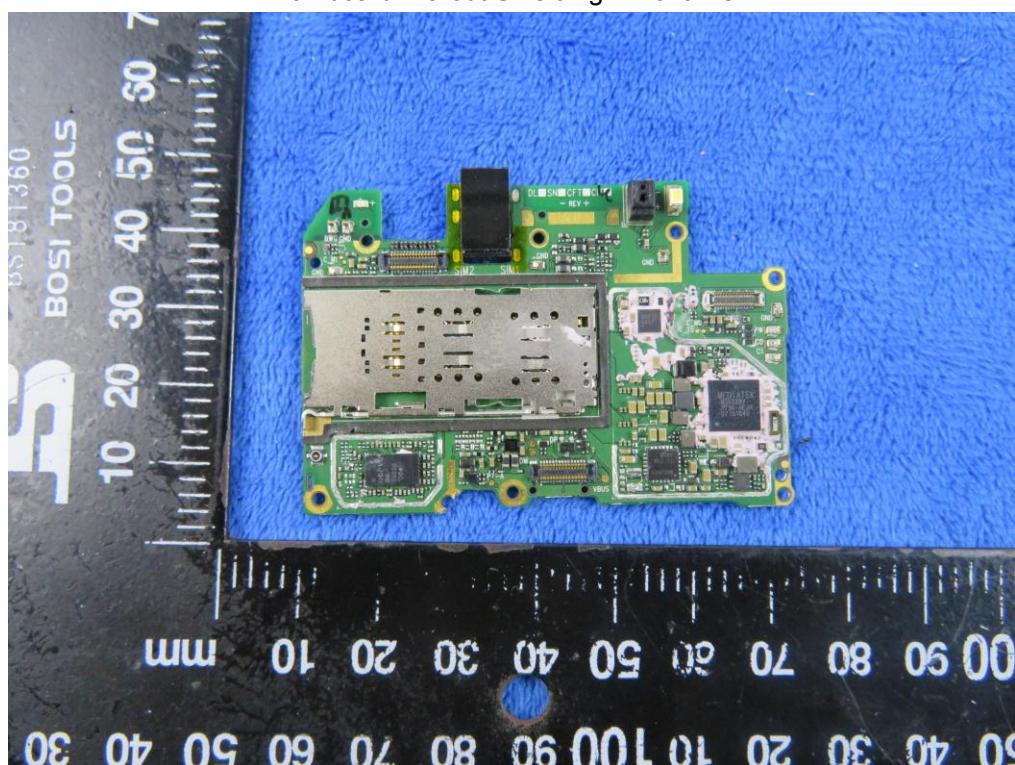
Battery - Rear View



Mainboard with Shielding - Front View



Mainboard without Shielding - Front View



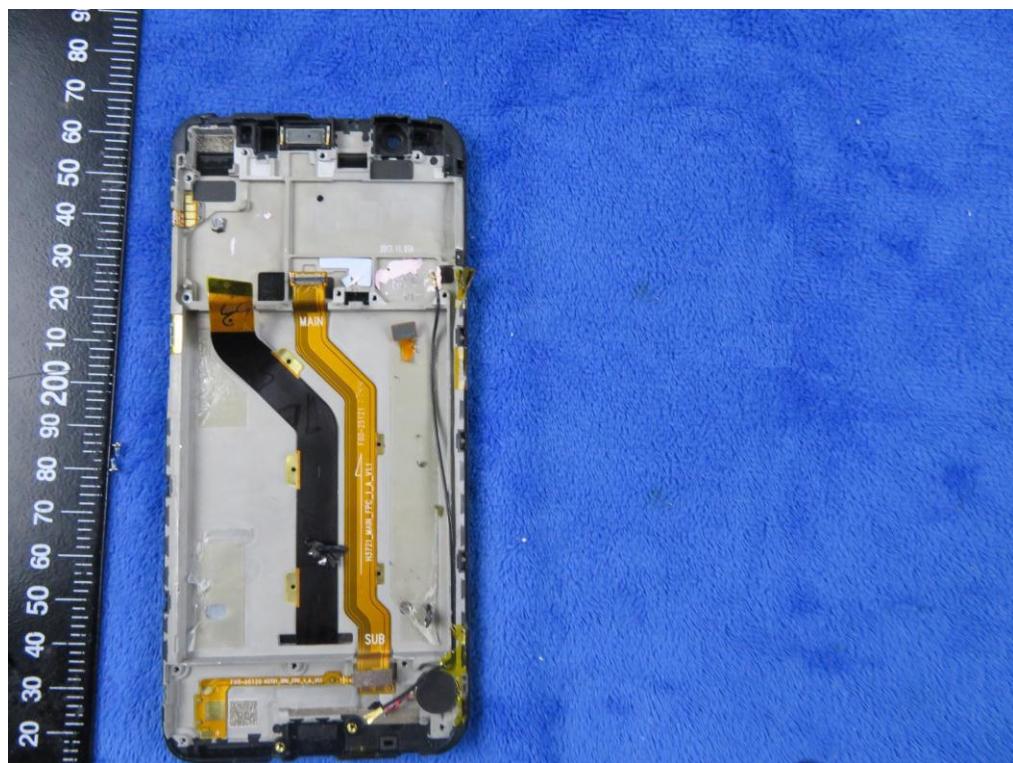
Mainboard – Rear View



LCD – Front View



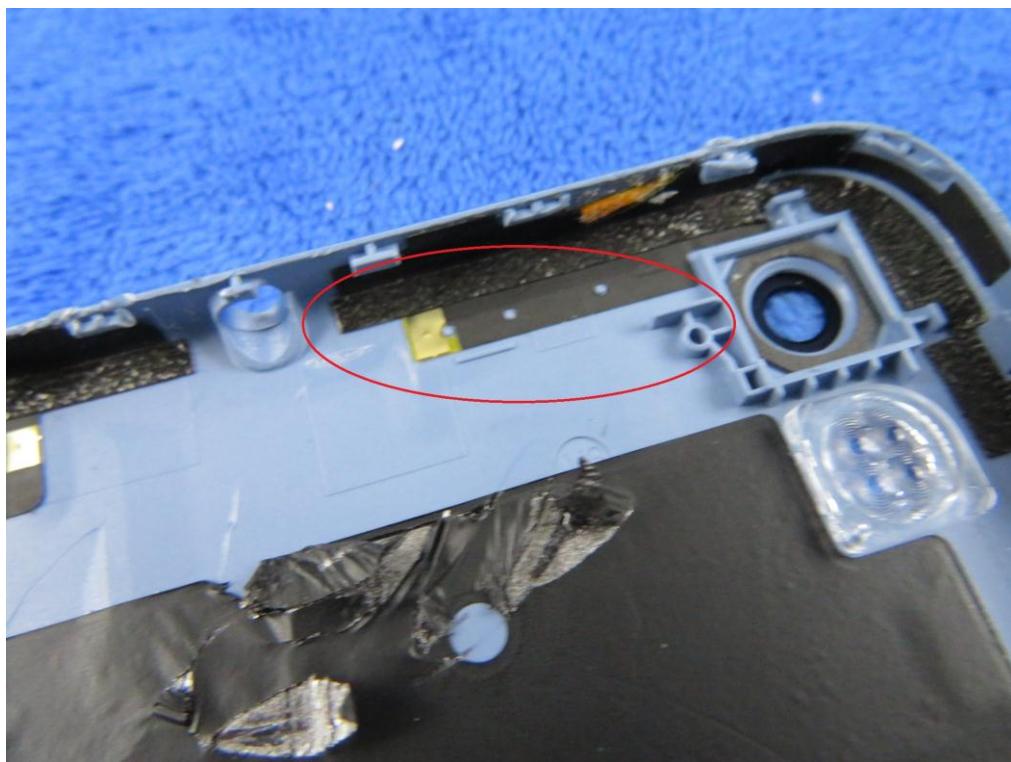
LCD – Rear View



GSM/PCS/UMTS-FDD/LTE Antenna View



