# RF TEST REPORT

Report No.: 17070963-FCC-R1

Supersede Report No.: N/A

| | |
|---|---|
| Applicant | BLU Products, Inc. |
| Product Name | Mobile Phone |
| Model No. | R2 PLUS |
| Serial No. | N/A |
| Test Standard | FCC Part 22(H):2016 ;FCC Part 24(E):2016; FCC Part 27:2016; ANSI/TIA-603-D: 2010 |
| Test Date | October 17 to November 05, 2017 |
| Issue Date | November 06, 2017 |
| Test Result | ☑ Pass ☐ Fail |
| Equipment complied with the specification | ☑ |
| Equipment did not comply with the specification | ☐ |

| | | |
|---|---|---|
| Loren Luo | David Huang | |
| Loren Luo<br>Test Engineer | David Huang<br>Checked By | |

This test report may be reproduced in full only

Test result presented in this test report is applicable to the tested sample only


Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

# Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

## Accreditations for Conformity Assessment

| Country/Region | Scope |
|---|---|
| USA | EMC, RF/Wireless, SAR, Telecom |
| Canada | EMC, RF/Wireless, SAR, Telecom |
| Taiwan | EMC, RF, Telecom, SAR, Safety |
| Hong Kong | RF/Wireless, SAR, Telecom |
| Australia | EMC, RF, Telecom, SAR, Safety |
| Korea | EMI, EMS, RF, SAR, Telecom, Safety |
| Japan | EMI, RF/Wireless, SAR, Telecom |
| Singapore | EMC, RF, SAR, Telecom |
| Europe | EMC, RF, SAR, Telecom, Safety |

This page has been left blank intentionally.

# CONTENTS

1. REPORT REVISION HISTORY ..... 5

2. CUSTOMER INFORMATION ..... 5

3. TEST SITE INFORMATION ..... 5

4. EQUIPMENT UNDER TEST (EUT) INFORMATION ..... 6

5. TEST SUMMARY ..... 10

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS ..... 11

6.1 RF EXPOSURE (SAR) ..... 11

6.2 RF OUTPUT POWER ..... 12

6.3 PEAK-AVERAGE RATIO ..... 25

6.4 OCCUPIED BANDWIDTH ..... 30

6.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS ..... 45

6.6 SPURIOUS RADIATED EMISSIONS ..... 61

6.7 BAND EDGE ..... 68

6.8 FREQUENCY STABILITY ..... 82

ANNEX A. TEST INSTRUMENT ..... 87

ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS ..... 89

ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT ..... 101

ANNEX C.II. EUT OPERATING CONKITIONS ..... 103

ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST ..... 104

ANNEX E. DECLARATION OF SIMILARITY ..... 105

# 1. Report Revision History

| Report No. | Report Version | Description | Issue Date |
| --- | --- | --- | --- |
| 17070963-FCC-R1 | NONE | Original | November 06, 2017 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# 2. Customer information

| | |
| --- | --- |
| Applicant Name | BLU Products, Inc. |
| Applicant Add | 10814 NW 33rd St # 100 Doral, FL 33172 |
| Manufacturer | BLU Products, Inc. |
| Manufacturer Add | 10814 NW 33rd St # 100 Doral, FL 33172 |

# 3. Test site information

Test Lab A:

| | |
| --- | --- |
| Lab performing tests | SIEMIC (Shenzhen-China) LABORATORIES |
| Lab Address | Zone A, Floor 1, Building 2 Wan Ye Long Technology Park<br>South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108 |
| FCC Test Site No. | 535293 |
| IC Test Site No. | 4842E-1 |
| Test Software | Radiated Emission Program-To Shenzhen v2.0 |

Test Lab B:

| | |
| --- | --- |
| Lab performing tests | SIEMIC (Nanjing-China) Laboratories |
| Lab Address | 2-1 Longcang Avenue Yuhua Economic and<br>Technology Development Park, Nanjing, China |
| FCC Test Site No. | 694825 |
| IC Test Site No. | 4842B-1 |
| Test Software | EZ_EMC(ver.lcp-03A1) |

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

# 4. Equipment under Test (EUT) Information

| | |
| --- | --- |
| Description of EUT: | Mobile Phone |
| Main Model: | R2 PLUS |
| Serial Model: | N/A |
| Date EUT received: | October 16, 2017 |
| Test Date(s): | October 17 to November 05, 2017 |
| Equipment Category : | PCE |
| Antenna Gain: | GSM850: -2.8dBi<br>PCS1900: -2.3dBi<br>UMTS-FDD Band V: -2.5dBi<br>UMTS-FDD Band IV: -2.5dBi<br>UMTS-FDD Band II: -2.5dBi<br>LTE Band II: -2.8dBi<br>LTE Band IV: -2.4dBi<br>LTE Band VII: -2.5dBi<br>LTE Band XII: -2.8dBi<br>LTE Band XVII: -3.0dBi<br>Bluetooth/BLE: -2.7dBi<br>WIFI: -3.0dBi<br>GPS: -2.9dBi |
| Antenna Type: | PIFA antenna |
| Type of Modulation: | GSM / GPRS: GMSK<br>EGPRS: GMSK,8PSK<br>UMTS-FDD: QPSK<br>LTE Band: QPSK, 16QAM<br>802.11b/g/n: DSSS, OFDM<br>Bluetooth: GFSK, π /4DQPSK, 8DPSK<br>BLE: GFSK<br>GPS:BPSK |

| | |
| --- | --- |
| RF Operating Frequency (ies): | GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz<br>PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz<br>UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz<br>UMTS-FDD Band IV TX:1712.4 ~ 1752.6 MHz;<br>RX : 2112.4 ~ 2152.6 MHz<br>UMTS-FDD Band II TX:1852.4 ~ 1907.6 MHz;<br>RX: 1932.4 ~ 1987.6 MHz<br>LTE Band II TX: 1850.7 ~ 1909.3MHz; RX : 1930.7 ~ 1989.3 MHz<br>LTE Band IV TX: 1710.7 ~ 1754.3 MHz; RX : 2110.7~ 2154.3 MHz<br>LTE Band VII TX: 2502.5 ~ 2567.5 MHz; RX : 2622.5 ~ 2687.5 MHz<br>LTE Band XII TX:699.7 ~ 715.3 MHz; RX : 729.7~ 745.3MHz<br>LTE Band XVII TX: 706.5 ~ 713.5 MHz; RX : 736.5 ~ 743.5 MHz<br>WIFI: 802.11b/g/n(20M): 2412-2462 MHz<br>WIFI: 802.11n(40M): 2422-2452 MHz<br>Bluetooth& BLE: 2402-2480 MHz<br>GPS: 1575.42 MHz |
| Maximum Conducted AV Power to Antenna: | GSM Vioce:GSM850: 31.46 dBm<br>PCS1900: 28.23 dBm<br>GPRS:GSM850: 31.46 dBm<br>PCS1900: 28.30 dBm<br>EGPRS(MCS1):GSM850: 31.45 dBm<br>PCS1900: 28.29 dBm<br>RMC:UMTS-FDD Band V: 21.94 dBm<br>UMTS-FDD Band II: 21.33 dBm<br>UMTS-FDD Band IV: 21.98 dBm<br>HSDPA:UMTS-FDD Band V: 21.41 dBm<br>UMTS-FDD Band II: 20.82 dBm<br>UMTS-FDD Band IV: 21.42 dBm<br>HSUPA:UMTS-FDD Band V: 21.25 dBm<br>UMTS-FDD Band II: 20.78 dBm<br>UMTS-FDD Band IV: 21.46 dBm |

| | |
| --- | --- |
| ERP/EIRP: | GSM Vioce:GSM850: 26.51 dBm / ERP<br>PCS1900: 25.93 dBm / EIRP<br>GPRS:GSM850: 26.51 dBm / ERP<br>PCS1900: 26.00 dBm / EIRP<br>EGPRS(MCS1):GSM850: 26.50 dBm / ERP<br>PCS1900: 25.99 dBm / EIRP<br>RMC:UMTS-FDD Band V: 17.29 dBm / ERP<br>UMTS-FDD Band II: 18.83 dBm / EIRP<br>UMTS-FDD Band IV: 19.48 dBm / EIRP<br>HSDPA:UMTS-FDD Band V: 16.76 dBm / ERP<br>UMTS-FDD Band II: 18.32 dBm / EIRP<br>UMTS-FDD Band IV: 18.87 dBm / EIRP<br>HSUPA:UMTS-FDD Band V: 16.60 dBm / ERP<br>UMTS-FDD Band II: 18.28 dBm / EIRP<br>UMTS-FDD Band IV: 18.76 dBm / EIRP |
| Number of Channels: | GSM 850: 124CH<br>PCS1900: 299CH<br>UMTS-FDD Band V: 102CH<br>UMTS-FDD Band IV: 202CH<br>UMTS-FDD Band II: 277CH<br>WIFI :802.11b/g/n(20M): 11CH<br>WIFI :802.11n(40M): 7CH<br>Bluetooth: 79CH<br>BLE: 40CH<br>GPS:1CH |
| Port: | USB Port, Earphone Port |
| Input Power: | Adapter:<br>Model: US-WT-1500<br>Input: AC100-240V~50/60Hz,0.3A<br>Output: DC 5V~1.5A<br>Battery:<br>Model: C716041300P<br>Spec: 3.8V, 3000mAh, 11.4Wh |
| Trade Name : | BLU |

GPRS/EGPRS Multi-slot class 8/10/11/12

FCC ID: YHLBLUR2PLUS

## 5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

| FCC Rules | Description of Test | Result |
|---|---|---|
| § 1.1307; § 2.1093 | RF Exposure (SAR) | Compliance |
| §2.1046; § 22.913(a); § 24.232(c); § 27.50(c.10) ; § 27.50(d.4) | RF Output Power | Compliance |
| § 24.232 (d) ; § 27.50(d) | Peak-Average Ratio | Compliance |
| § 2.1049; § 22.905; § 22.917; § 24.238; § 27.53(a.5) | 99% & -26 dB Occupied Bandwidth | Compliance |
| § 2.1051; § 22.917(a); § 24.238(a); § 27.53(h) | Spurious Emissions at Antenna Terminal | Compliance |
| § 2.1053; § 22.917(a); § 24.238(a); § 27.53(h) | Field Strength of Spurious Radiation | Compliance |
| § 22.917(a); § 24.238(a); § 27.53(h) | Out of band emission, Band Edge | Compliance |
| § 2.1055; § 22.355; § 24.235; § 27.5(h); § 27.54 | Frequency stability vs. temperature<br>Frequency stability vs. voltage | Compliance |

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

**Measurement Uncertainty**

| Emissions | | |
|---|---|---|
| **Test Item** | **Description** | **Uncertainty** |
| Band Edge and Radiated Spurious Emissions | Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m) | +5.6dB/-4.5dB |
| - | - | - |

# 6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

## 6.1 RF Exposure (SAR)

Test Result: Pass

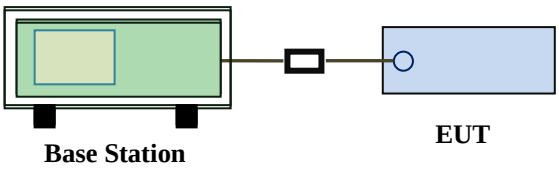
The EUT is a portable device, thus requires SAR evaluation;

Please refer to RF Exposure Evaluation Report: 17070963-FCC-H.

## 6.2 RF Output Power

| | |
|---|---|
| Temperature | 25 °C |
| Relative Humidity | 53% |
| Atmospheric Pressure | 1005mbar |
| Test date : | November 01, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §22.913 (a) | a) | ERP:38.45dBm | ☑ |
| §24.232 (c) | b) | EIRP:33dBm | ☑ |
| §27.50 (c) | c) | EIRP: 30dBm | ☑ |
| Test Setup |   | | |
| Test Procedure | For Conducted Power:<br>- The transmitter output port was connected to base station.<br>- Set EUT at maximum power through base station.<br>- Select lowest, middle, and highest channels for each band and different test mode.<br>For ERP/EIRP:<br>According with KDB 971168 v02r02<br>- 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>- 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>- The frequency range up to tenth harmonic of the fundamental | | |

| | |
| --- | --- |
| | frequency was investigated.<br>- 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>- Spurious emissions in dB = 10 log (TX power in Watts/0.001) – the absolute level<br>- Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts. |
| Remark | |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

## Conducted Power

# GSM Mode:

| Burst Average Power (dBm); | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Band | GSM850 | | | | PCS1900 | | | |
| Channel | 128 | 190 | 251 | Tune up Power tolerant | 512 | 661 | 810 | Tune up Power tolerant |
| Frequency (MHz) | 824.2 | 836.6 | 848.8 | / | 1850.2 | 1880 | 1909.8 | / |
| GSM Voice (1 uplink),GMSK | 31.25 | 31.29 | **31.46** | 31±1 | 28.22 | 28.04 | **28.23** | 28±1 |
| GPRS Multi-Slot Class 8 (1 uplink),GMSK | 31.26 | 31.29 | **31.46** | 31±1 | 28.25 | 28.03 | **28.3** | 28±1 |
| GPRS Multi-Slot Class 10 (2 uplink),GMSK | 30.89 | 30.9 | 31.05 | 31±1 | 27.96 | 27.66 | 27.94 | 28±1 |
| GPRS Multi-Slot Class 11 (3 uplink) GMSK | 29.55 | 29.54 | 29.71 | 30±1 | 26.6 | 26.32 | 26.63 | 26±1 |
| GPRS Multi-Slot Class 12 (4 uplink) GMSK | 28.46 | 28.45 | 28.63 | 28±1 | 25.53 | 25.26 | 25.58 | 25±1 |
| EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS1 | 31.25 | 31.29 | **31.45** | 31±1 | **28.29** | 28 | 28.29 | 28±1 |
| EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS1 | 30.89 | 30.9 | 31.06 | 31±1 | 27.94 | 27.63 | 27.9 | 28±1 |
| EGPRS Multi-Slot Class 11 (3 uplink) GMSK MCS1 | 29.54 | 29.54 | 29.71 | 30±1 | 26.59 | 26.32 | 26.62 | 26±1 |
| EGPRS Multi-Slot Class 12 (4 uplink) GMSK MCS1 | 28.45 | 28.46 | 28.63 | 28±1 | 25.53 | 25.26 | 25.57 | 25±1 |
| Remark :<br>GPRS, CS1 coding scheme.<br>EGPRS, MCS1 coding scheme. | | | | | | | | |

| |
|---|
| Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link |
| Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link |
| Multi-Slot Class 11 , Support Max 4 downlink, 2 uplink , 5 working link |
| Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link |

# UMTS Mode:

## UMTS-FDD Band V

| Band/ Time Slot configuration | Channel | Frequency | Average power (dBm) | Tune up Power tolerant |
| --- | --- | --- | --- | --- |
| RMC 12.2kbps | 4132 | 826.4 | 21.78 | 22±1 |
| | 4175 | 835 | 21.69 | 22±1 |
| | 4233 | 846.6 | **21.94** | 22±1 |
| HSDPA Subtest1 | 4132 | 826.4 | 21.01 | 21.3±1 |
| | 4175 | 835 | 21.08 | 21.3±1 |
| | 4233 | 846.6 | 21.28 | 21.3±1 |
| HSDPA Subtest2 | 4132 | 826.4 | 21.2 | 21.3±1 |
| | 4175 | 835 | 21.19 | 21.3±1 |
| | 4233 | 846.6 | **21.41** | 21.3±1 |
| HSDPA Subtest3 | 4132 | 826.4 | 21.16 | 21.3±1 |
| | 4175 | 835 | 20.91 | 21.3±1 |
| | 4233 | 846.6 | 21.19 | 21.3±1 |
| HSDPA Subtest4 | 4132 | 826.4 | 21.13 | 21.3±1 |
| | 4175 | 835 | 21.09 | 21.3±1 |
| | 4233 | 846.6 | 21.37 | 21.3±1 |
| HSUPA Subtest1 | 4132 | 826.4 | 20.99 | 21.3±1 |
| | 4175 | 835 | 21.05 | 21.3±1 |
| | 4233 | 846.6 | 21.15 | 21.3±1 |
| HSUPA Subtest2 | 4132 | 826.4 | 21.01 | 21.3±1 |
| | 4175 | 835 | 20.91 | 21.3±1 |
| | 4233 | 846.6 | 21.14 | 21.3±1 |
| HSUPA Subtest3 | 4132 | 826.4 | 21.12 | 21.3±1 |
| | 4175 | 835 | 21.07 | 21.3±1 |
| | 4233 | 846.6 | 21.15 | 21.3±1 |
| HSUPA Subtest4 | 4132 | 826.4 | 20.93 | 21.3±1 |
| | 4175 | 835 | 20.94 | 21.3±1 |
| | 4233 | 846.6 | 21.04 | 21.3±1 |
| HSUPA Subtest5 | 4132 | 826.4 | **21.25** | 21.3±1 |
| | 4175 | 835 | 21.08 | 21.3±1 |
| | 4233 | 846.6 | 21.19 | 21.3±1 |

# UMTS-FDD Band II

| Band/ Time Slot configuration | Channel | Frequency | Average power (dBm) | Tune up Power tolerant |
| --- | --- | --- | --- | --- |
| RMC 12.2kbps | 9262 | 1852.4 | 21.32 | 21.3±1 |
| | 9400 | 1880 | 21.31 | 21.3±1 |
| | 9538 | 1907.6 | **21.33** | 21.3±1 |
| HSDPA Subtest1 | 9262 | 1852.4 | 20.63 | 21.3±1 |
| | 9400 | 1880 | 20.52 | 21.3±1 |
| | 9538 | 1907.6 | 20.63 | 21.3±1 |
| HSDPA Subtest2 | 9262 | 1852.4 | **20.82** | 21.3±1 |
| | 9400 | 1880 | 20.78 | 21.3±1 |
| | 9538 | 1907.6 | 20.71 | 21.3±1 |
| HSDPA Subtest3 | 9262 | 1852.4 | 20.53 | 21.3±1 |
| | 9400 | 1880 | 20.51 | 21.3±1 |
| | 9538 | 1907.6 | 20.67 | 21.3±1 |
| HSDPA Subtest4 | 9262 | 1852.4 | 20.71 | 21.3±1 |
| | 9400 | 1880 | 20.58 | 21.3±1 |
| | 9538 | 1907.6 | 20.62 | 21.3±1 |
| HSUPA Subtest1 | 9262 | 1852.4 | 20.62 | 21.3±1 |
| | 9400 | 1880 | 20.61 | 21.3±1 |
| | 9538 | 1907.6 | 20.56 | 21.3±1 |
| HSUPA Subtest2 | 9262 | 1852.4 | 20.4 | 21.3±1 |
| | 9400 | 1880 | 20.52 | 21.3±1 |
| | 9538 | 1907.6 | 20.47 | 21.3±1 |
| HSUPA Subtest3 | 9262 | 1852.4 | 20.71 | 21.3±1 |
| | 9400 | 1880 | 20.69 | 21.3±1 |
| | 9538 | 1907.6 | 20.73 | 21.3±1 |
| HSUPA Subtest4 | 9262 | 1852.4 | 20.41 | 21.3±1 |
| | 9400 | 1880 | 20.54 | 21.3±1 |
| | 9538 | 1907.6 | 20.56 | 21.3±1 |
| HSUPA Subtest5 | 9262 | 1852.4 | **20.78** | 21.3±1 |
| | 9400 | 1880 | 20.64 | 21.3±1 |
| | 9538 | 1907.6 | 20.61 | 21.3±1 |

# UMTS-FDD Band IV

| Band/ Time Slot configuration | Channel | Frequency | Average power (dBm) | Tune up Power tolerant |
| --- | --- | --- | --- | --- |
| RMC 12.2kbps | 1313 | 1712.6 | 21.78 | 22±1 |
| | 1413 | 1732.6 | **21.98** | 22±1 |
| | 1512 | 1752.4 | 21.8 | 22±1 |
| HSDPA Subtest1 | 1313 | 1712.6 | 21.02 | 21.3±1 |
| | 1413 | 1732.6 | 21.32 | 21.3±1 |
| | 1512 | 1752.4 | 21.04 | 21.3±1 |
| HSDPA Subtest2 | 1313 | 1712.6 | 21.23 | 21.3±1 |
| | 1413 | 1732.6 | 21.37 | 21.3±1 |
| | 1512 | 1752.4 | 21.26 | 21.3±1 |
| HSDPA Subtest3 | 1313 | 1712.6 | 21.15 | 21.3±1 |
| | 1413 | 1732.6 | 21.19 | 21.3±1 |
| | 1512 | 1752.4 | 21.09 | 21.3±1 |
| HSDPA Subtest4 | 1313 | 1712.6 | 21.21 | 21.3±1 |
| | 1413 | 1732.6 | **21.42** | 21.3±1 |
| | 1512 | 1752.4 | 21.23 | 21.3±1 |
| HSUPA Subtest1 | 1313 | 1712.6 | 21.17 | 21.3±1 |
| | 1413 | 1732.6 | 21.37 | 21.3±1 |
| | 1512 | 1752.4 | 21.09 | 21.3±1 |
| HSUPA Subtest2 | 1313 | 1712.6 | 20.92 | 21.3±1 |
| | 1413 | 1732.6 | 21.22 | 21.3±1 |
| | 1512 | 1752.4 | 21.03 | 21.3±1 |
| HSUPA Subtest3 | 1313 | 1712.6 | 21.02 | 21.3±1 |
| | 1413 | 1732.6 | 21.26 | 21.3±1 |
| | 1512 | 1752.4 | 21.13 | 21.3±1 |
| HSUPA Subtest4 | 1313 | 1712.6 | 20.9 | 21.3±1 |
| | 1413 | 1732.6 | 21.28 | 21.3±1 |
| | 1512 | 1752.4 | 20.95 | 21.3±1 |
| HSUPA Subtest5 | 1313 | 1712.6 | 21.06 | 21.3±1 |
| | 1413 | 1732.6 | **21.46** | 21.3±1 |
| | 1512 | 1752.4 | 21.13 | 21.3±1 |

# ERP & EIRP

## GSM Voice

### ERP for Cellular Band (Part 22H)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 824.2 | 20.73 | V | 6.1 | 0.53 | 26.3 | 38.45 |
| 824.2 | 19.8 | H | 6.1 | 0.53 | 25.37 | 38.45 |
| 836.6 | 20.67 | V | 6.2 | 0.53 | 26.34 | 38.45 |
| 836.6 | 19.86 | H | 6.2 | 0.53 | 25.53 | 38.45 |
| 848.8 | 20.84 | V | 6.2 | 0.53 | **26.51** | 38.45 |
| 848.8 | 19.42 | H | 6.2 | 0.53 | 25.09 | 38.45 |

### EIRP for PCS Band (Part 24E)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 1850.2 | 18.76 | V | 7.88 | 0.72 | 25.92 | 33 |
| 1850.2 | 17.53 | H | 7.88 | 0.72 | 24.69 | 33 |
| 1880 | 18.58 | V | 7.88 | 0.72 | 25.74 | 33 |
| 1880 | 17.2 | H | 7.88 | 0.72 | 24.36 | 33 |
| 1909.8 | 18.79 | V | 7.86 | 0.72 | **25.93** | 33 |
| 1909.8 | 17.68 | H | 7.86 | 0.72 | 24.82 | 33 |

GPRS:

## ERP for Cellular Band (Part 22H)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 824.2 | 20.74 | V | 6.1 | 0.53 | 26.31 | 38.45 |
| 824.2 | 18.83 | H | 6.1 | 0.53 | 24.4 | 38.45 |
| 836.6 | 20.67 | V | 6.2 | 0.53 | 26.34 | 38.45 |
| 836.6 | 18.97 | H | 6.2 | 0.53 | 24.64 | 38.45 |
| 848.8 | 20.84 | V | 6.2 | 0.53 | **26.51** | 38.45 |
| 848.8 | 19.63 | H | 6.2 | 0.53 | 25.3 | 38.45 |