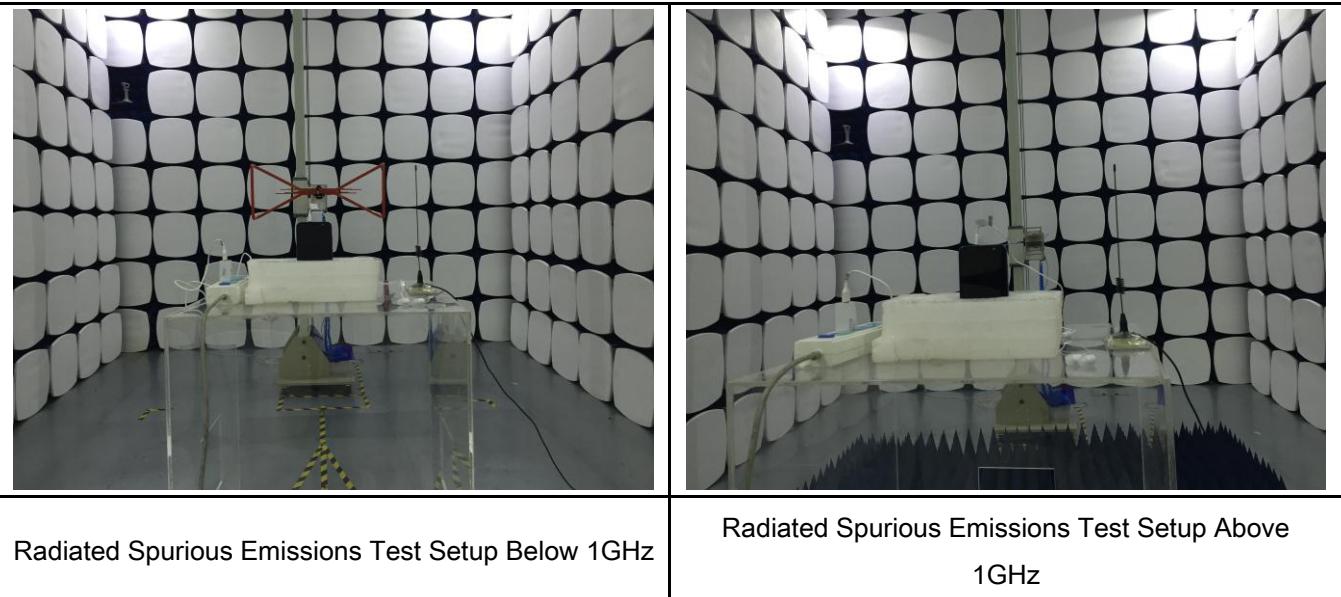
WIFI/BT/BLE/GPS - Antenna View



RXD- Antenna View



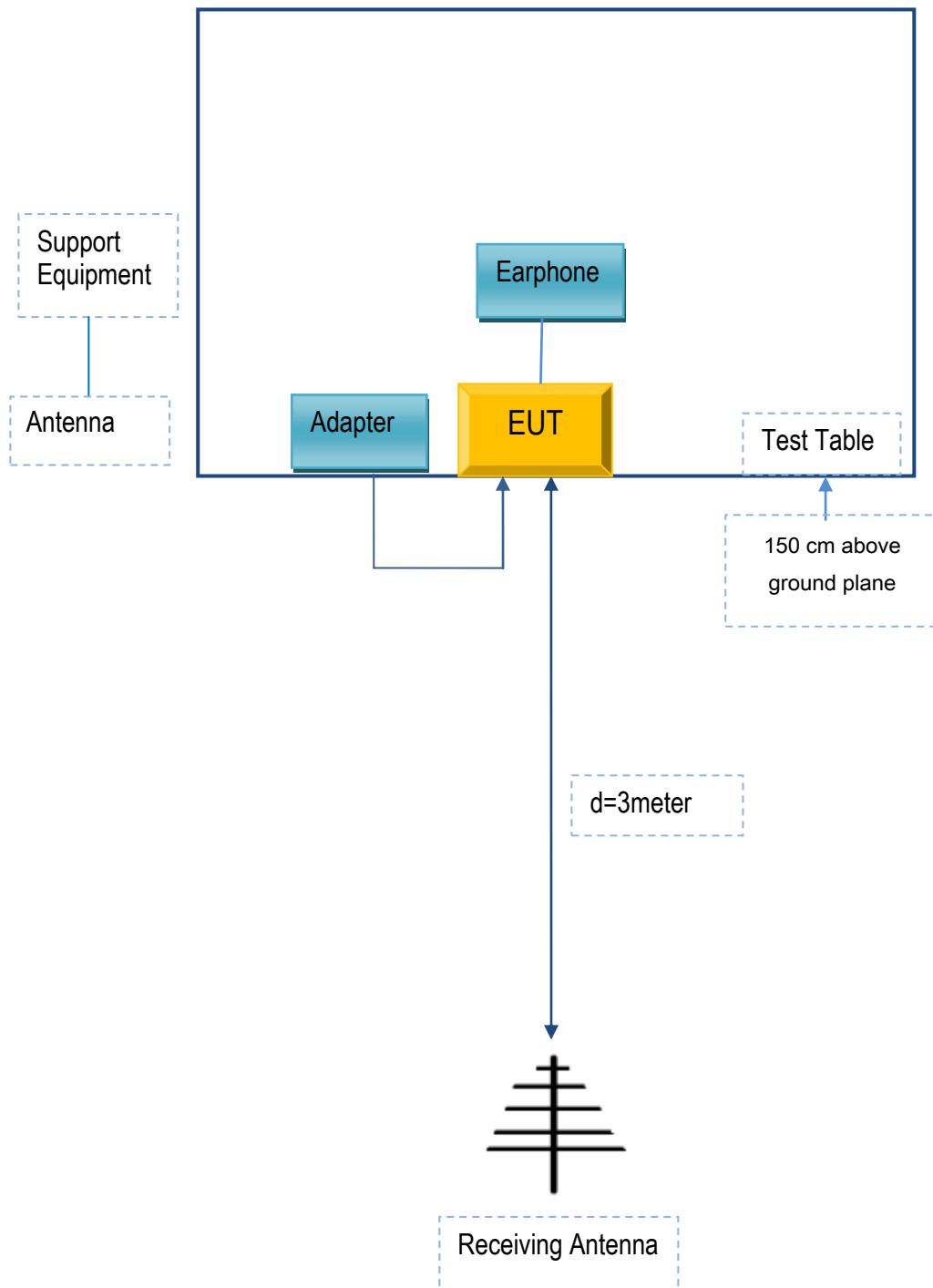
Annex B.iii. Photograph: Test Setup Photo



## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### Annex C.ii. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



## Annex C. ii. 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
TECNO MOBILE LIMITED	Adapter	CU-52JT	N/A
TECNO MOBILE LIMITED	Earphone	CA6	N/A

### Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	N/A

## Annex C.ii. EUT OPERATING CONDITIONS

N/A

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

Please see the attachment

## Annex E. DECLARATION OF SIMILARITY

N/A