## EIRP for PCS Band (Part 24E)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 1850.2 | 18.79 | V | 7.88 | 0.72 | 25.95 | 33 |
| 1850.2 | 17.59 | H | 7.88 | 0.72 | 24.75 | 33 |
| 1880 | 18.57 | V | 7.88 | 0.72 | 25.73 | 33 |
| 1880 | 16.72 | H | 7.88 | 0.72 | 23.88 | 33 |
| 1909.8 | 18.86 | V | 7.86 | 0.72 | **26** | 33 |
| 1909.8 | 18.05 | H | 7.86 | 0.72 | 25.19 | 33 |

## EGPRS (MCS1):

### ERP for Cellular Band (Part 22H)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 824.2 | 20.73 | V | 6.1 | 0.53 | 26.3 | 38.45 |
| 824.2 | 19.95 | H | 6.1 | 0.53 | 25.52 | 38.45 |
| 836.6 | 20.67 | V | 6.2 | 0.53 | 26.34 | 38.45 |
| 836.6 | 19.71 | H | 6.2 | 0.53 | 25.38 | 38.45 |
| 848.8 | 20.83 | V | 6.2 | 0.53 | **26.5** | 38.45 |
| 848.8 | 19.6 | H | 6.2 | 0.53 | 25.27 | 38.45 |

### EIRP for PCS Band (Part 24E)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 1850.2 | 18.83 | V | 7.88 | 0.72 | **25.99** | 33 |
| 1850.2 | 17.94 | H | 7.88 | 0.72 | 25.1 | 33 |
| 1880 | 18.54 | V | 7.88 | 0.72 | 25.7 | 33 |
| 1880 | 17.01 | H | 7.88 | 0.72 | 24.17 | 33 |
| 1909.8 | 18.85 | V | 7.86 | 0.72 | 25.99 | 33 |
| 1909.8 | 17 | H | 7.86 | 0.72 | 24.14 | 33 |

RMC

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

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|
| 826.4 | 11.56 | V | 6.1 | 0.53 | 17.13 | 38.45 |
| 826.4 | 10.23 | H | 6.1 | 0.53 | 15.8 | 38.45 |
| 835 | 11.37 | V | 6.2 | 0.53 | 17.04 | 38.45 |
| 835 | 10.38 | H | 6.2 | 0.53 | 16.05 | 38.45 |
| 846.6 | 11.62 | V | 6.2 | 0.53 | **17.29** | 38.45 |
| 846.6 | 10.58 | H | 6.2 | 0.53 | 16.25 | 38.45 |

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

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|
| 1852.4 | 11.66 | V | 7.88 | 0.72 | 18.82 | 33 |
| 1852.4 | 10.54 | H | 7.88 | 0.72 | 17.7 | 33 |
| 1880 | 11.65 | V | 7.88 | 0.72 | 18.81 | 33 |
| 1880 | 10.49 | H | 7.88 | 0.72 | 17.65 | 33 |
| 1907.6 | 11.69 | V | 7.86 | 0.72 | **18.83** | 33 |
| 1907.6 | 10.74 | H | 7.86 | 0.72 | 17.88 | 33 |

## EIRP for UMTS-FDD Band IV (Part 27H)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
|---|---|---|---|---|---|---|
| 1712.4 | 12.02 | V | 7.95 | 0.69 | 19.28 | 30 |
| 1712.4 | 11.09 | H | 7.95 | 0.69 | 18.35 | 30 |
| 1740 | 12.24 | V | 7.93 | 0.69 | **19.48** | 30 |
| 1740 | 11.21 | H | 7.93 | 0.69 | 18.45 | 30 |
| 1752.6 | 12.07 | V | 7.92 | 0.69 | 19.3 | 30 |
| 1752.6 | 10.21 | H | 7.92 | 0.69 | 17.44 | 30 |

## HSDPA

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

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 826.4 | 10.98 | V | 6.1 | 0.53 | 16.55 | 38.45 |
| 826.4 | 9.31 | H | 6.1 | 0.53 | 14.88 | 38.45 |
| 835 | 10.87 | V | 6.2 | 0.53 | 16.54 | 38.45 |
| 835 | 8.89 | H | 6.2 | 0.53 | 14.56 | 38.45 |
| 846.6 | 11.09 | V | 6.2 | 0.53 | **16.76** | 38.45 |
| 846.6 | 10.27 | H | 6.2 | 0.53 | 15.94 | 38.45 |

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

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 1852.4 | 11.16 | V | 7.88 | 0.72 | **18.32** | 33 |
| 1852.4 | 9.92 | H | 7.88 | 0.72 | 17.08 | 33 |
| 1880 | 11.12 | V | 7.88 | 0.72 | 18.28 | 33 |
| 1880 | 10.25 | H | 7.88 | 0.72 | 17.41 | 33 |
| 1907.6 | 11.07 | V | 7.86 | 0.72 | 18.21 | 33 |
| 1907.6 | 9.48 | H | 7.86 | 0.72 | 16.62 | 33 |

### EIRP for UMTS-FDD Band IV (Part 27H)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 1712.4 | 11.47 | V | 7.95 | 0.69 | 18.73 | 30 |
| 1712.4 | 10.39 | H | 7.95 | 0.69 | 17.65 | 30 |
| 1740 | 11.63 | V | 7.93 | 0.69 | **18.87** | 30 |
| 1740 | 10.35 | H | 7.93 | 0.69 | 17.59 | 30 |
| 1752.6 | 11.53 | V | 7.92 | 0.69 | 18.76 | 30 |
| 1752.6 | 10.35 | H | 7.92 | 0.69 | 17.58 | 30 |

## HSUPA

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

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 826.4 | 11.03 | V | 6.1 | 0.53 | **16.6** | 38.45 |
| 826.4 | 9.07 | H | 6.1 | 0.53 | 14.64 | 38.45 |
| 835 | 10.76 | V | 6.2 | 0.53 | 16.43 | 38.45 |
| 835 | 10.06 | H | 6.2 | 0.53 | 15.73 | 38.45 |
| 846.6 | 10.87 | V | 6.2 | 0.53 | 16.54 | 38.45 |
| 846.6 | 9.77 | H | 6.2 | 0.53 | 15.44 | 38.45 |

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

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 1852.4 | 11.12 | V | 7.88 | 0.72 | **18.28** | 33 |
| 1852.4 | 10.1 | H | 7.88 | 0.72 | 17.26 | 33 |
| 1880 | 11.03 | V | 7.88 | 0.72 | 18.19 | 33 |
| 1880 | 9.82 | H | 7.88 | 0.72 | 16.98 | 33 |
| 1907.6 | 11.09 | V | 7.86 | 0.72 | 18.23 | 33 |
| 1907.6 | 9.62 | H | 7.86 | 0.72 | 16.76 | 33 |

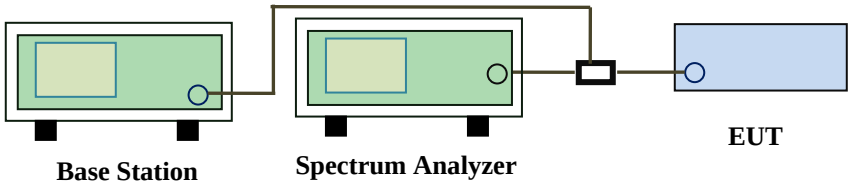
### EIRP for UMTS-FDD Band IV (Part 27H)

| Frequency (MHz) | Substituted level (dBm) | Antenna Polarization | Antenna Gain correction (dBi) | Cable Loss (dB) | Absolute Level (dBm) | Limit (dBm) |
| --- | --- | --- | --- | --- | --- | --- |
| 1712.4 | 11.41 | V | 7.95 | 0.69 | 18.67 | 30 |
| 1712.4 | 9.8 | H | 7.95 | 0.69 | 17.06 | 30 |
| 1740 | 11.52 | V | 7.93 | 0.69 | **18.76** | 30 |
| 1740 | 10.23 | H | 7.93 | 0.69 | 17.47 | 30 |
| 1752.6 | 11.4 | V | 7.92 | 0.69 | 18.63 | 30 |
| 1752.6 | 10.52 | H | 7.92 | 0.69 | 17.75 | 30 |

## 6.3 Peak-Average Ratio

| | |
|---|---|
| Temperature | 25 °C |
| Relative Humidity | 53% |
| Atmospheric Pressure | 1005mbar |
| Test date : | November 01, 2017 |
| Tested By : | Loren Luo |

Requirement(s):

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §24.232(d)<br>§ 27.50(d) | a) | The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB. | ☑ |
| Test Setup |  | | |
| Test Procedure | According with KDB 971168 v02r02<br><br>5.7.2 Alternate procedure for PAPR<br><br>5.1.2 Peak power measurements with a peak power meter<br><br>The total peak output power may be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector.<br><br>5.2.3 Average power measurement with average power meter<br><br>As an alternative to the use of a spectrum/signal analyzer or EMI receiver to perform a measurement of the total in-band average output power, a wideband RF average power meter with a thermocouple detector or equivalent can be used under certain conditions<br>If the EUT can be configured to transmit continuously (i.e., the burst duty cycle ≥ 98%) and at all times the EUT is transmitting at is maximum output | | |

| | |
| --- | --- |
| | power level, then a conventional wide-band RF power meter can be used.<br>If the EUT cannot be configured to transmit continuously (i.e., the burst duty cycle < 98%), then there are two options for the use of an average power meter. First, a gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only over active transmission bursts at maximum output power levels. A conventional average power meter can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to 10log(1/duty cycle) |
| Remark | |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

GSM : GSM 1900 PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1850.2 | 29.56 | 28.22 | 1.34 |
| 1880 | 29.66 | 28.04 | 1.62 |
| 1909.8 | 29.48 | 28.23 | 1.25 |

GPRS 1900 PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1850.2 | 29.52 | 28.25 | 1.27 |
| 1880 | 29.44 | 28.03 | 1.41 |
| 1909.8 | 29.36 | 28.3 | 1.06 |

EGPRS (MSC5) 1900 PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1850.2 | 29.47 | 29.29 | 0.18 |
| 1880 | 29.33 | 28 | 1.33 |
| 1909.8 | 29.51 | 28.29 | 1.22 |

RMC ：UMTS-FDD Band II PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1852.4 | 23.22 | 21.32 | 1.9 |
| 1880 | 23.45 | 21.31 | 2.14 |
| 1907.6 | 23.19 | 21.33 | 1.86 |

UMTS-FDD Band IV PK-AV POWER (PART 27H)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1712.6 | 24.22 | 21.78 | 2.44 |
| 1732.6 | 24.19 | 21.98 | 2.21 |
| 1752.4 | 24.32 | 21.8 | 2.52 |

HSUPA ：UMTS-FDD Band II PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1852.4 | 22.52 | 20.62 | 1.9 |
| 1880 | 22.41 | 20.61 | 1.8 |
| 1907.6 | 22.33 | 20.56 | 1.77 |

UMTS-FDD Band IV PK-AV POWER (PART 27H)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1712.6 | 23.62 | 20.99 | 2.63 |
| 1732.6 | 23.51 | 21.05 | 2.46 |
| 1752.4 | 23.44 | 21.15 | 2.29 |

HSDPA ：UMTS-FDD Band II PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1852.4 | 22.52 | 20.63 | 1.89 |
| 1880 | 22.48 | 20.52 | 1.96 |
| 1907.6 | 22.13 | 20.63 | 1.5 |

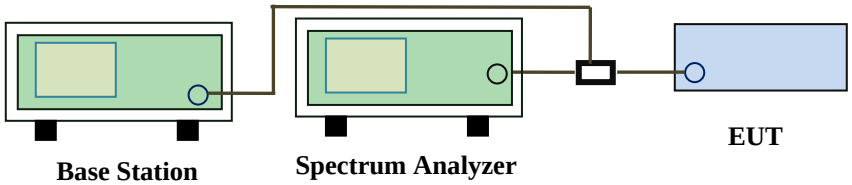
UMTS-FDD Band IV PK-AV POWER (PART 27H)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
| --- | --- | --- | --- |
| | Peak | Average | |
| 1712.6 | 24.22 | 21.01 | 3.21 |
| 1732.6 | 24.15 | 21.08 | 3.07 |
| 1752.4 | 24.32 | 21.28 | 3.04 |

## 6.4 Occupied Bandwidth

| | |
|---|---|
| Temperature | 22 °C |
| Relative Humidity | 53% |
| Atmospheric Pressure | 1008mbar |
| Test date : | November 02, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1049, §22.917, §22.905 §24.238 §27.53(a) | a) | 99% Occupied Bandwidth(kHz) | ☑ |
| | b) | 26 dB Bandwidth(kHz) | ☑ |
| Test Setup |   | | |
| Test Procedure | - The EUT was connected to Spectrum Analyzer and Base Station via power divider.<br>- The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

GSM Voice:

Cellular Band (Part 22H) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 128 | 824.2 | 241.9681 | 320.578 |
| 190 | 836.6 | 246.1273 | 321.425 |
| 251 | 848.8 | 247.4866 | 320.828 |

PCS Band (Part 24E) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 512 | 1850.2 | 250.7815 | 320.597 |
| 661 | 1880.0 | 246.5627 | 320.576 |
| 810 | 1909.8 | 247.7121 | 320.882 |

GPRS:

Cellular Band (Part 22H) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 128 | 824.2 | 249.2149 | 320.381 |
| 190 | 836.6 | 246.4801 | 321.134 |
| 251 | 848.8 | 245.2972 | 319.93 |

PCS Band (Part 24E) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 512 | 1850.2 | 246.2776 | 320.836 |
| 661 | 1880.0 | 244.412 | 320.843 |
| 810 | 1909.8 | 246.2183 | 320.298 |

EGPRS (MCS 1):

Cellular Band (Part 22H) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 128 | 824.2 | 244.2492 | 320.319 |
| 190 | 836.6 | 245.3906 | 319.92 |
| 251 | 848.8 | 252.8877 | 319.705 |

PCS Band (Part 24E) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 512 | 1850.2 | 245.9562 | 320.863 |
| 661 | 1880.0 | 247.9217 | 320.341 |
| 810 | 1909.8 | 248.0764 | 320.482 |

RMC:

UMTS-FDD Band V (Part 22H)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 4132 | 826.6 | 4.2038 | 4.883 |
| 4175 | 835.0 | 4.2017 | 4.833 |
| 4233 | 846.4 | 4.2131 | 4.88 |

UMTS-FDD Band II (Part 24E)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 9262 | 1852.4 | 4.2548 | 4.967 |
| 9400 | 1880.0 | 4.2434 | 4.96 |
| 9538 | 1907.6 | 4.2263 | 4.949 |

UMTS-FDD Band IV (Part 27)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 1313 | 1713 | 4.2614 | 4.883 |
| 1413 | 1733 | 4.2206 | 4.915 |
| 1512 | 1752 | 4.2209 | 4.882 |

HSDPA:

UMTS-FDD Band V (Part 22H)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 4132 | 826.6 | 4.2411 | 4.844 |
| 4175 | 835.0 | 4.1997 | 4.88 |
| 4233 | 846.6 | 4.2358 | 4.887 |

UMTS-FDD Band II (Part 24E)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 9262 | 1852.4 | 4.2559 | 4.947 |
| 9400 | 1880.0 | 4.2423 | 4.912 |
| 9538 | 1907.6 | 4.2354 | 4.94 |

UMTS-FDD Band IV (Part 27)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 1313 | 1713 | 4.2487 | 4.897 |
| 1413 | 1733 | 4.2661 | 4.902 |
| 1512 | 1752 | 4.2402 | 4.895 |

HSUPA:

UMTS-FDD Band V (Part 22H)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 4132 | 826.4 | 4.2302 | 4.899 |
| 4175 | 835.0 | 4.2368 | 4.89 |
| 4233 | 846.6 | 4.2294 | 4.893 |

UMTS-FDD Band II (Part 24E)

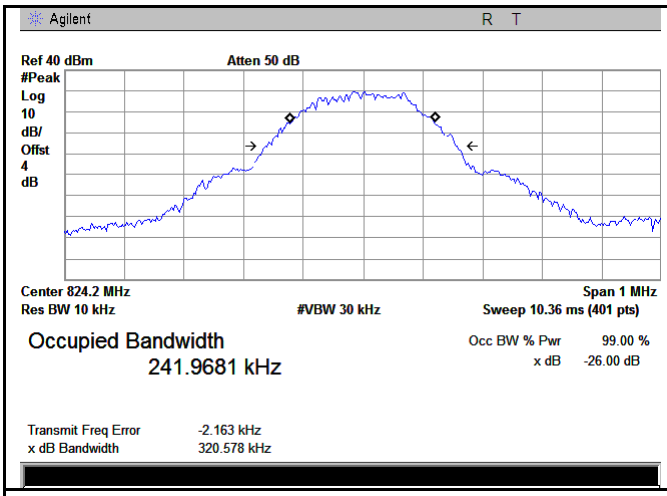
| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 9262 | 1852.4 | 4.2656 | 4.958 |
| 9400 | 1880.0 | 4.2387 | 4.965 |
| 9538 | 1907.6 | 4.2336 | 4.948 |

UMTS-FDD Band IV (Part 27)

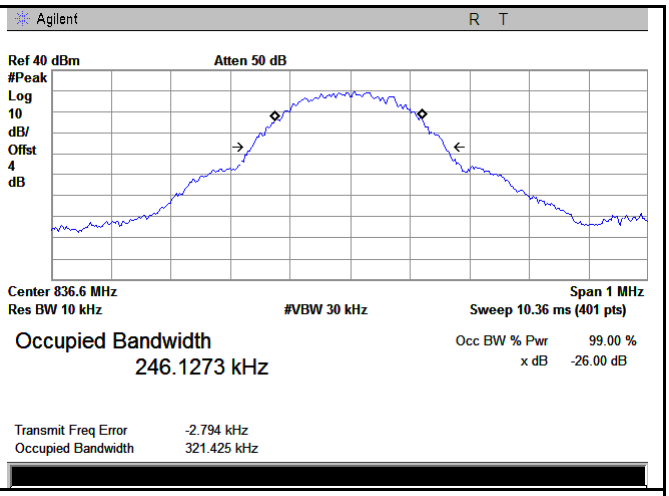
| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 1313 | 1713 | 4.2242 | 4.864 |
| 1413 | 1733 | 4.2494 | 4.915 |
| 1512 | 1752 | 4.2354 | 4.888 |

## Test Plots

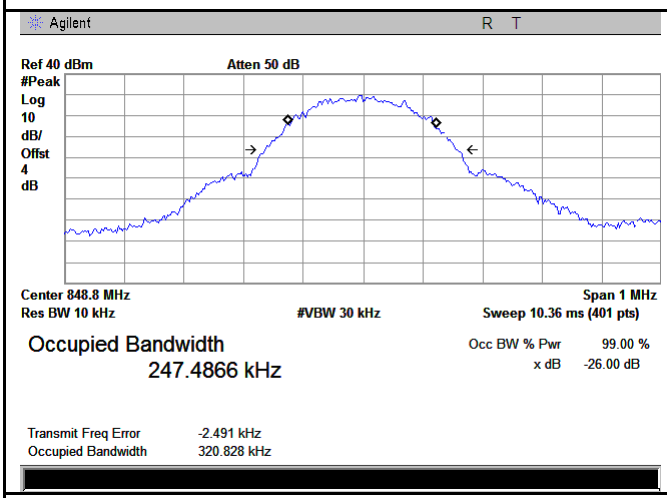
### GMS Voice:



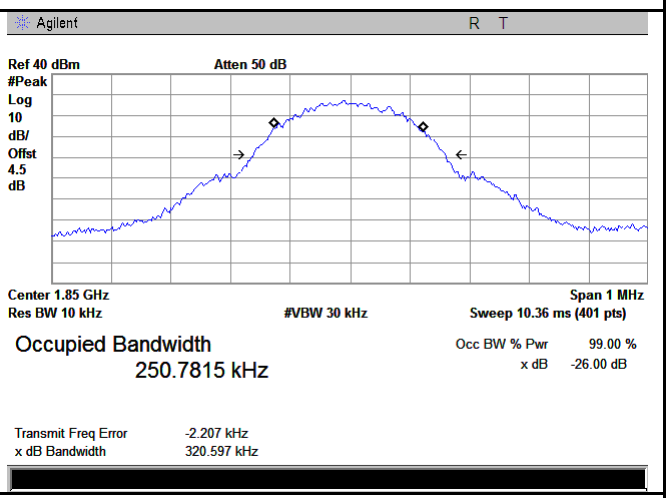

GSM 850 BW - Low CH 824.2MHz



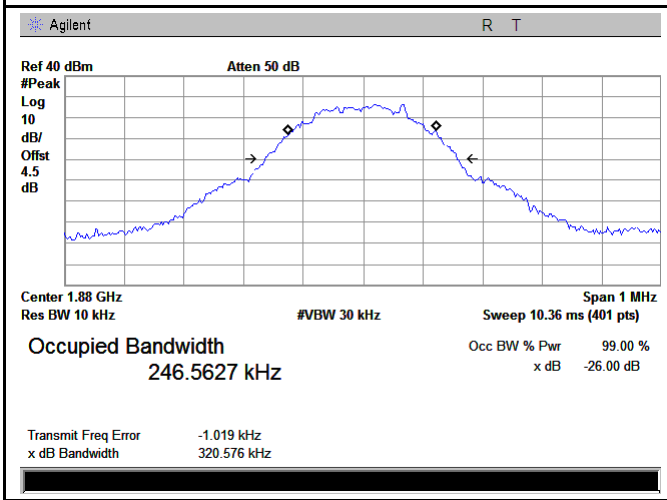

GSM 850 BW - Mid CH 836.6MHz



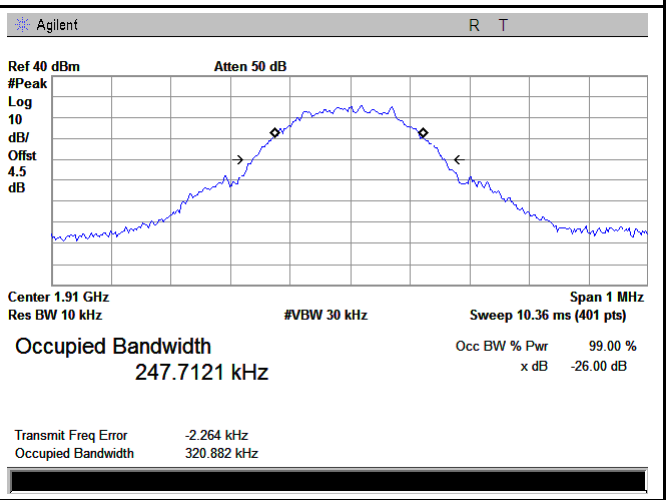

GSM 850 BW - High CH 848.8MHz




PCS 1900 BW - Low CH 1850.2MHz

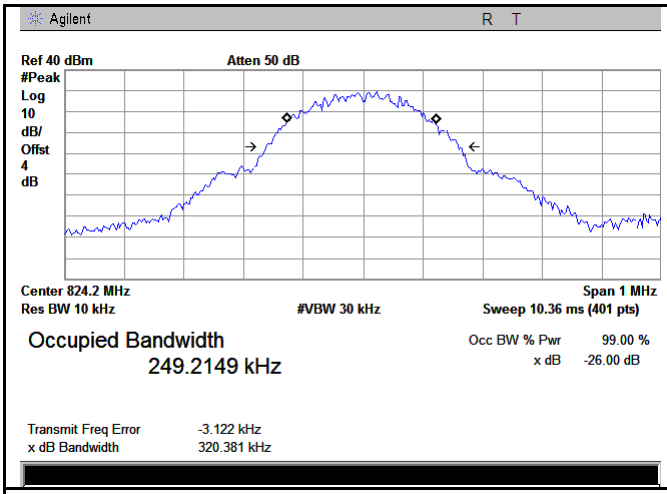



PCS 1900 BW - Mid CH 1880MHz

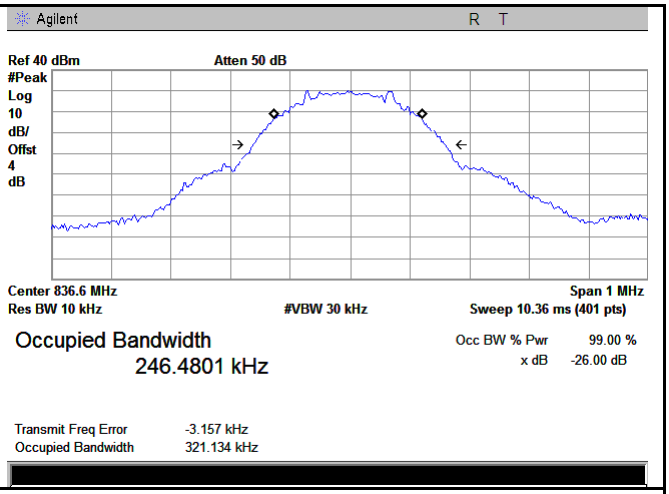



PCS 1900 BW - High CH 1910MHz

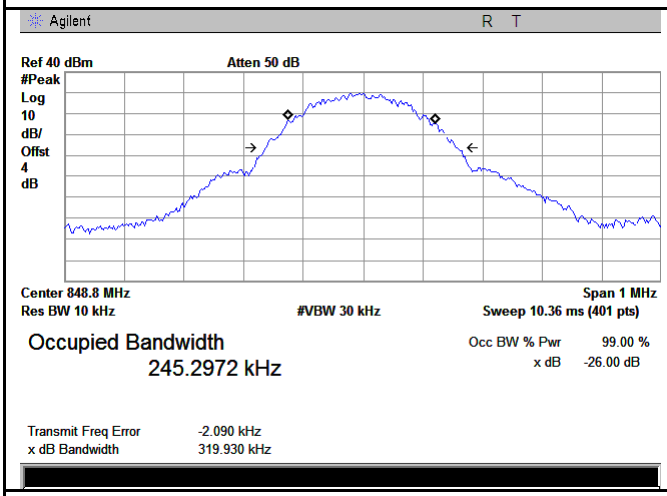
## GPRS:



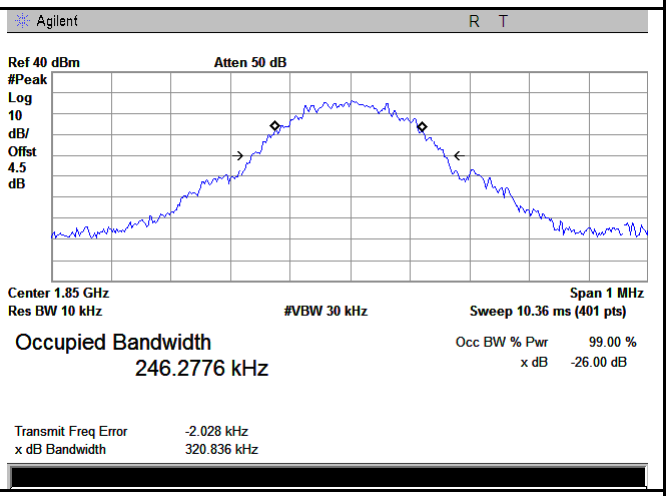

GSM 850 BW - Low CH 824.2MHz



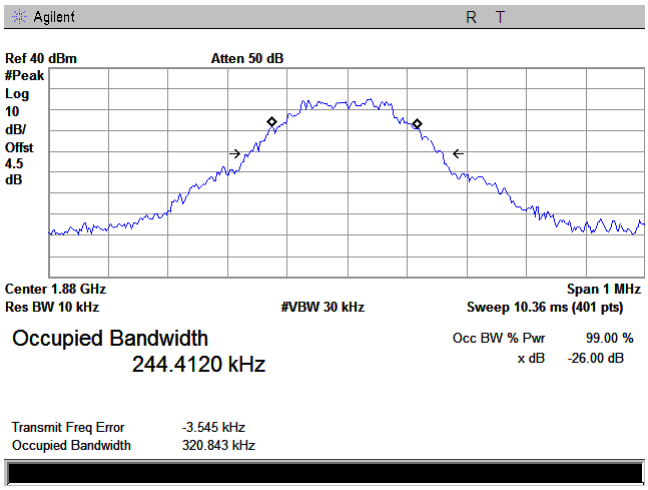

GSM 850 BW - Mid CH 836.6MHz



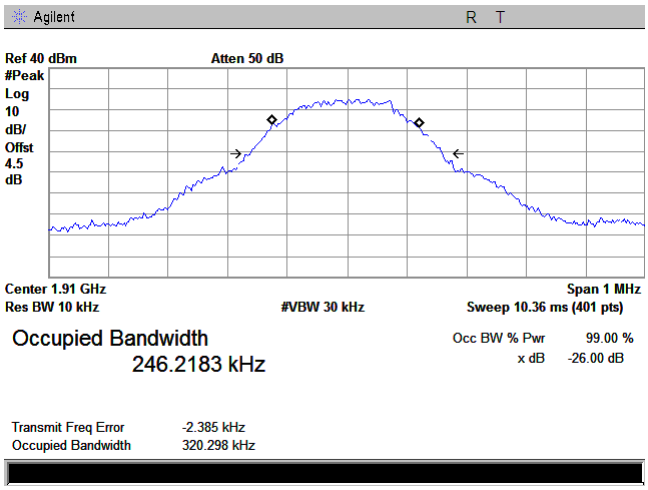

GSM 850 BW - High CH 848.8MHz




PCS 1900 BW - Low CH 1850.2MHz

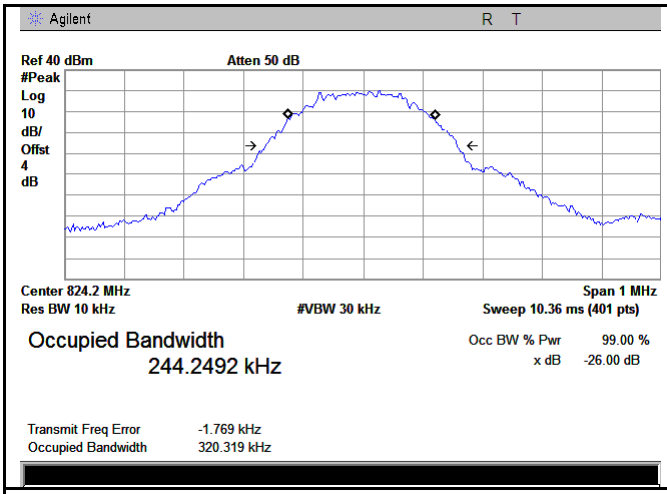



PCS 1900 BW - Mid CH 1880MHz

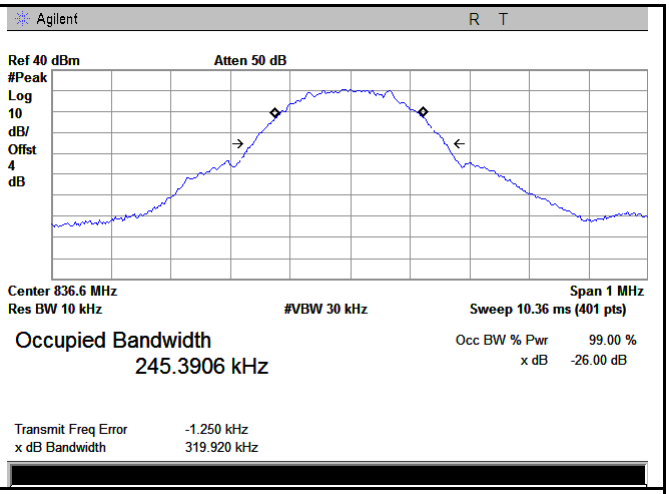



PCS 1900 BW - High CH 1910MHz

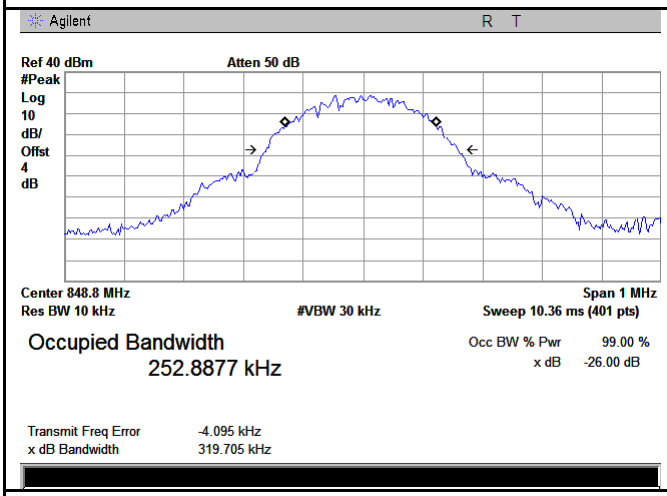
## EGPRS:



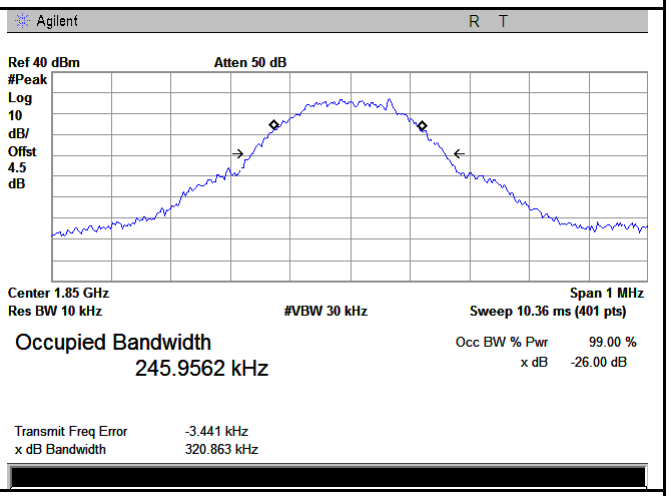

GSM 850 BW - Low CH 824.2MHz



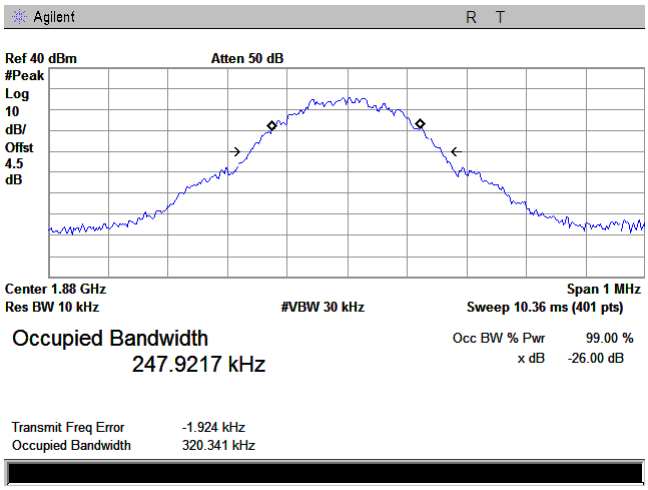

GSM 850 BW - Mid CH 836.6MHz



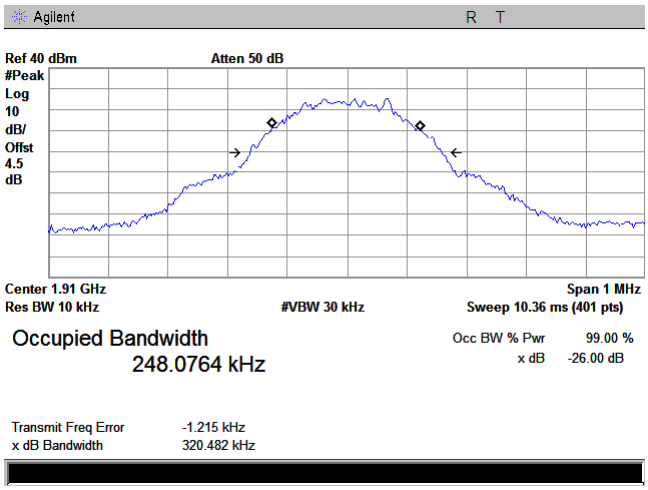

GSM 850 BW - High CH 848.8MHz




PCS 1900 BW - Low CH 1850.2MHz

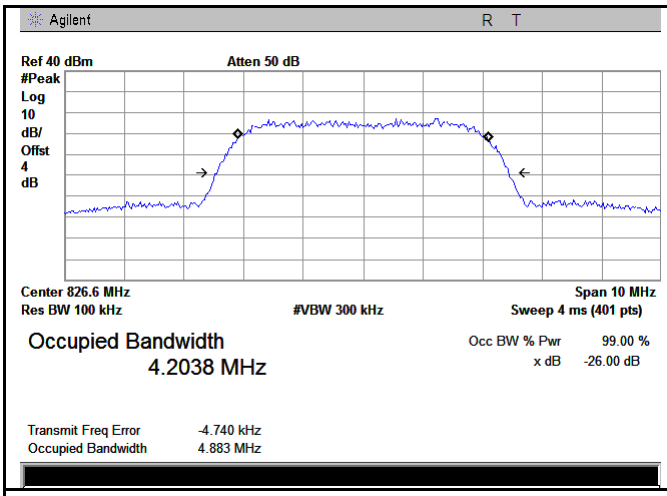



PCS 1900 BW - Mid CH 1880MHz

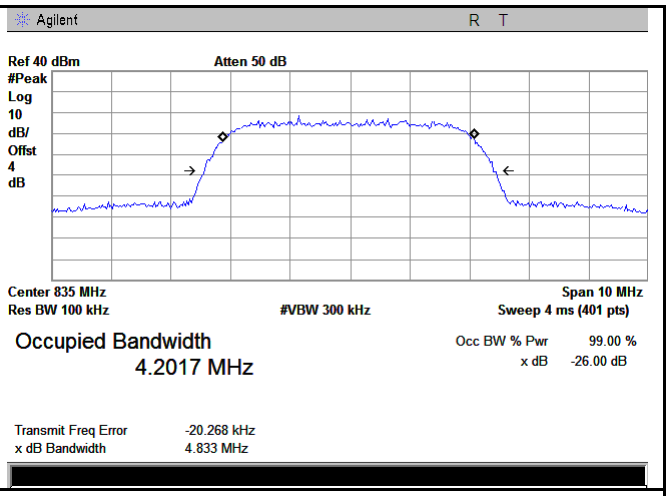



PCS 1900 BW - High CH 1910MHz

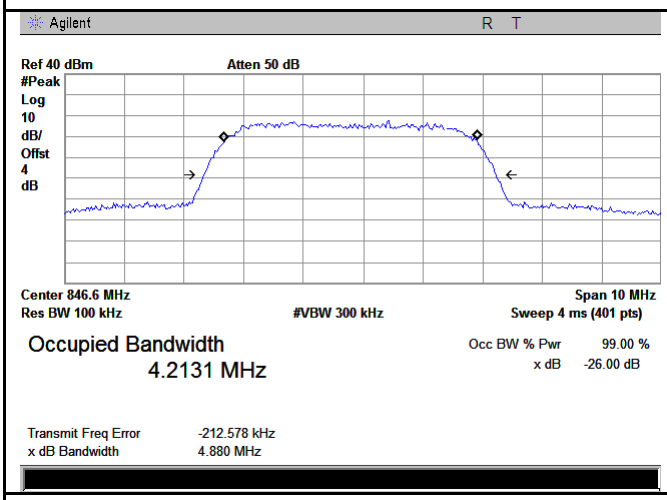
RMC:



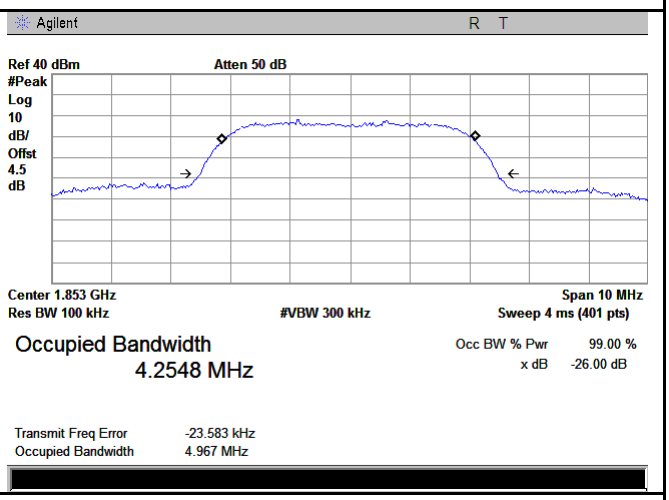

Band V BW - Low CH 826.6 MHz



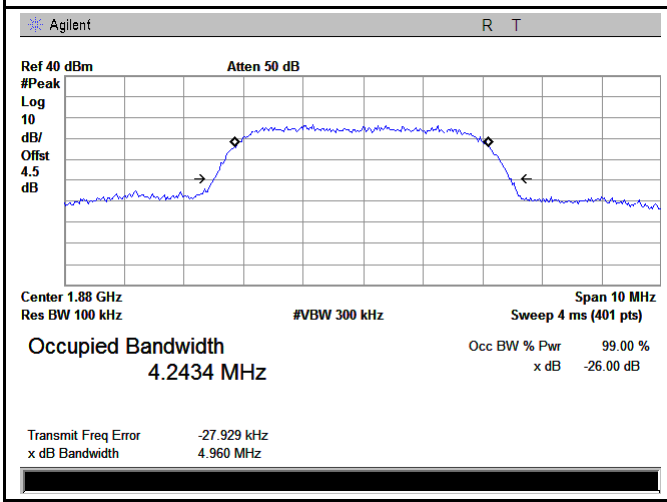

Band V BW - Mid CH 835.0 MHz



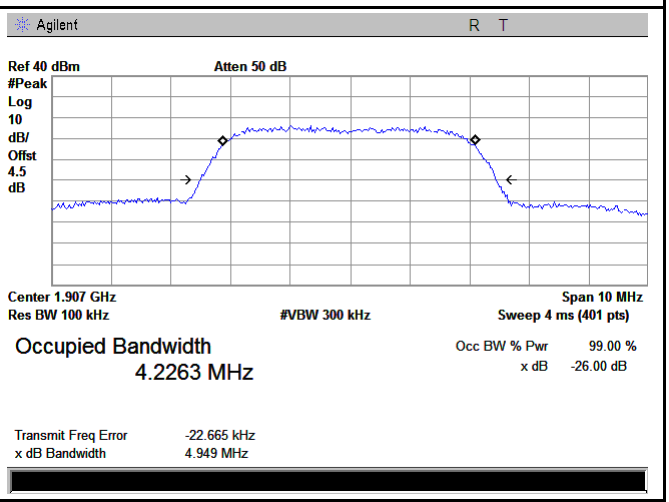

Band V BW - High CH 846.6 MHz



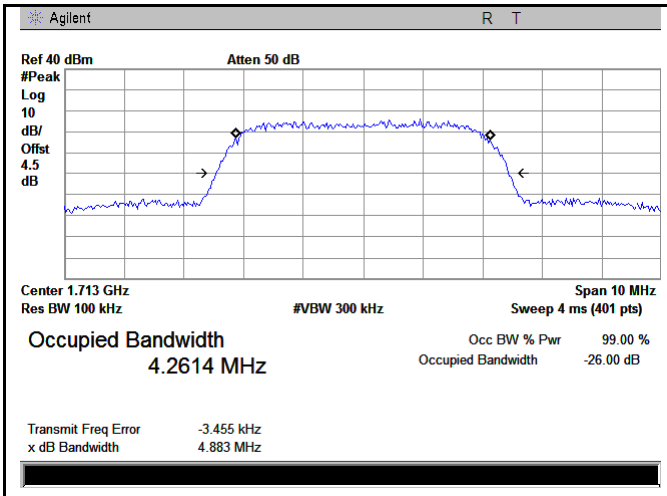

Band II BW - Low CH 1853MHz



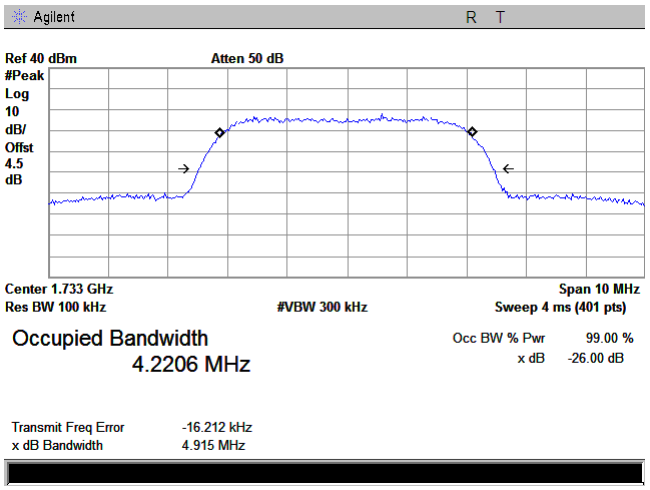

Band II BW - Mid CH 1880MHz



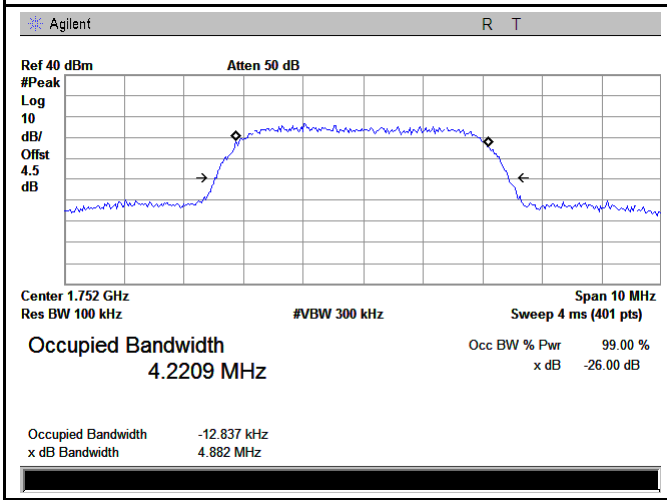

Band II BW - High CH 1907MHz




Band IV BW - Low CH 1713MHz

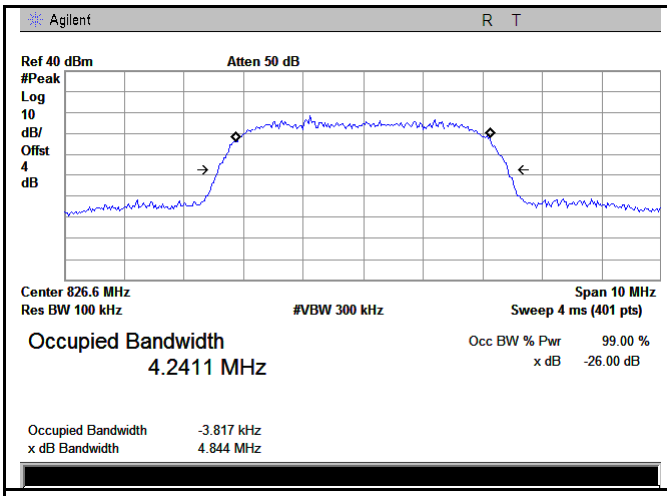



Band IVBW - Mid CH 1733MHz

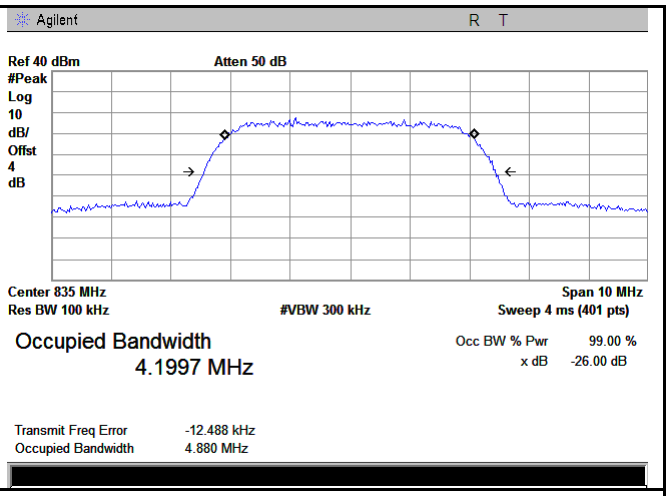



Band IV BW - High CH 1752MHz

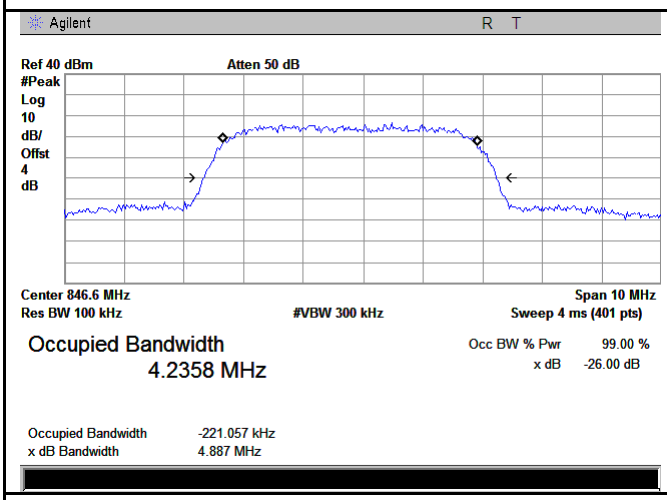
HSDPA:



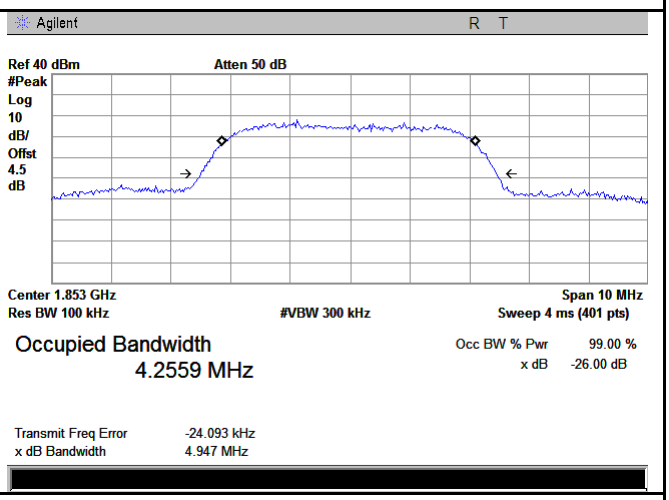

Band V BW - Low CH 826.6 MHz



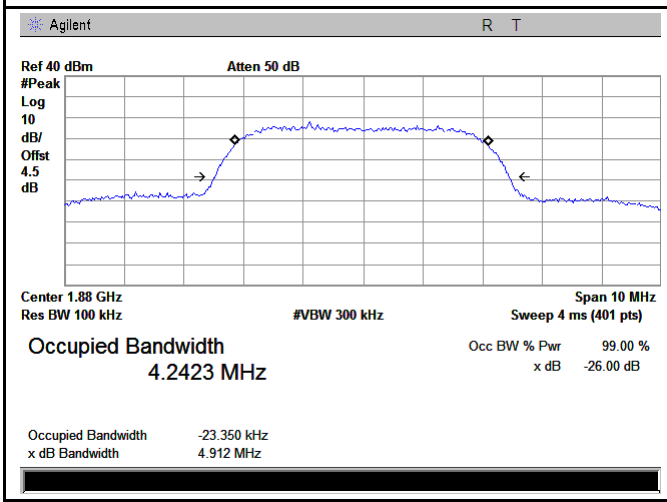

Band V BW - Mid CH 835.0 MHz



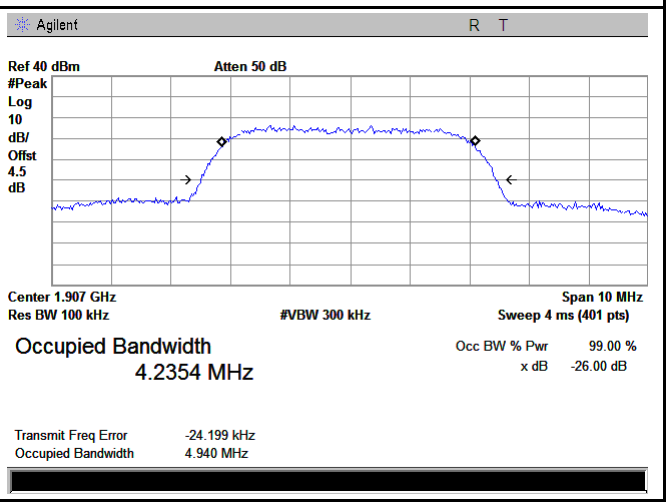

Band V BW - High CH 846.4 MHz



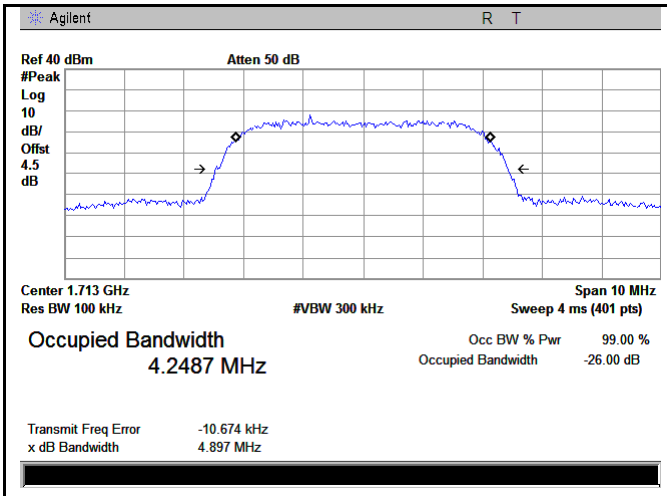

Band II BW - Low CH 1852.4MHz



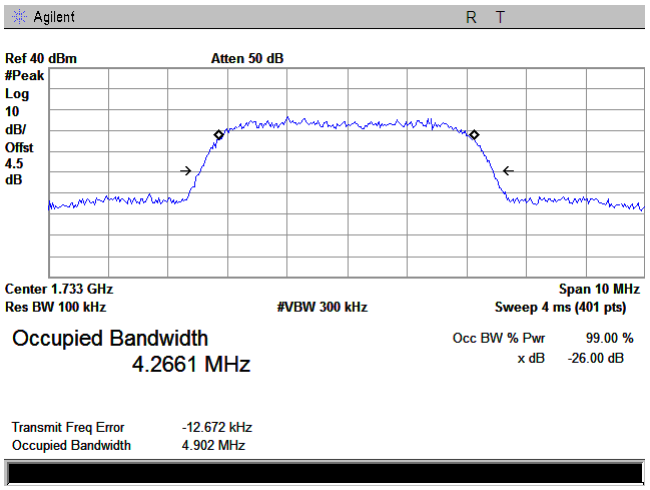

Band II BW - Mid CH 1880MHz



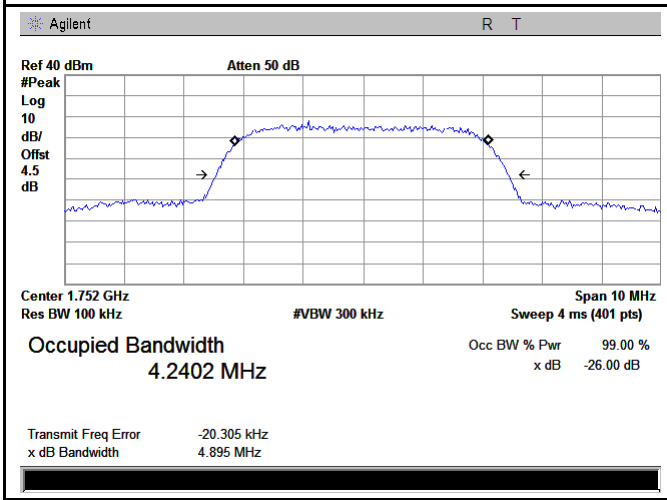

Band II BW - High CH 1907MHz




Band IV BW - Low CH 1713MHz

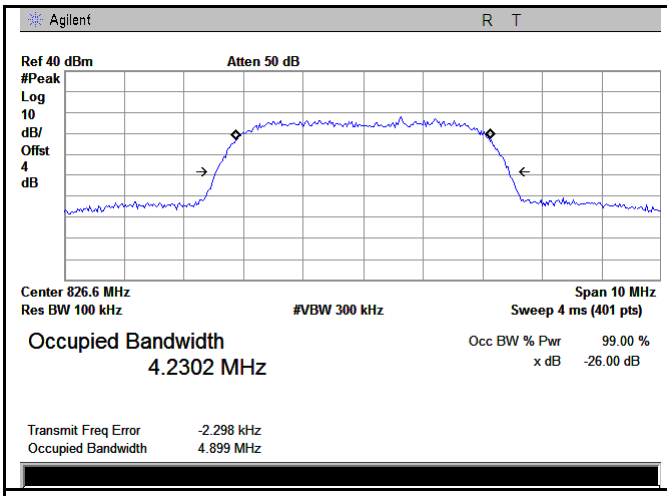



Band IVBW - Mid CH 1733MHz

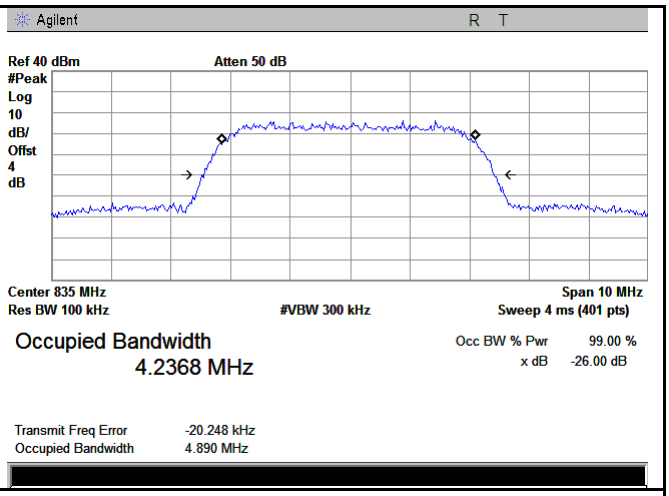



Band IV BW - High CH 1752MHz

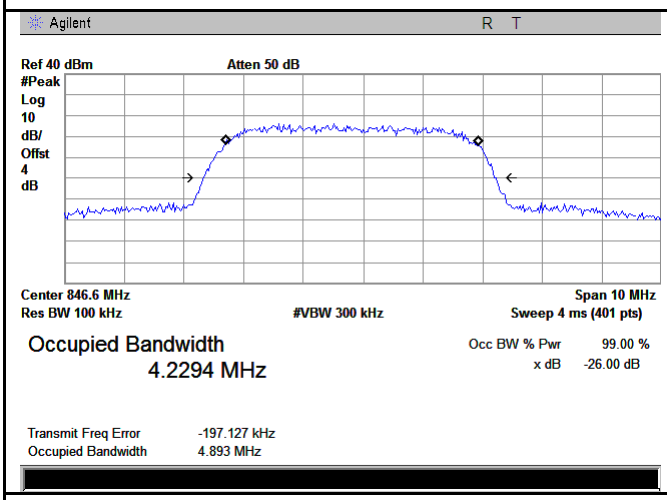
HSUPA:



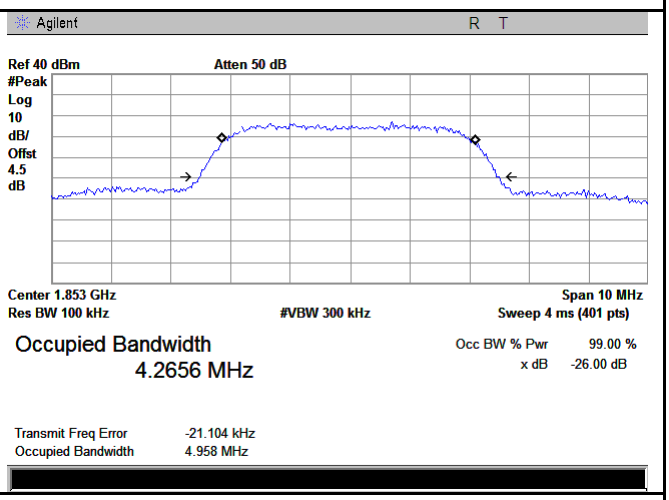

Band V BW - Low CH 826.6 MHz



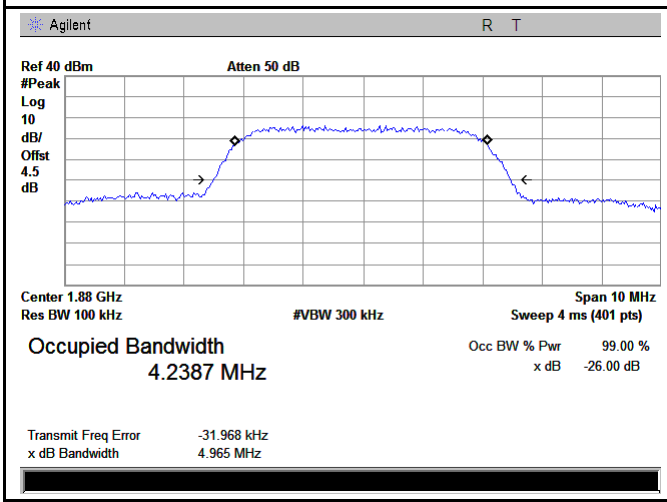

Band V BW - Mid CH 835.0 MHz



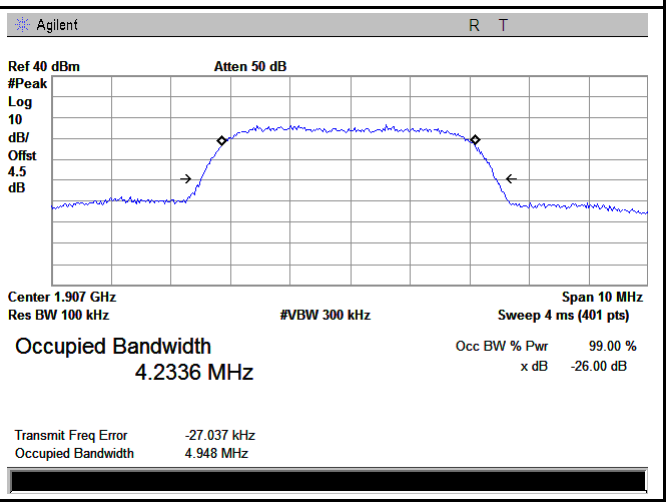

Band V BW - High CH 846.4 MHz



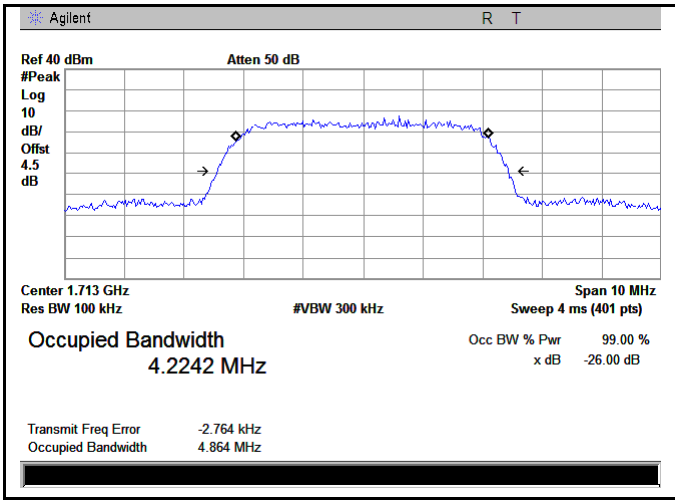

Band II BW - Low CH 1853MHz



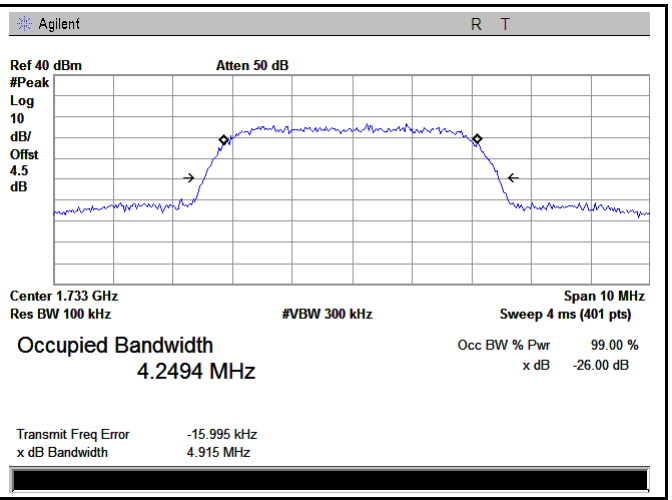

Band II BW - Mid CH 1880MHz



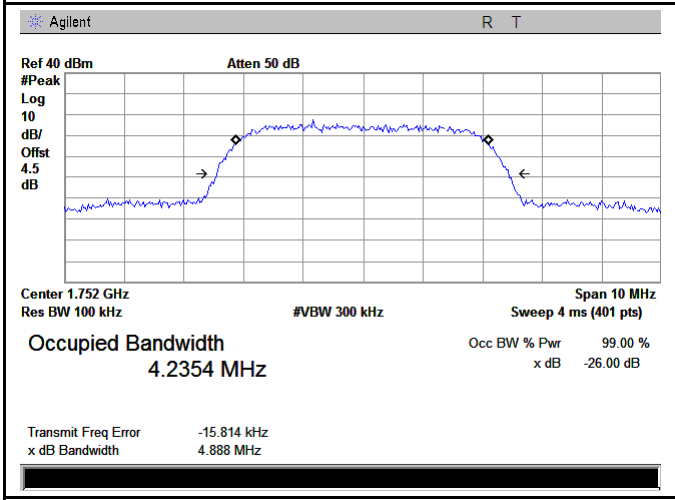

Band II BW - High CH 1907MHz




Band IV BW - Low CH 1713MHz




Band IVBW - Mid CH 1733MHz

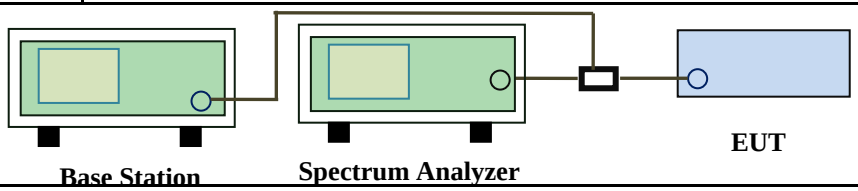



Band IV BW - High CH 1752MHz

## 6.5 Spurious Emissions at Antenna Terminals

| | |
|---|---|
| Temperature | 25 °C |
| Relative Humidity | 57% |
| Atmospheric Pressure | 1014mbar |
| Test date : | October 20, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1051, §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 | ☑ |
| Test Setup |   | | |
| Test 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.<br>- Setting RBW as roughly BW/100. | | |
| Remark | | | |
| Result | ☑ Pass ☐ Fail | | |

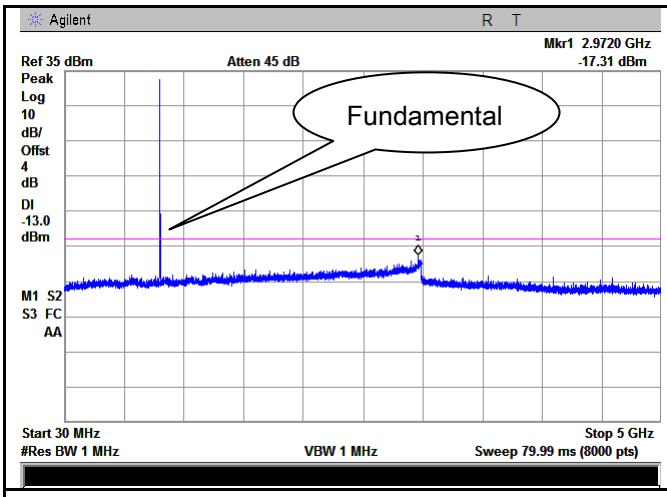
**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

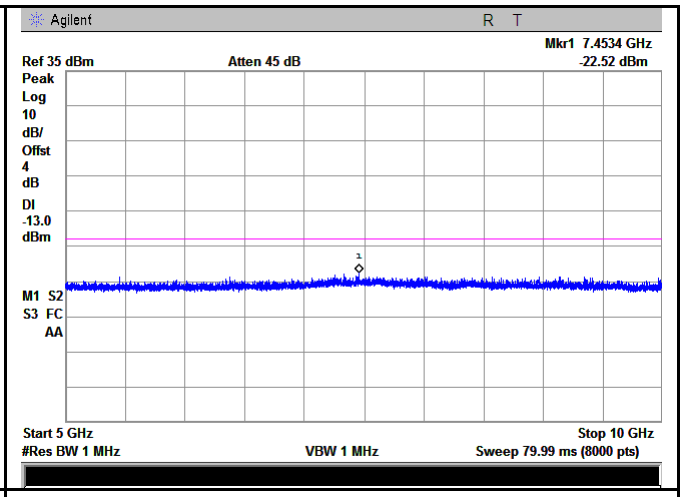
## Test Plots

## GSM Voice:

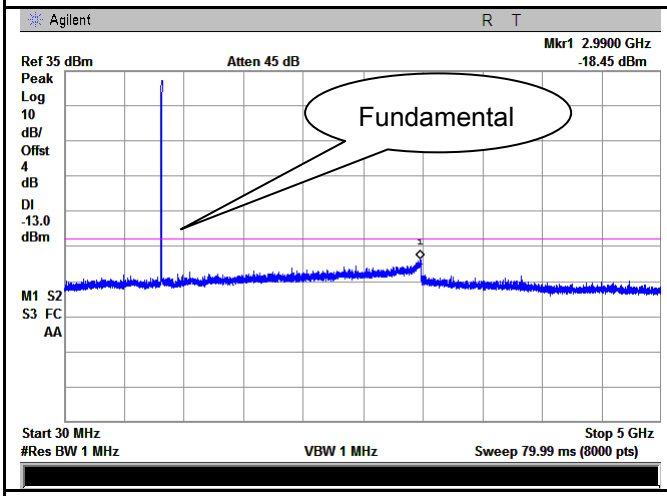
## Cellular Band (Part 22H) result



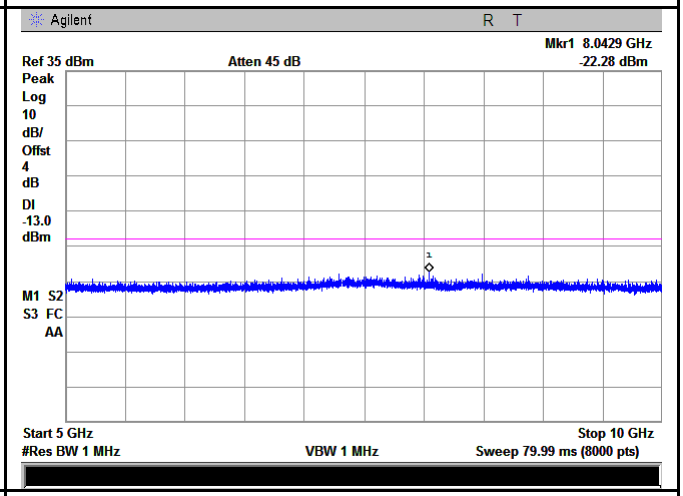

GSM 850 - Low Channel-1



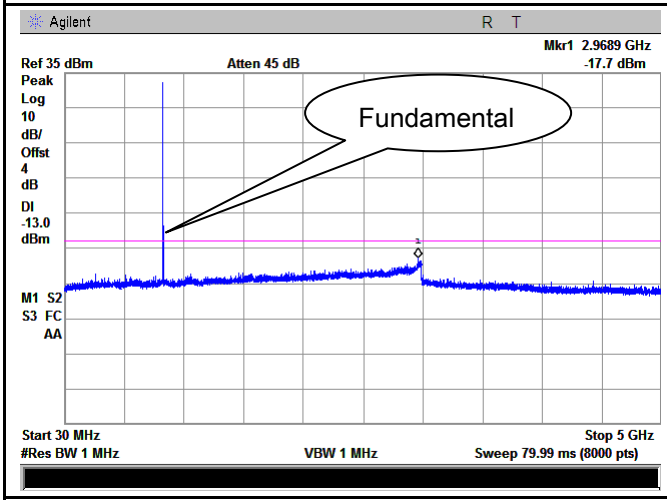

GSM 850 - Low Channel-2



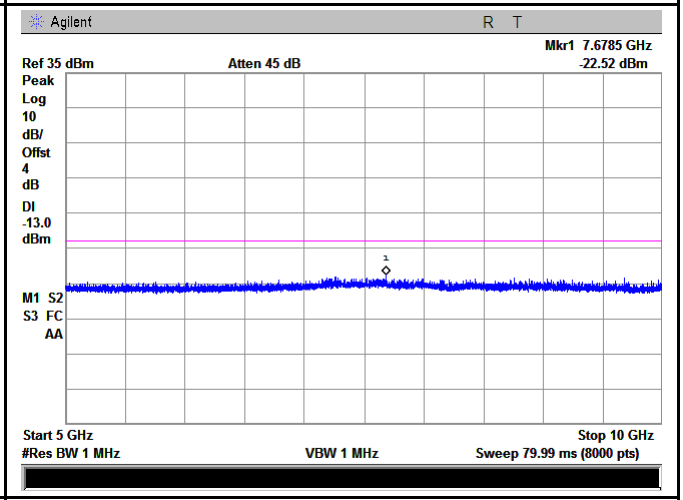

GSM 850 Middle Channel-1




GSM 850 Middle Channel-2

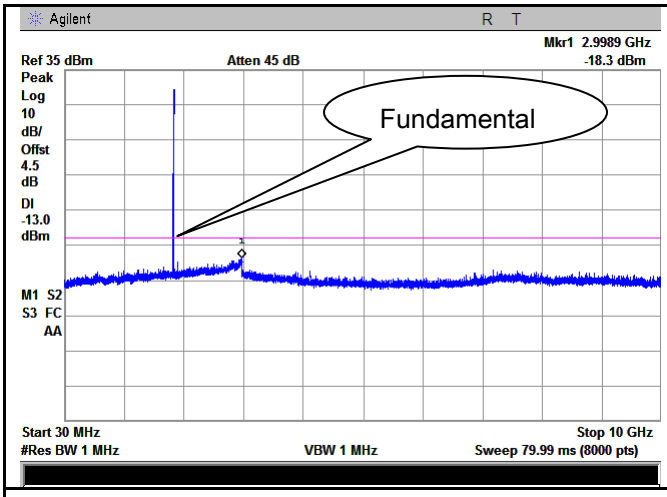



GSM 850 - High Channel-1

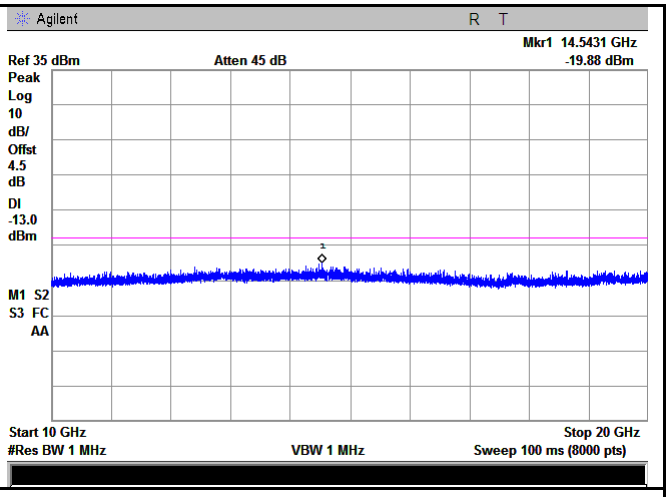



GSM 850 - High Channel-2

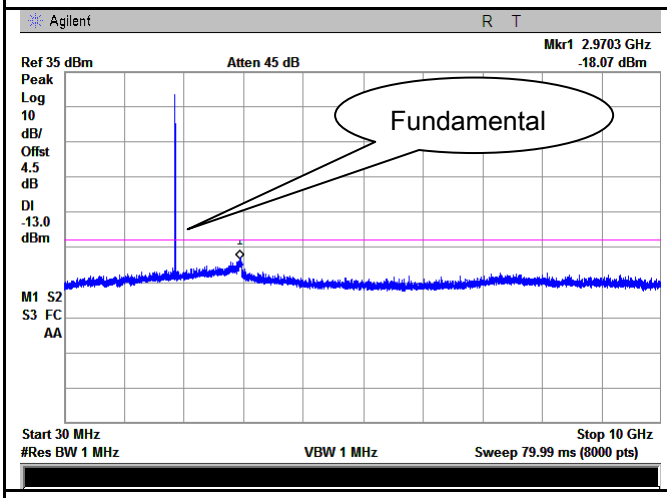
## PCS Band (Part24E) result



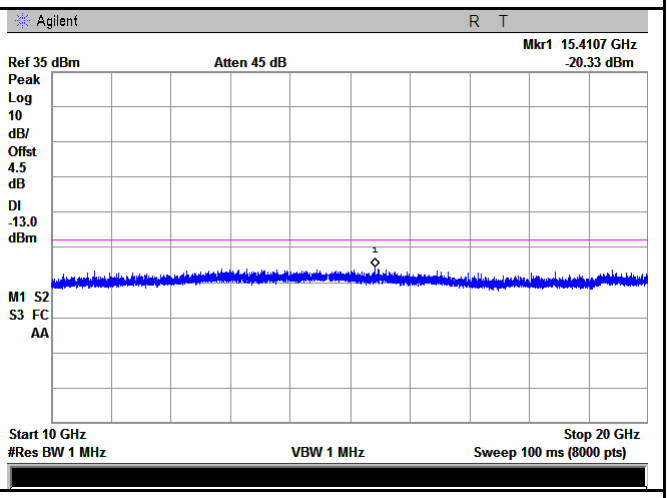

PCS1900 - Low Channel-1



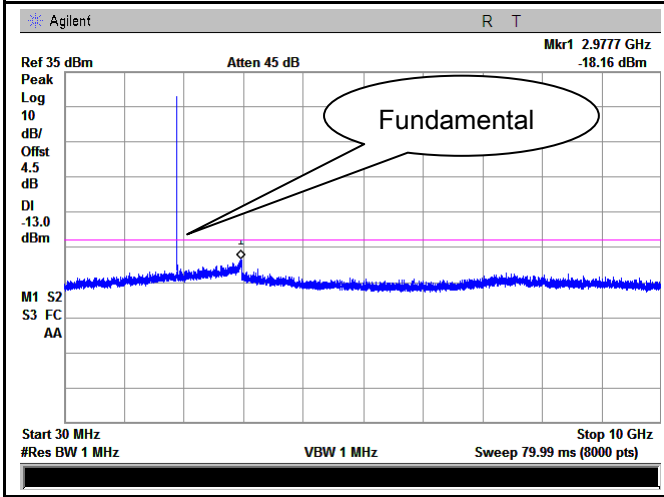

PCS 1900 - Low Channel-2



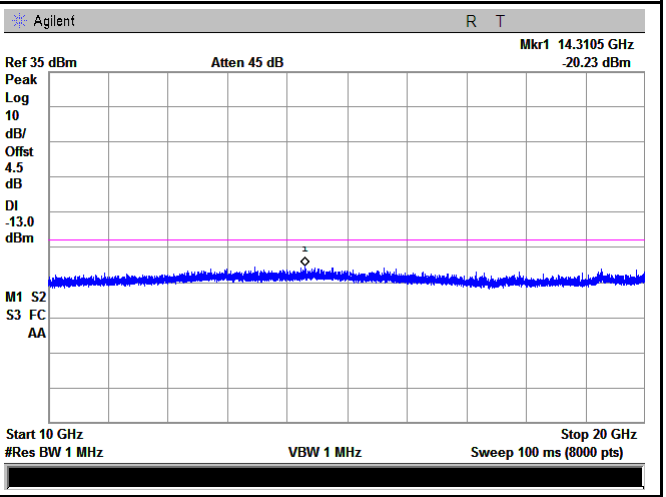

PCS1900 - Middle Channel-1




PCS 1900 - Middle Channel-2



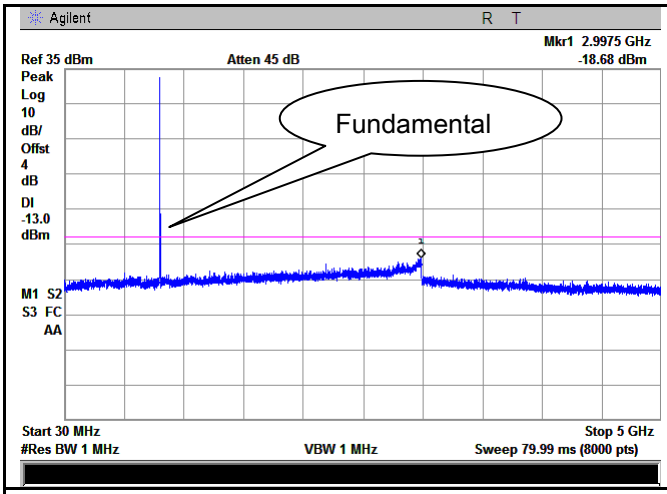

PCS1900 - High Channel-1



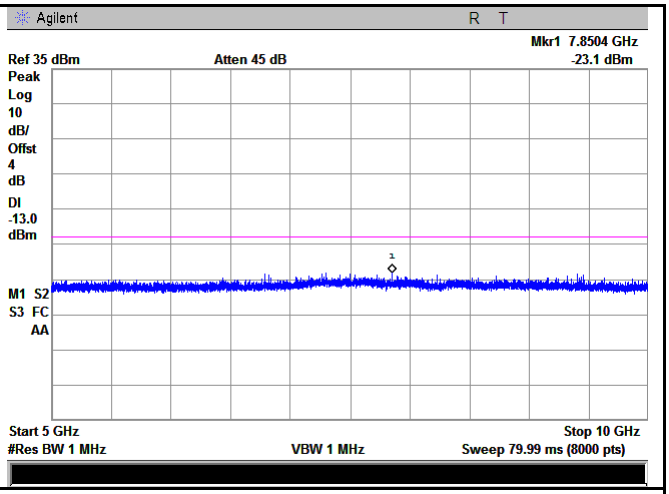

PCS 1900 - High Channel-2

## GPRS:

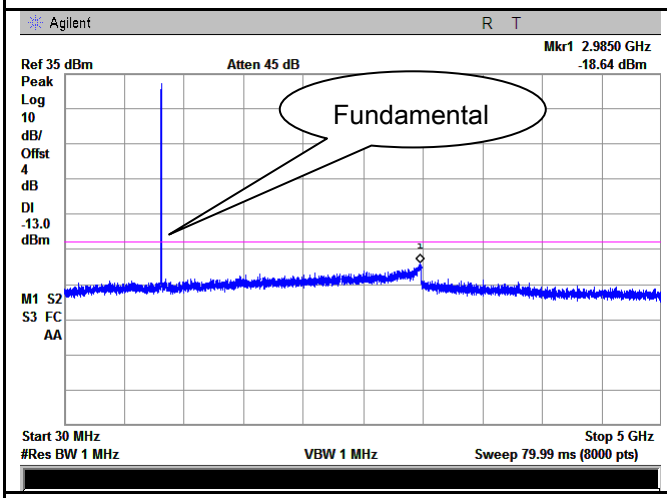
### Cellular Band (Part 22H) result



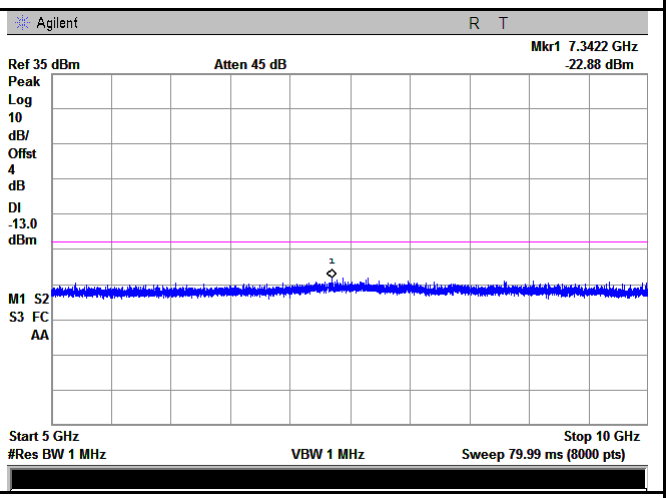

GSM 850 - Low Channel-1



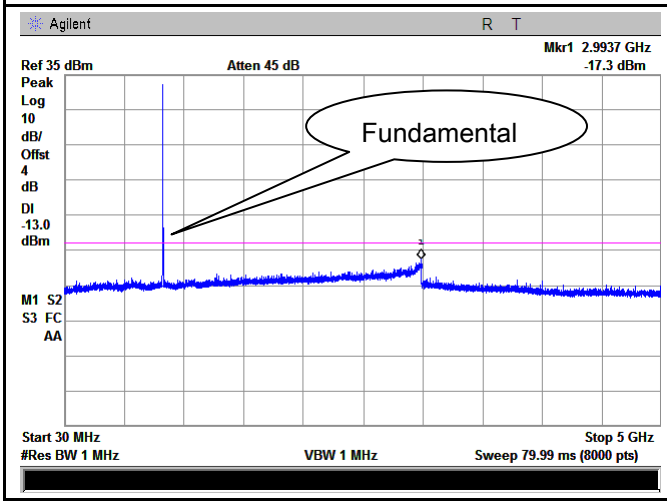

GSM 850 - Low Channel-2



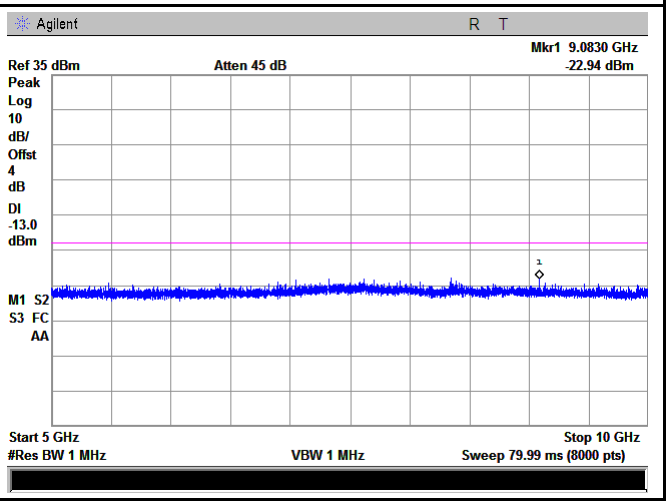

GSM 850 Middle Channel-1




GSM 850 Middle Channel-2

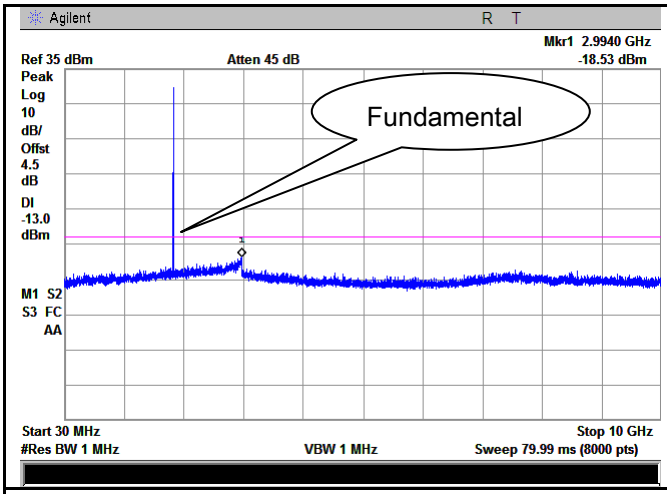



GSM 850 - High Channel-1

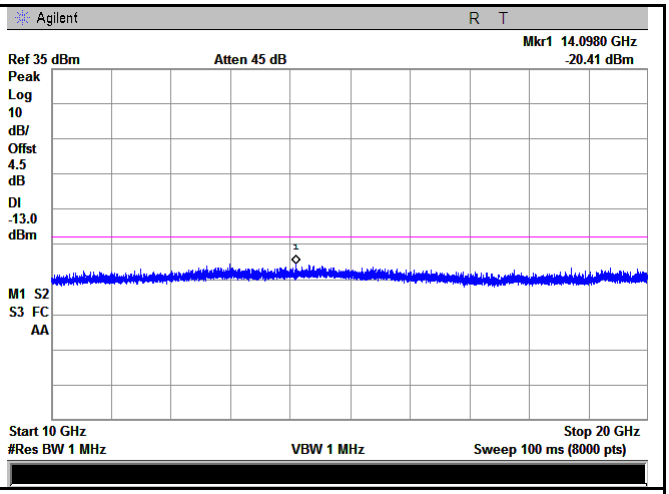



GSM 850 - High Channel-2

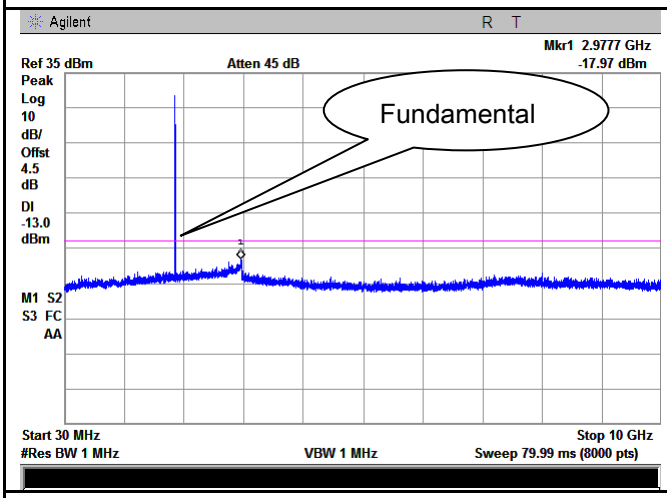
## PCS Band (Part24E) result



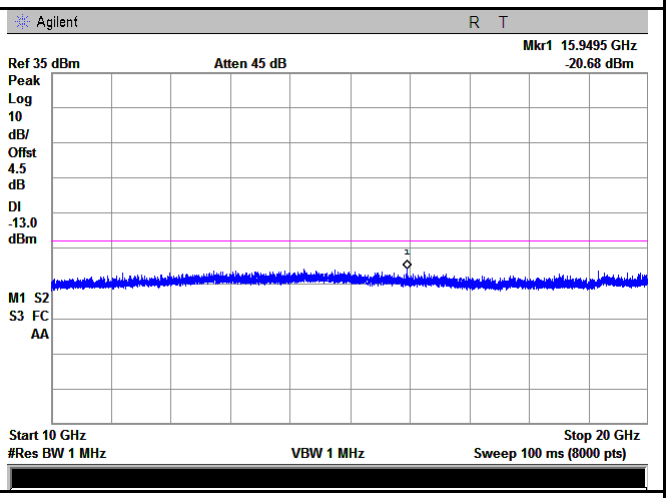

PCS1900 - Low Channel-1



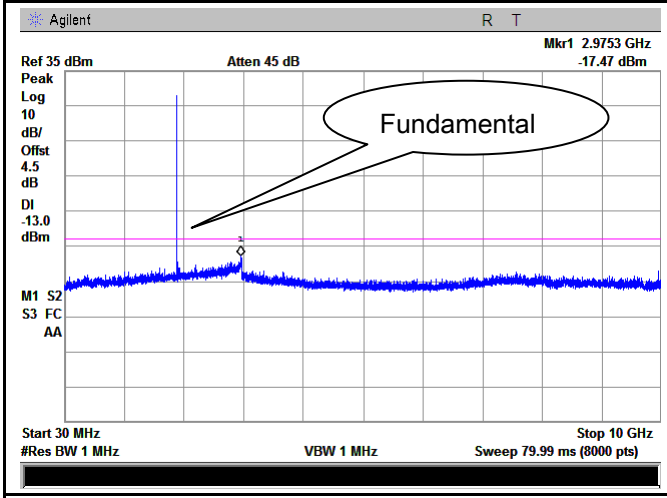

PCS 1900 - Low Channel-2



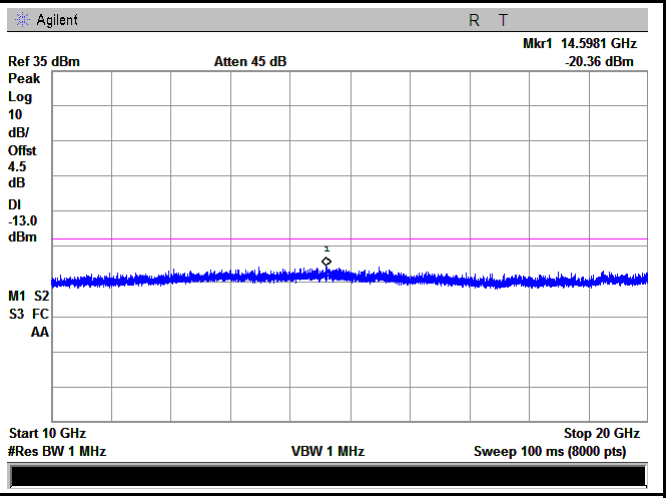

PCS1900 - Middle Channel-1




PCS 1900 - Middle Channel-2



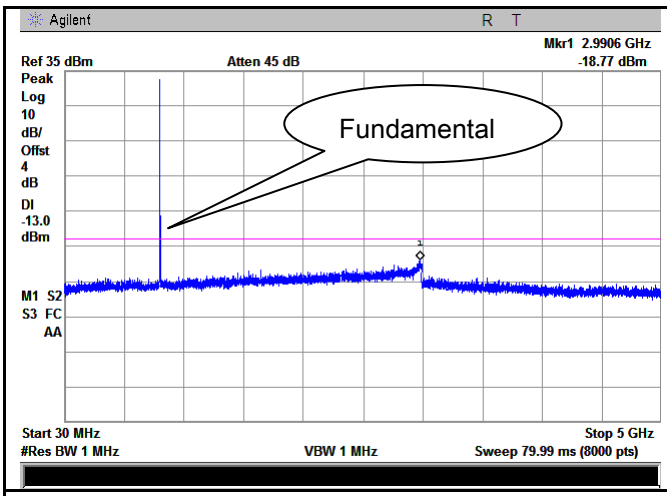

PCS1900 - High Channel-1



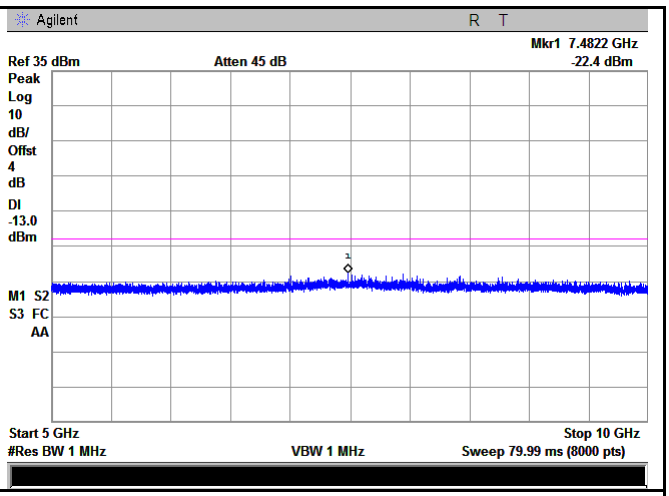

PCS 1900 - High Channel-2

## EGPRS (MCS1):

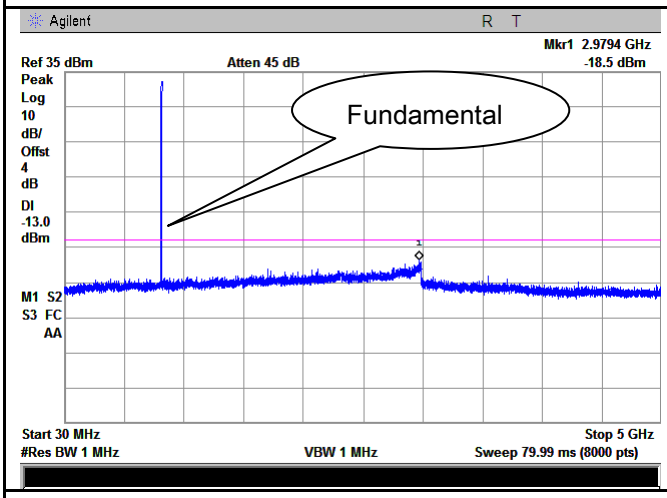
## Cellular Band (Part 22H) result



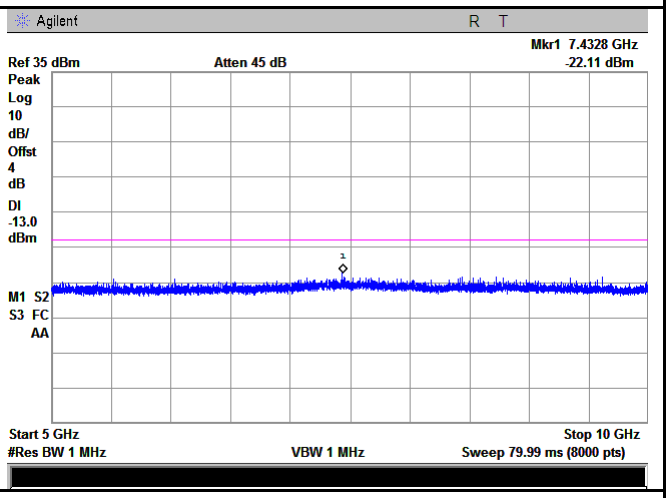

GSM 850 - Low Channel-1



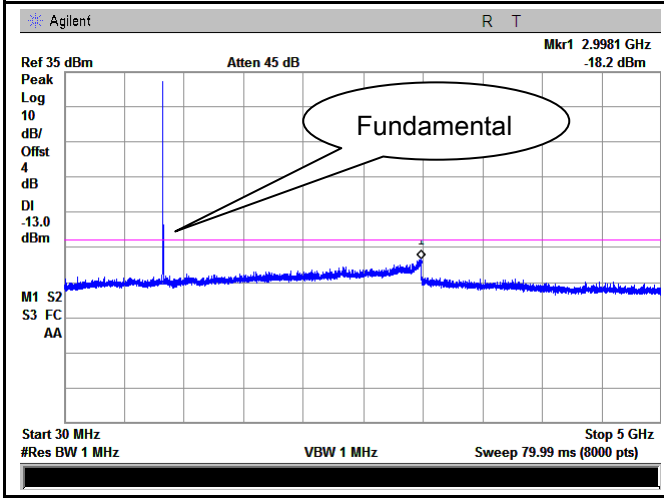

GSM 850 - Low Channel-2



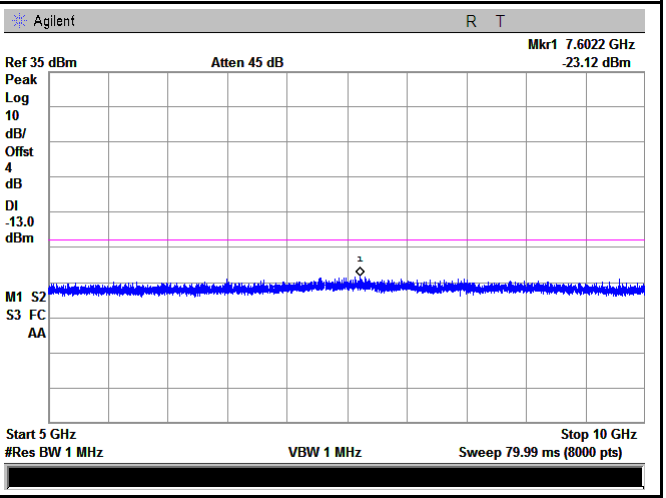

GSM 850 Middle Channel-1




GSM 850 Middle Channel-2

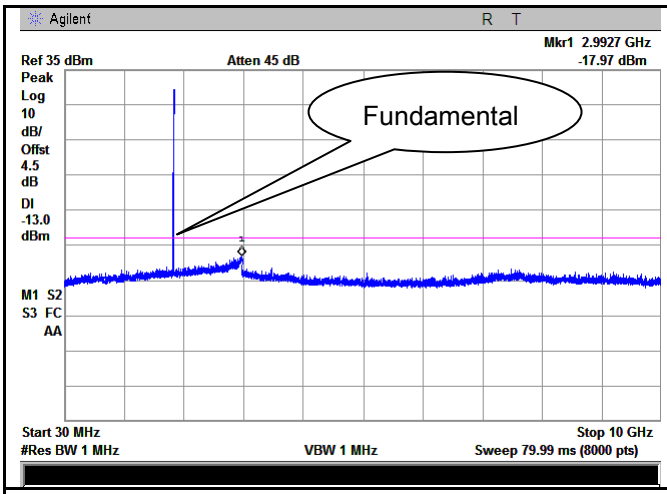



GSM 850 - High Channel-1

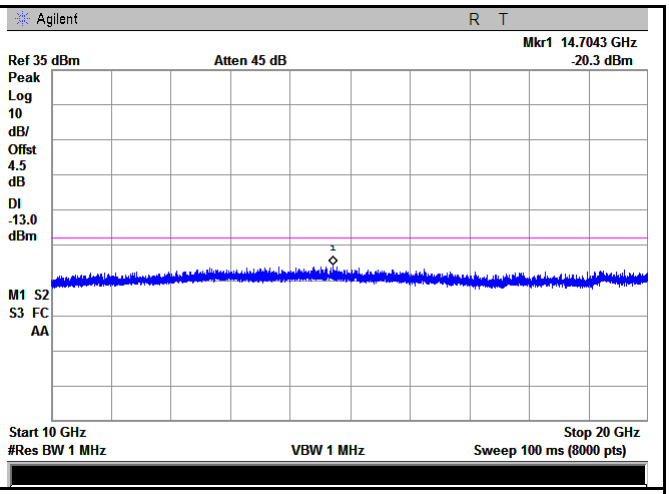



GSM 850 - High Channel-2

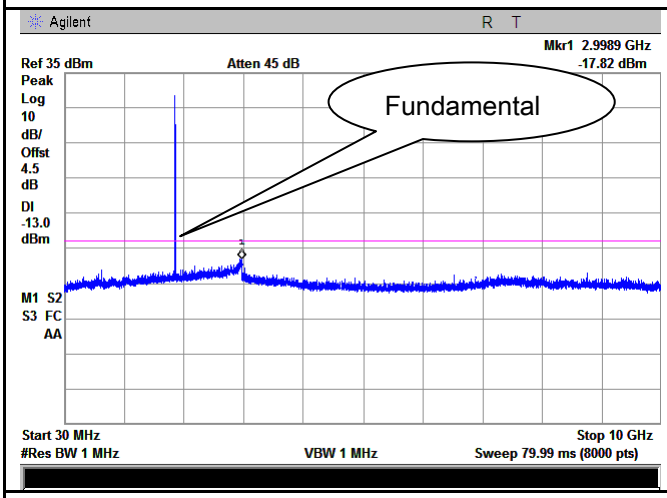
## PCS Band (Part24E) result



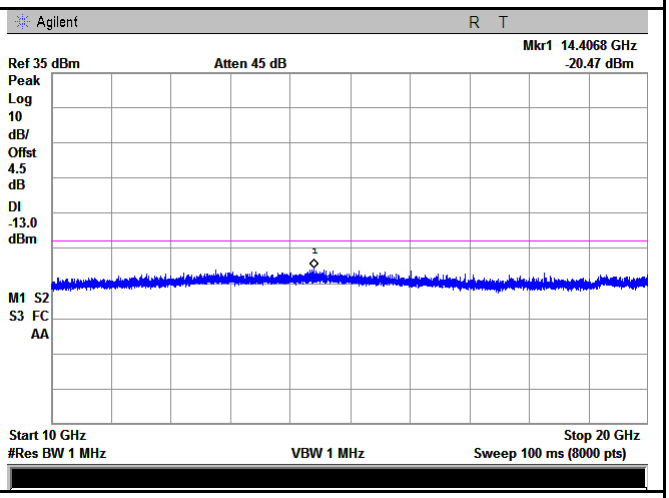

PCS1900 - Low Channel-1



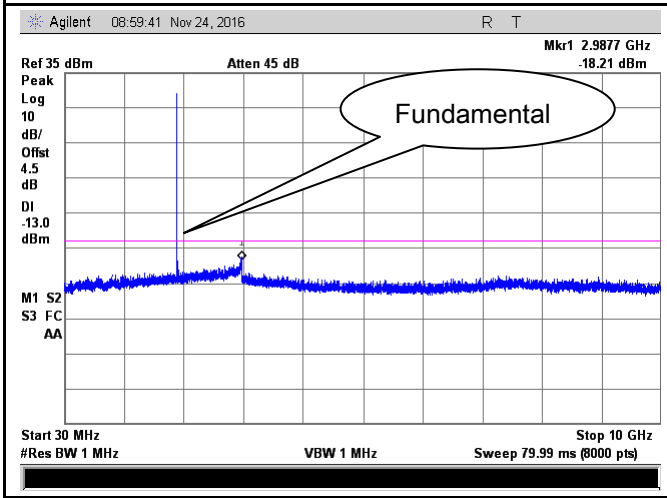

PCS 1900 - Low Channel-2



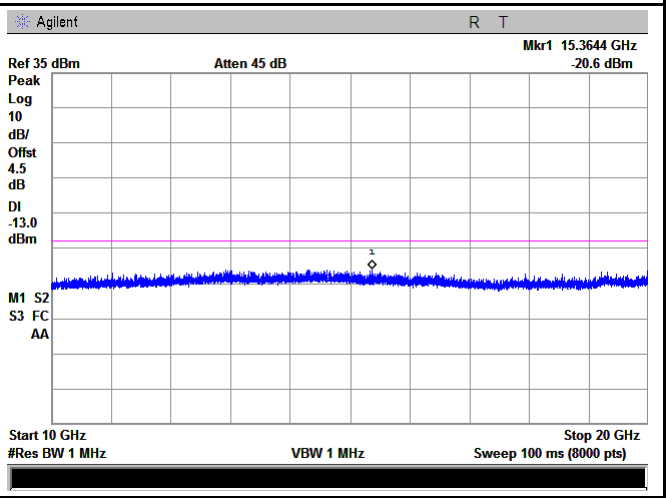

PCS1900 - Middle Channel-1




PCS 1900 - Middle Channel-2



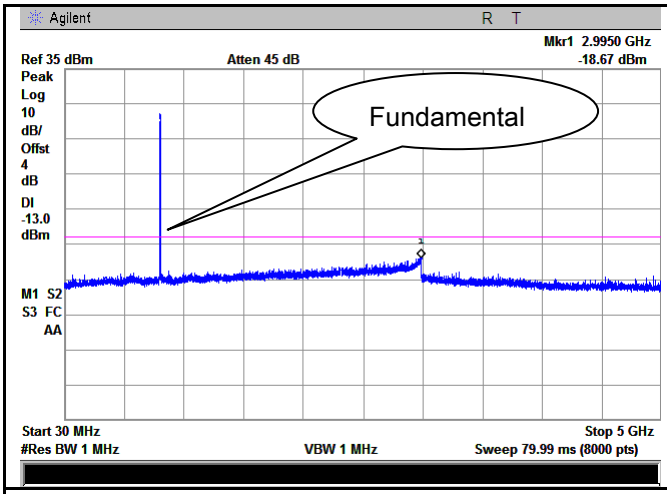

PCS1900 - High Channel-1



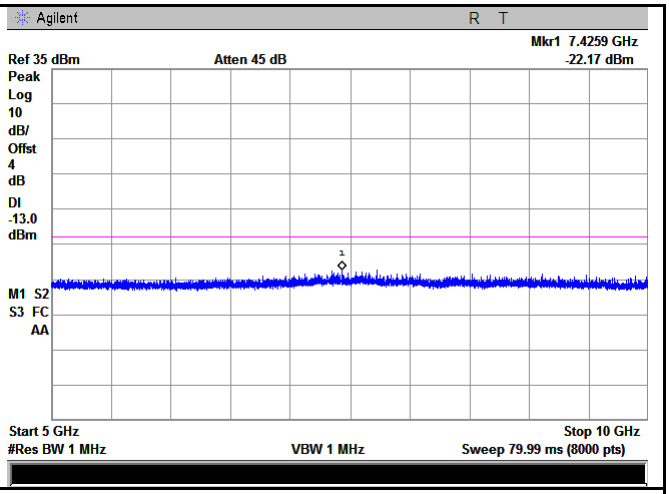

PCS 1900 - High Channel-2

## RMC

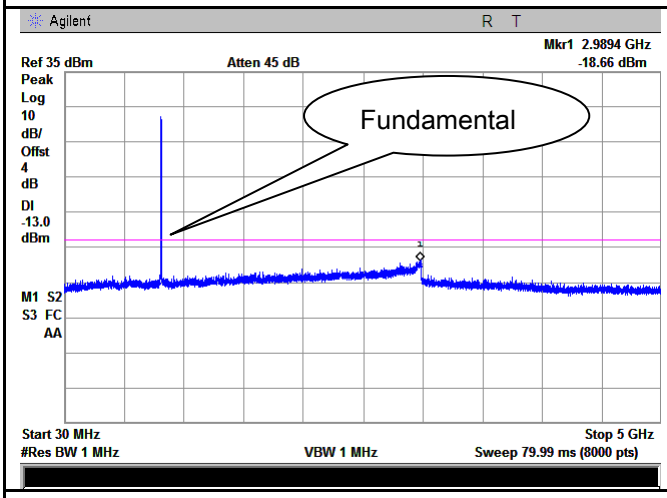
## UMTS-FDD Band V (Part 22H)



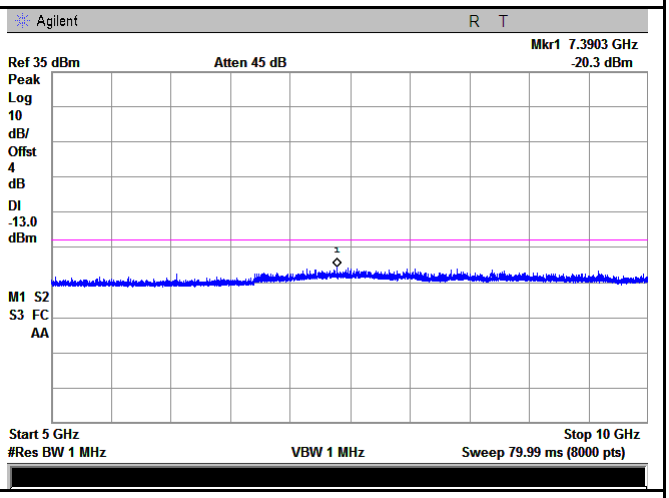

Band V - Low Channel-1



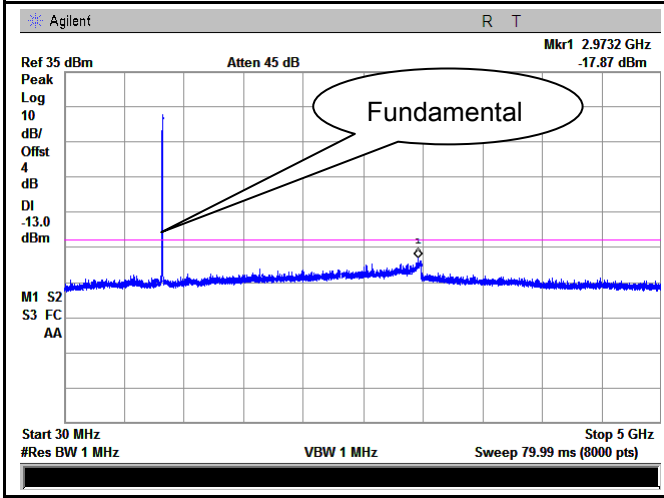

Band V - Low Channel-2



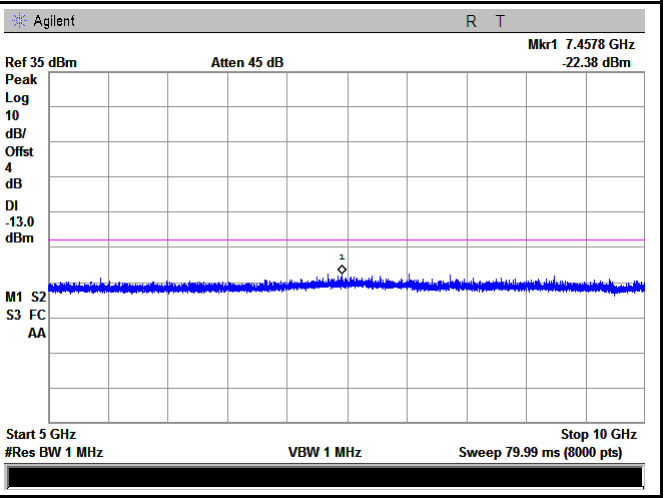

Band V - Middle Channel-1




Band V - Middle Channel-2

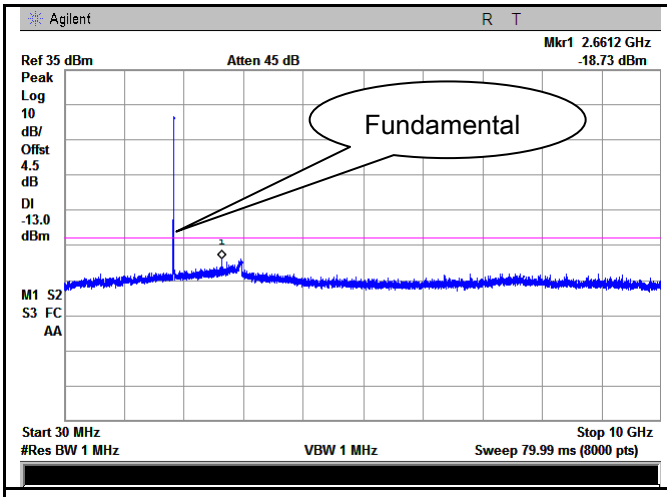



Band V - High Channel-1

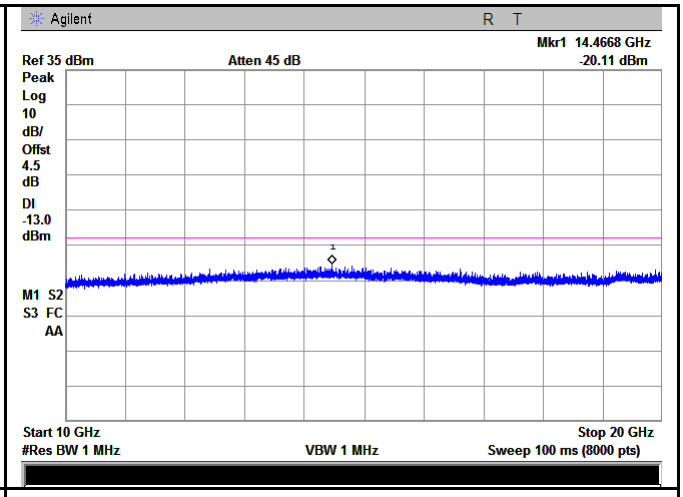



Band V - High Channel-2

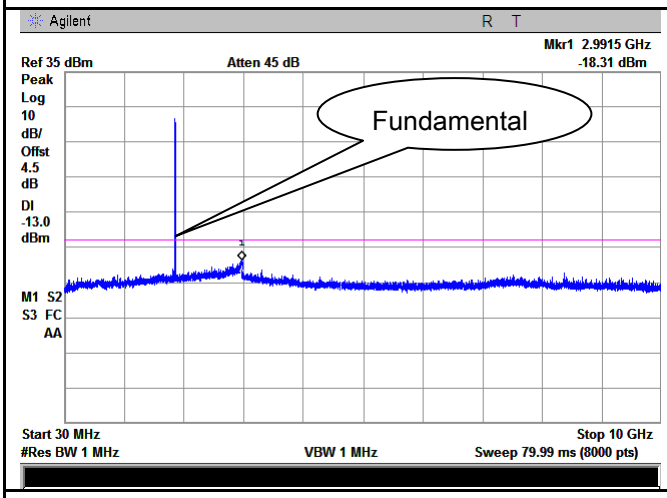
## UMTS-FDD Band II (Part 24E)



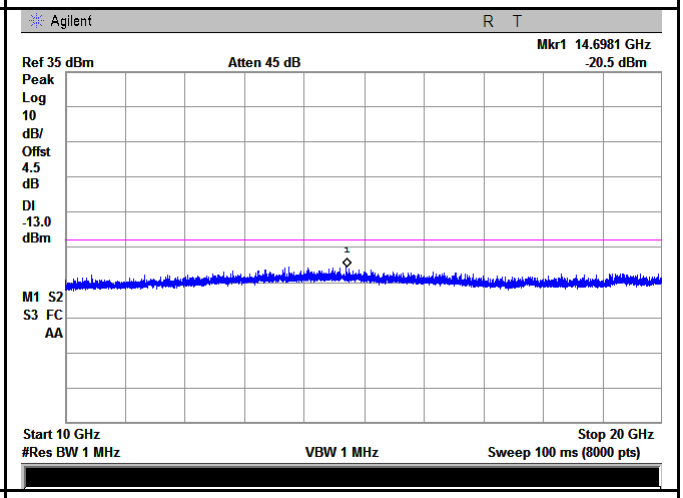

Band II - Low Channel-1



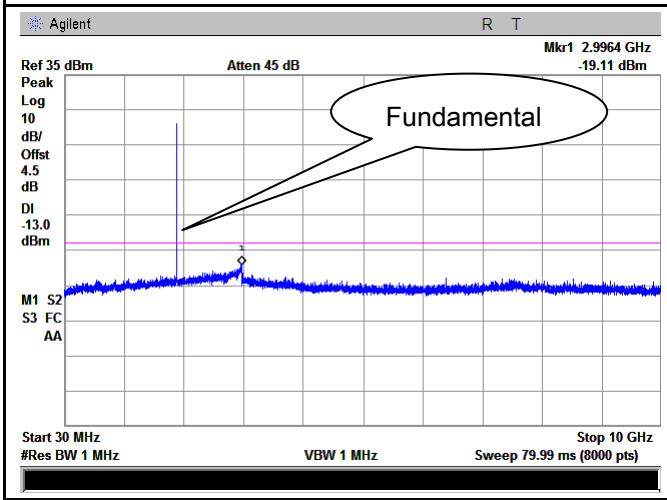

Band II - Low Channel-2



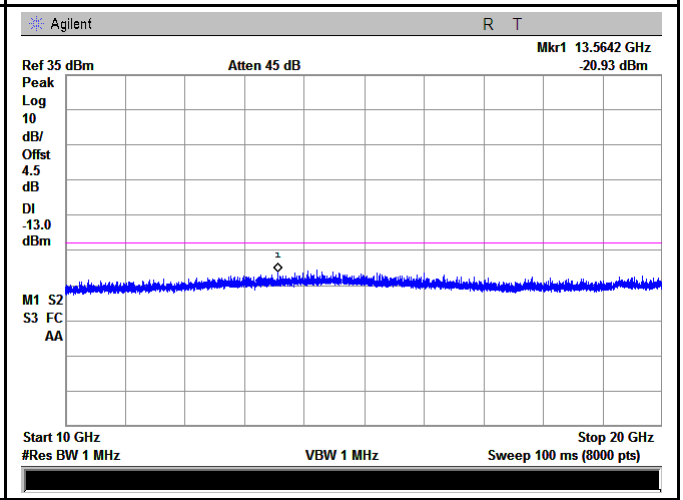

Band II - Middle Channel-1




Band II - Middle Channel-2

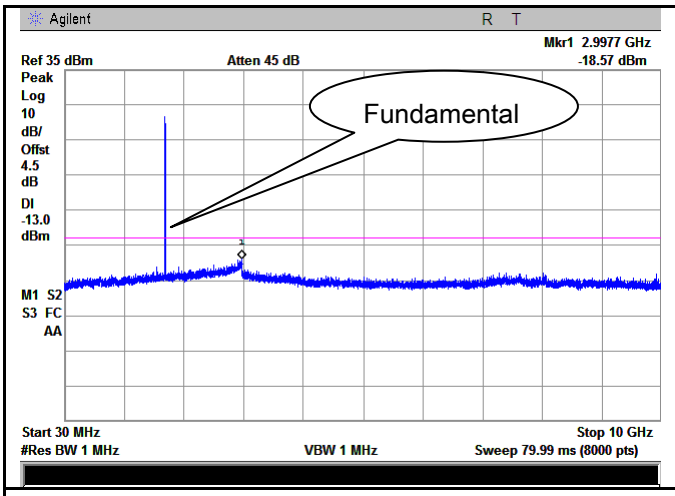



Band II - High Channel-1

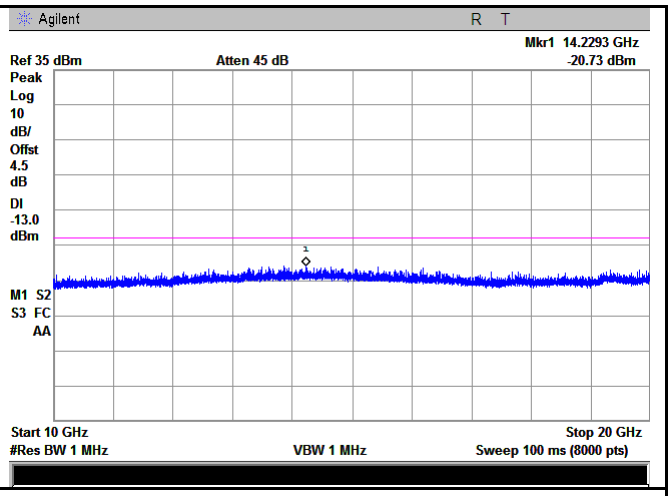



Band II - High Channel-2

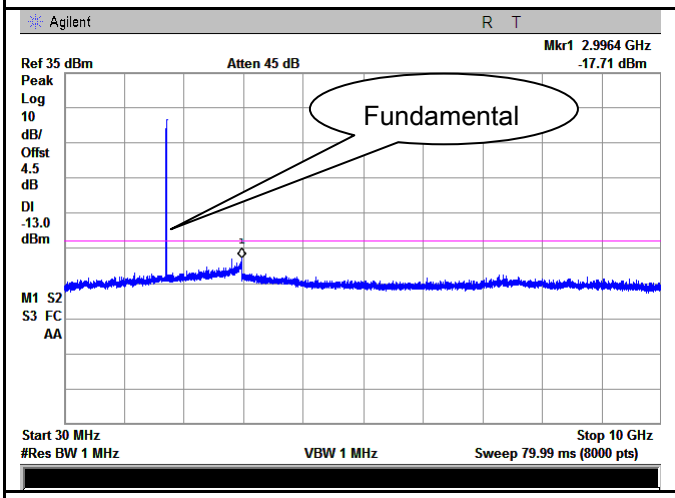
## UMTS-FDD Band IV (Part 27)



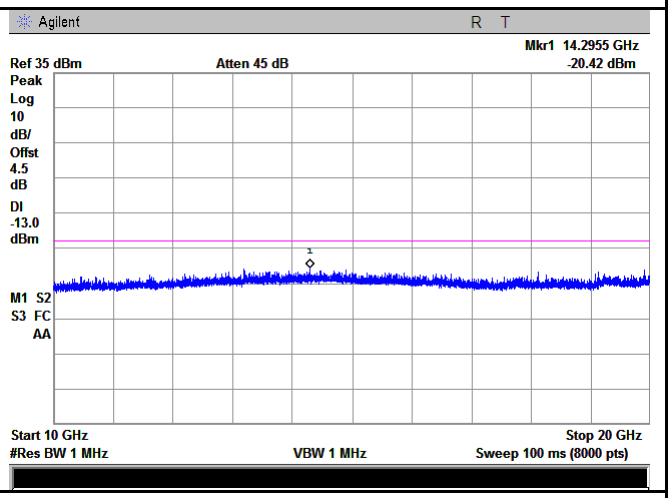

Band IV - Low Channel-1



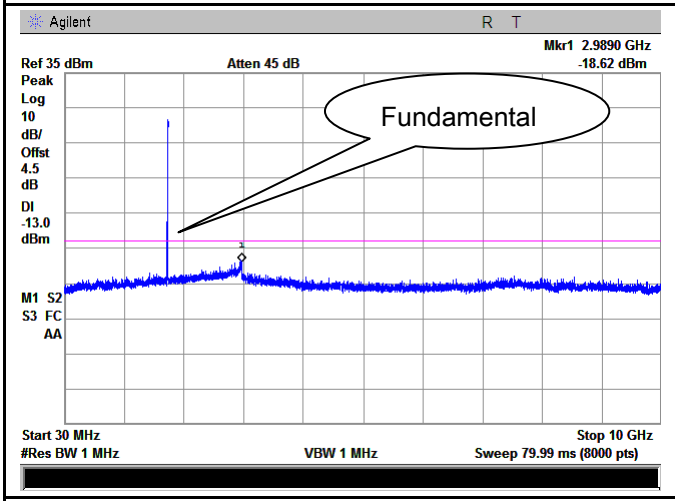

Band IV - Low Channel-2



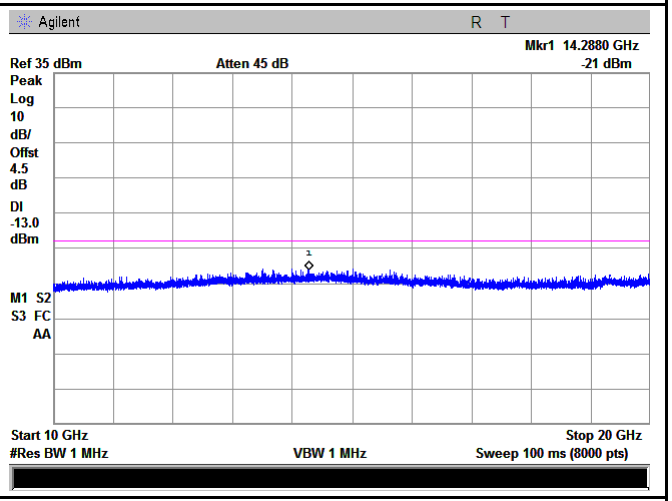

Band IV - Middle Channel-1




Band IV - Middle Channel-2



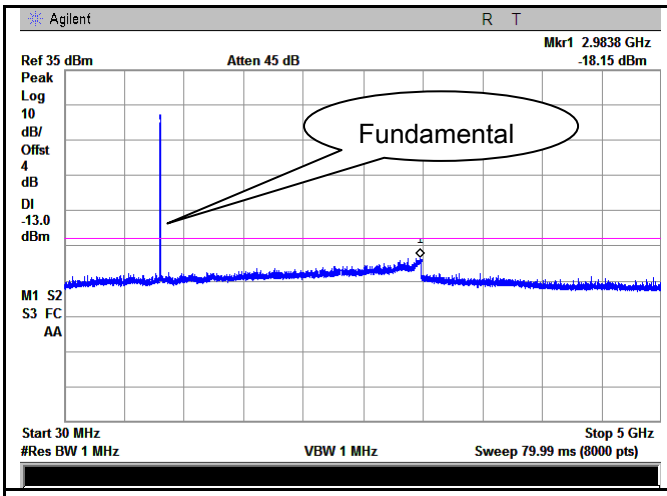

Band IV - High Channel-1



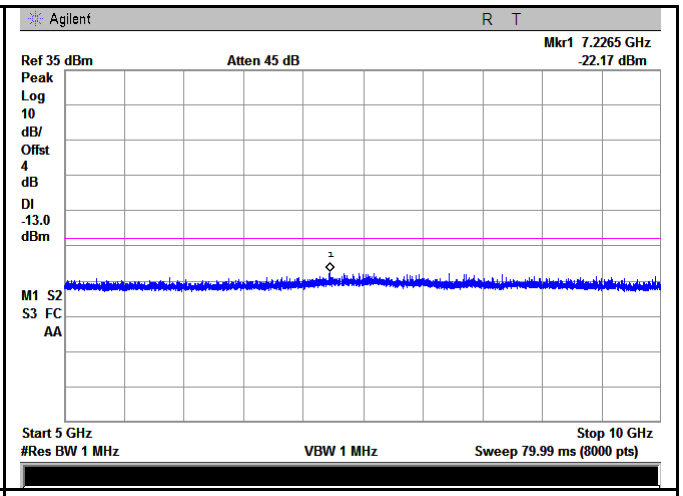

Band IV - High Channel-2

## HSUPA:

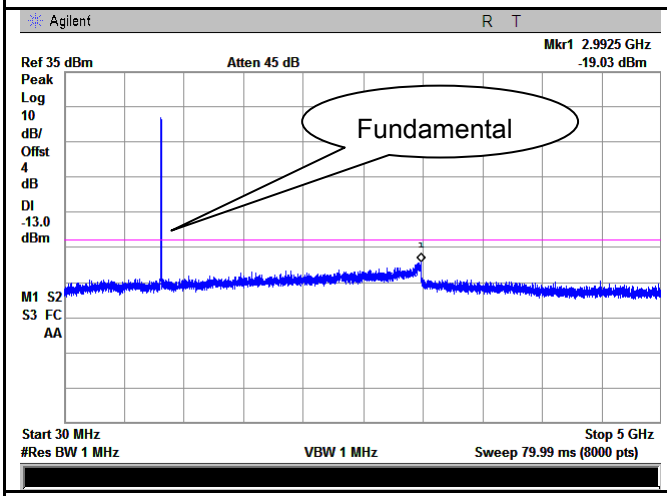
## UMTS-FDD Band V (Part 22H)



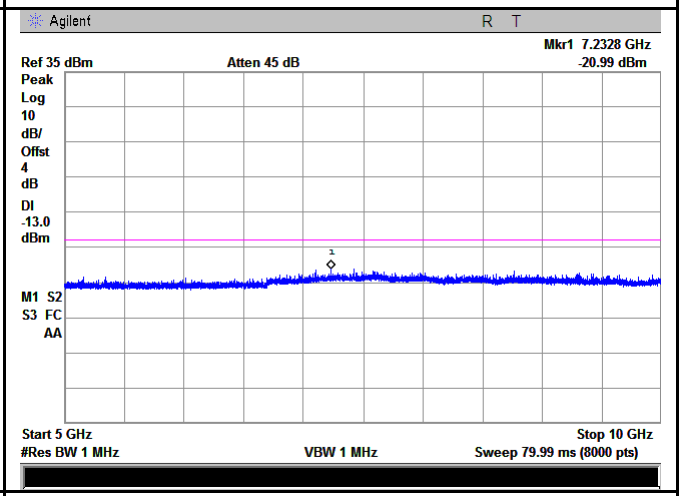

Band V - Low Channel-1



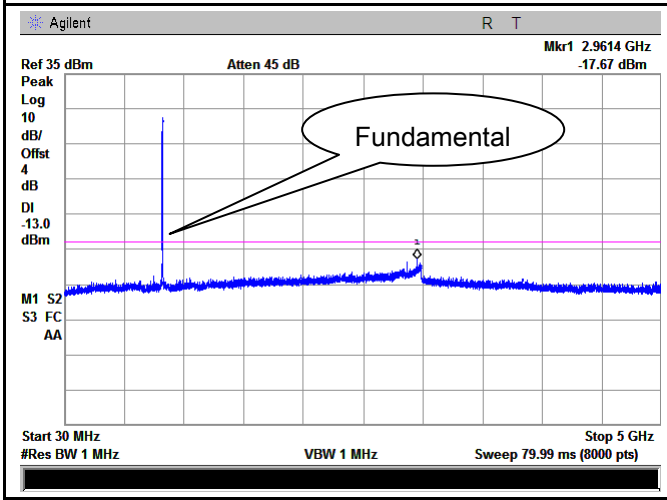

Band V - Low Channel-2



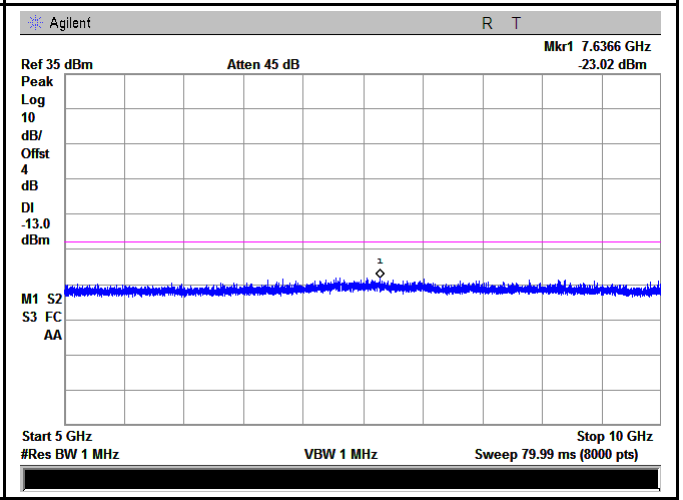

Band V - Middle Channel-1




Band V - Middle Channel-2

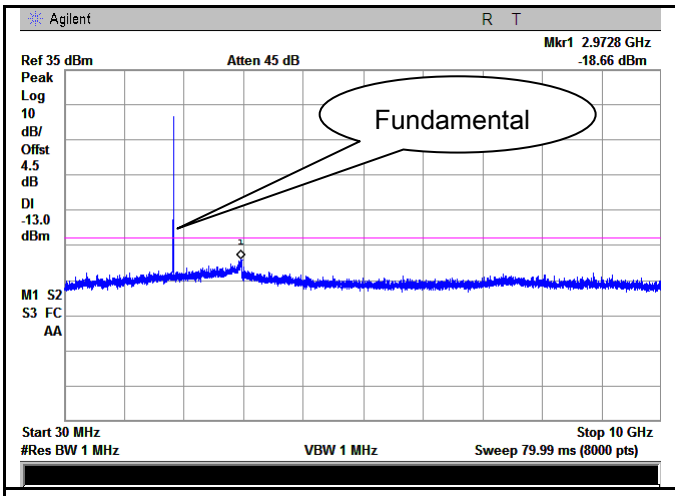



Band V - High Channel-1

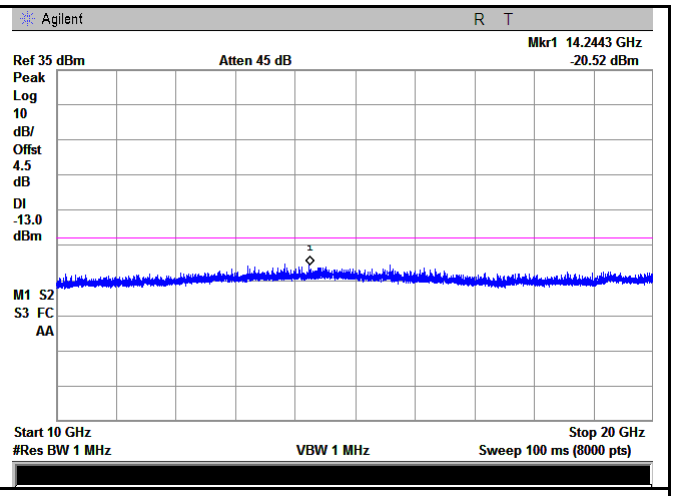



Band V - High Channel-2

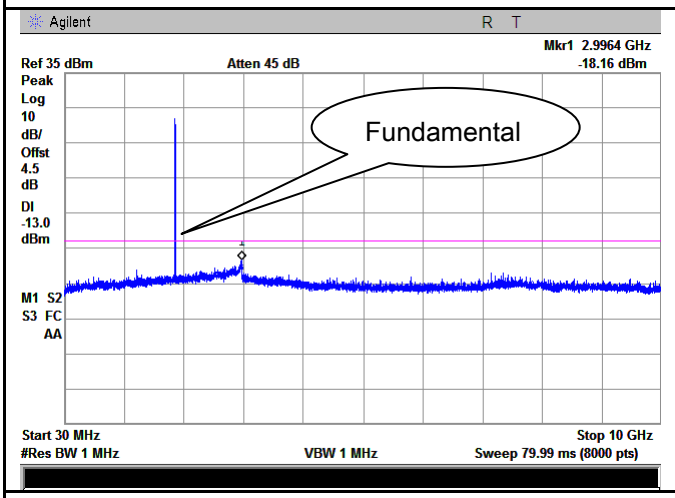
## UMTS-FDD Band II (Part 24E)



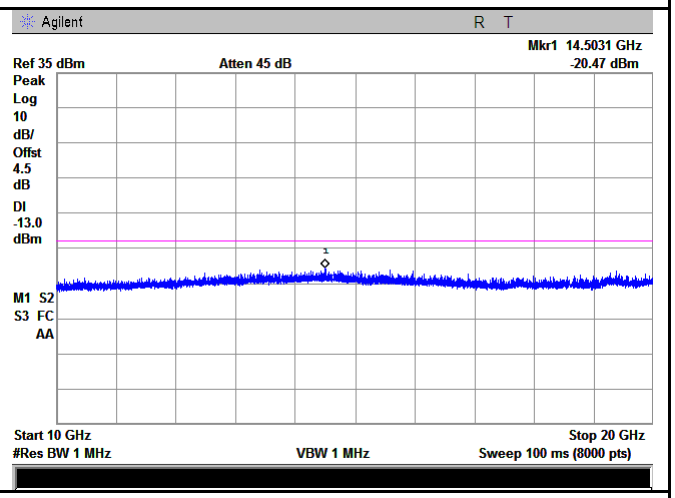

Band II - Low Channel-1



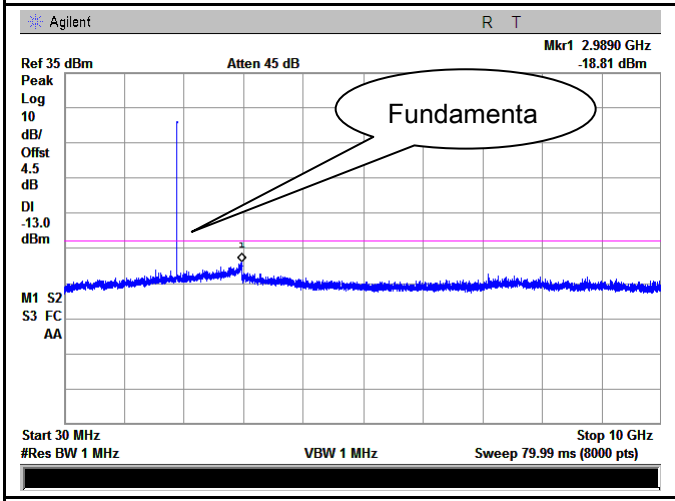

Band II - Low Channel-2



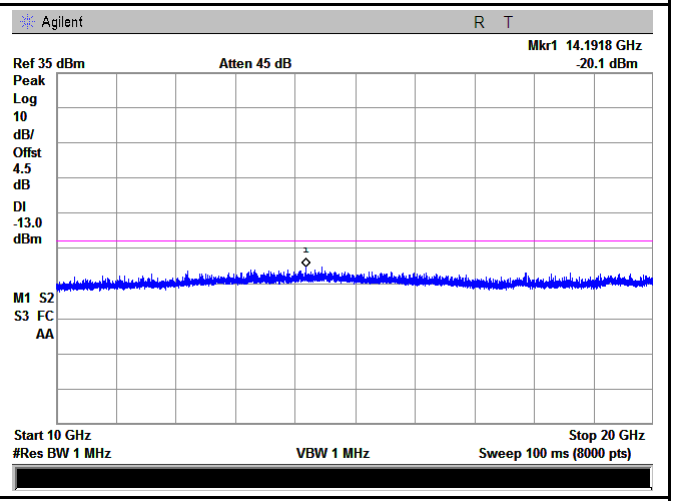

Band II - Middle Channel-1




Band II - Middle Channel-2

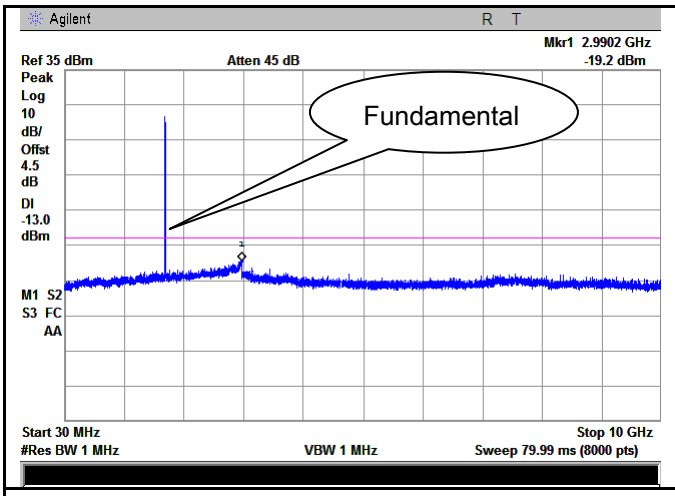



Band II - High Channel-1

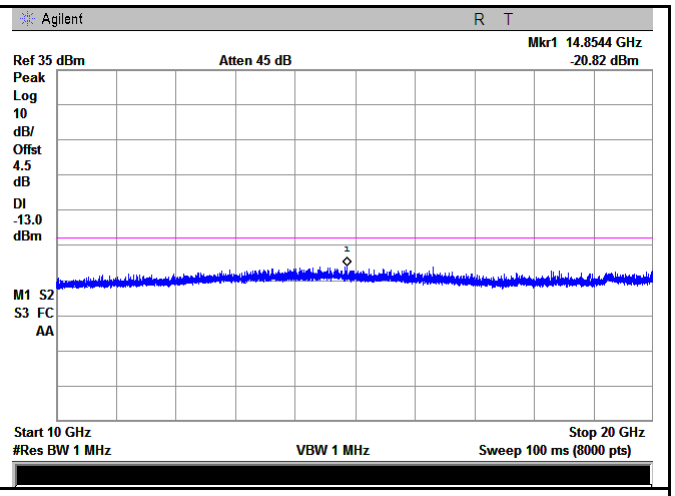



Band II - High Channel-2

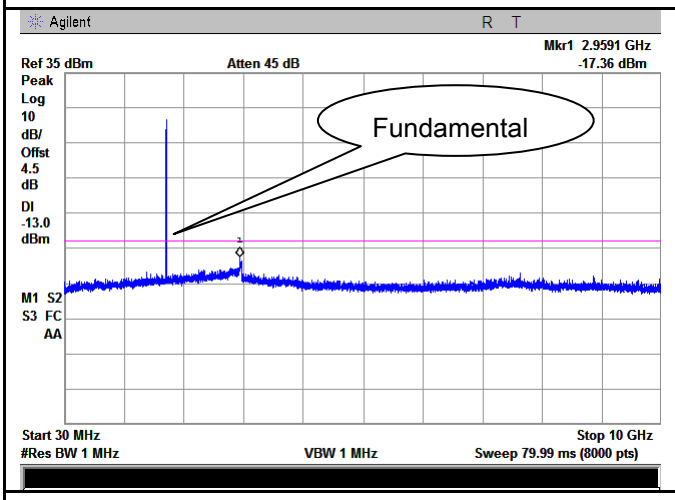
## UMTS-FDD Band IV (Part 27)



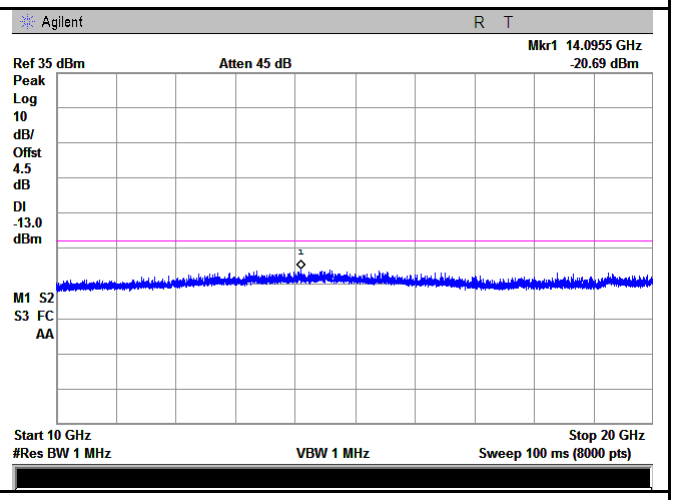

Band IV - Low Channel-1



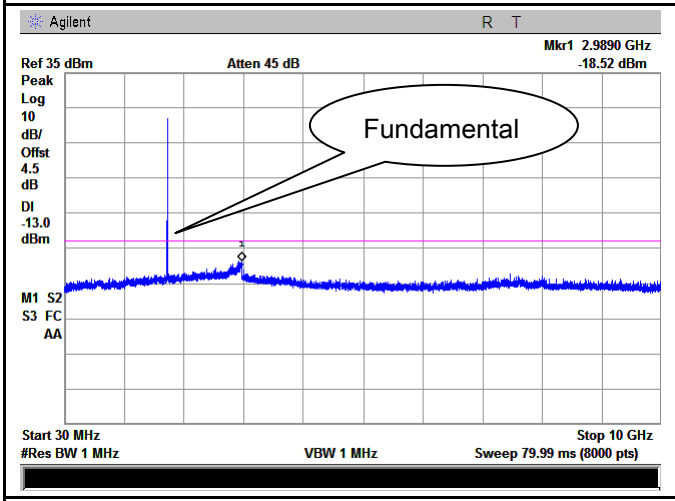

Band IV - Low Channel-2



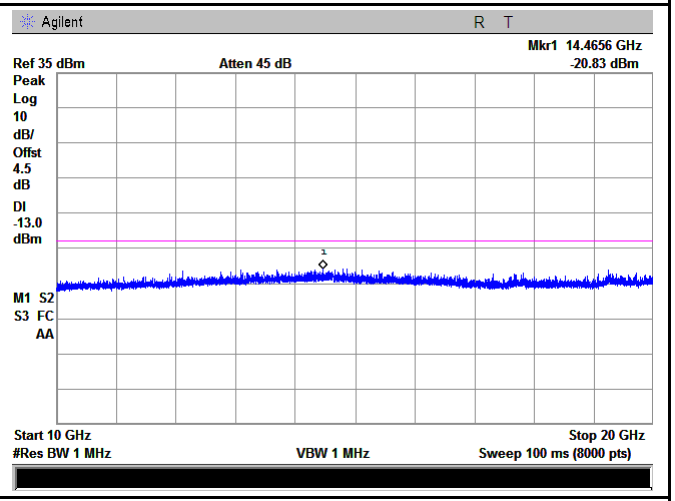

Band IV - Middle Channel-1




Band IV - Middle Channel-2



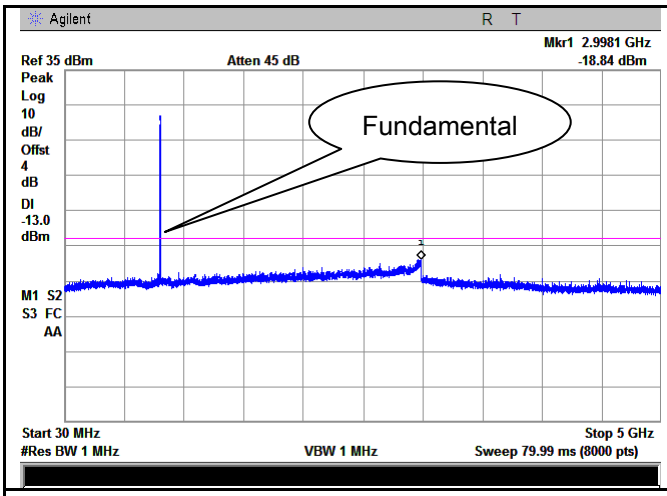

Band IV - High Channel-1



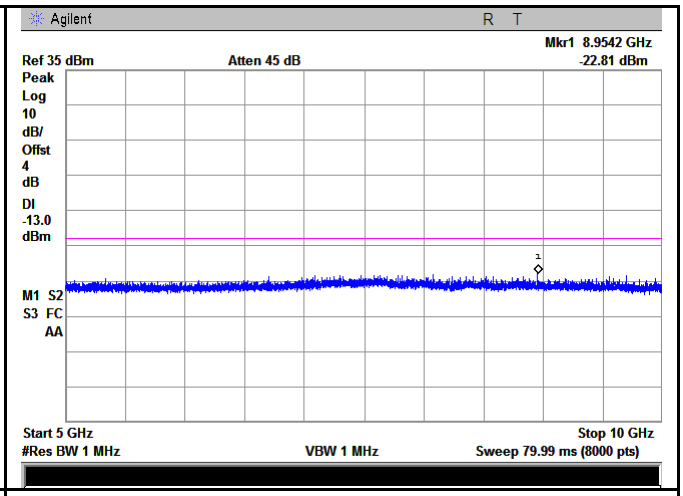

Band IV - High Channel-2

## HSDPA:

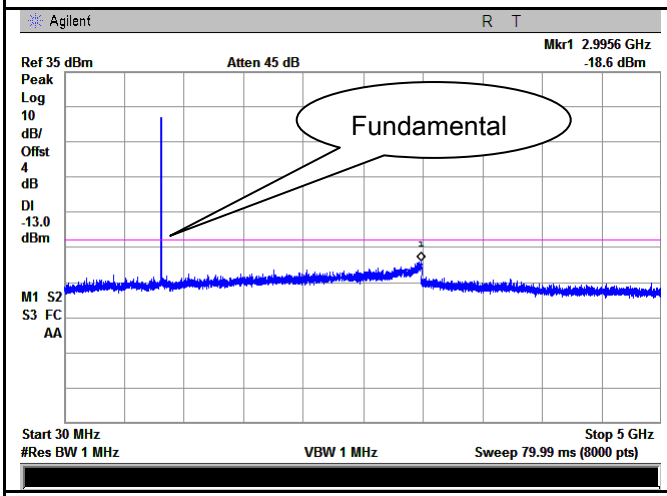
## UMTS-FDD Band V (Part 22H)



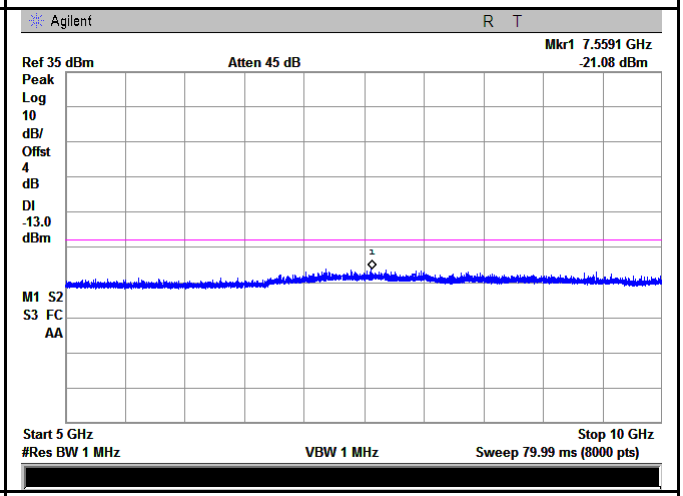

Band V - Low Channel-1



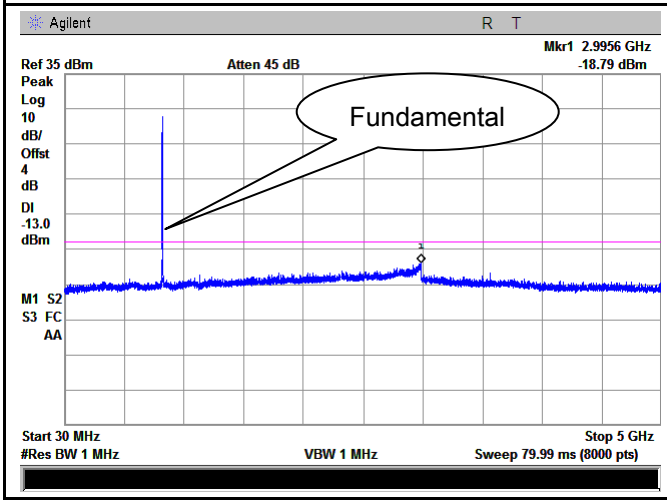

Band V - Low Channel-2



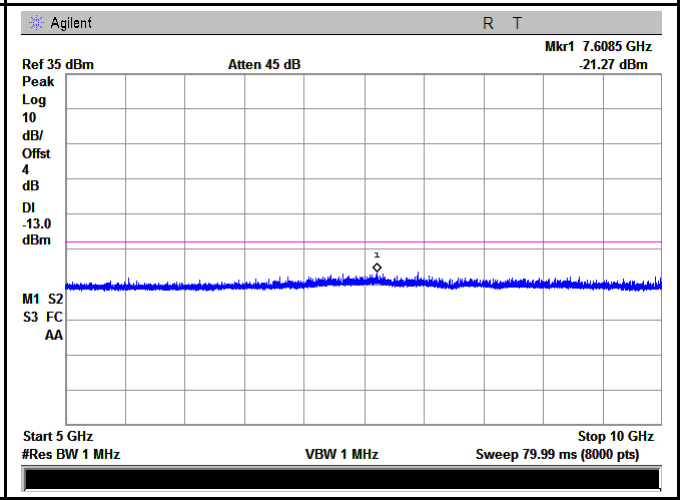

Band V - Middle Channel-1




Band V - Middle Channel-2

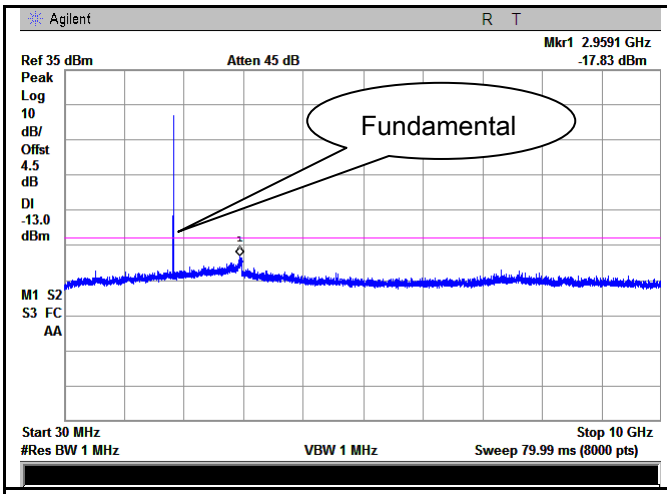



Band V - High Channel-1

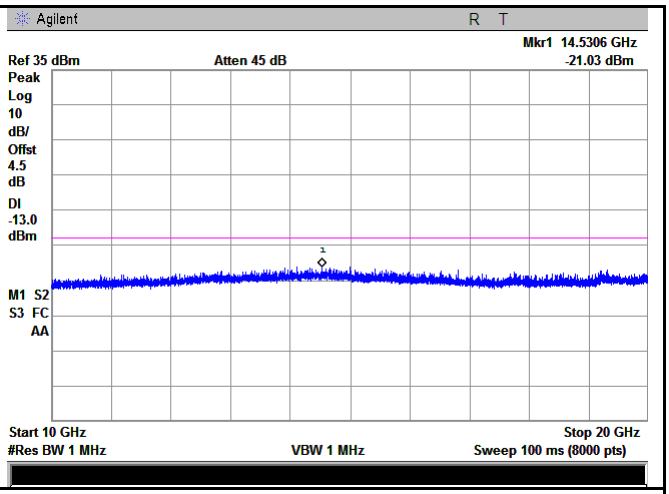



Band V - High Channel-2

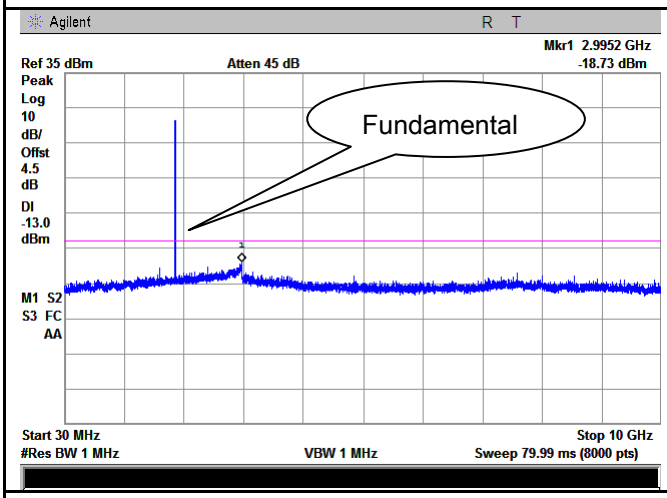
## UMTS-FDD Band II (Part 24E)



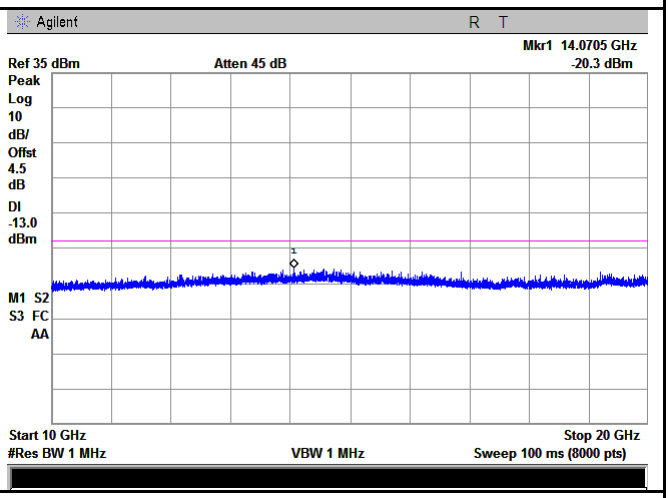

Band II - Low Channel-1



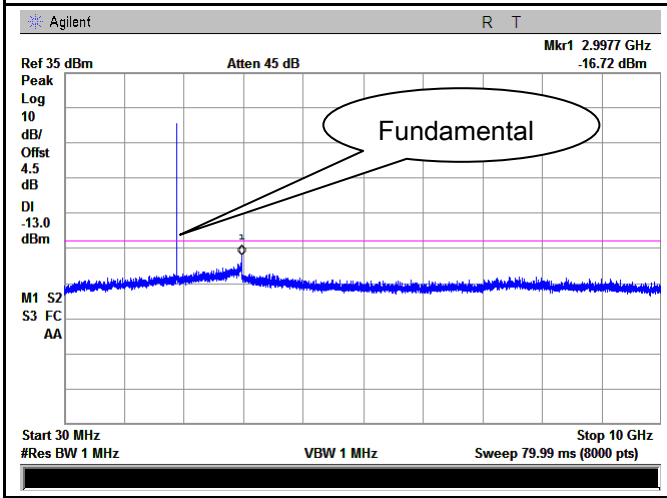

Band II - Low Channel-2



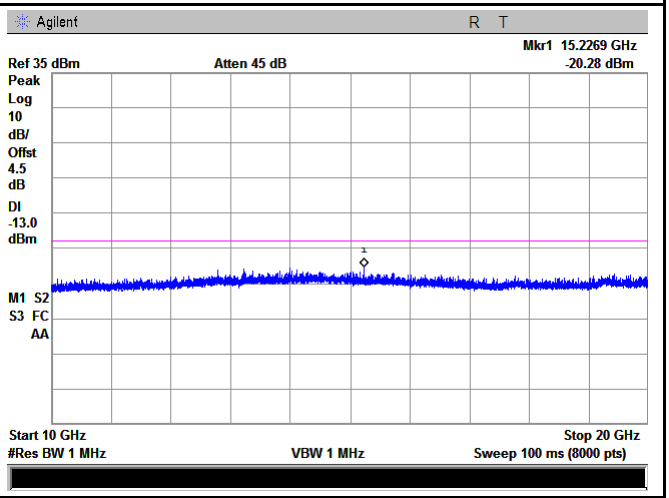

Band II - Middle Channel-1




Band II - Middle Channel-2

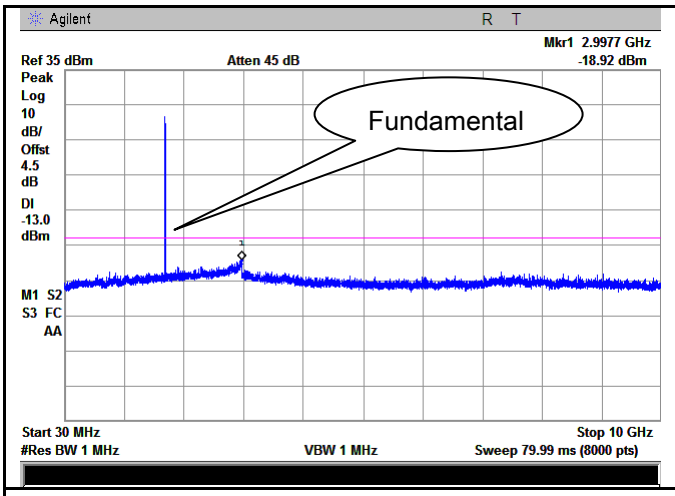



Band II - High Channel-1

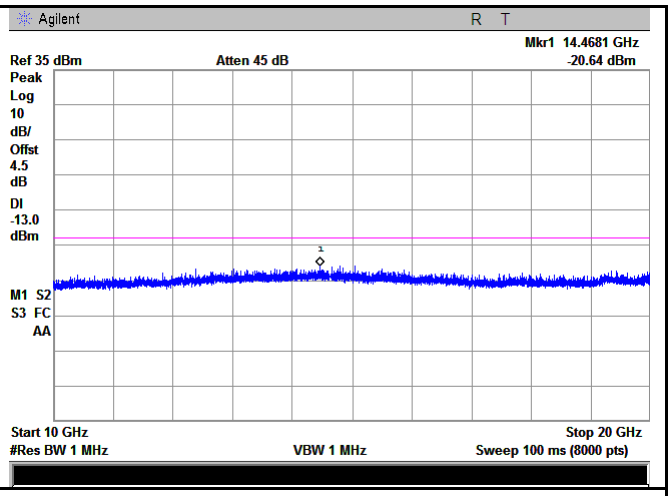



Band II - High Channel-2

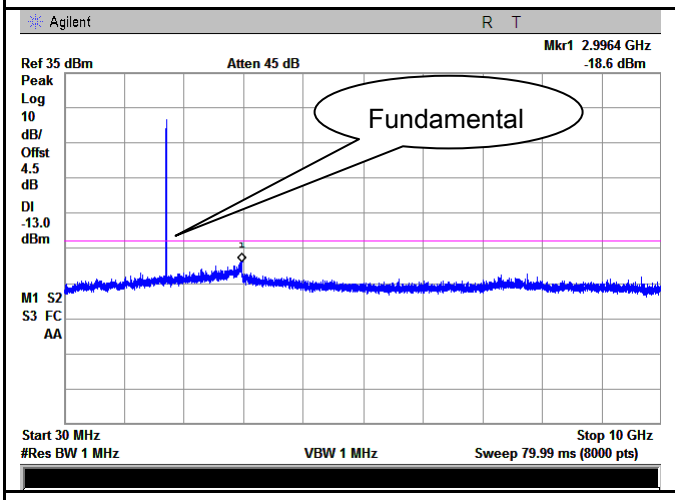
## UMTS-FDD Band IV (Part 27)



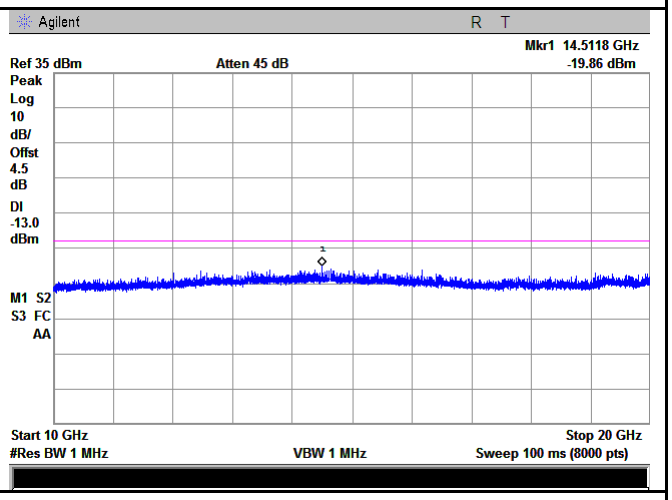

Band IV - Low Channel-1



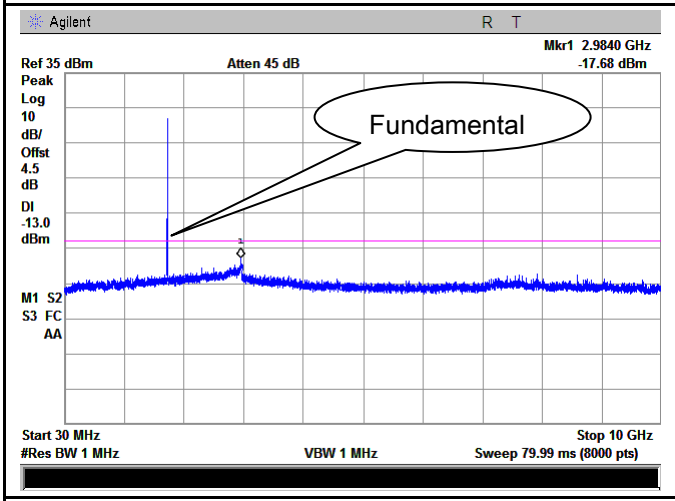

Band IV - Low Channel-2



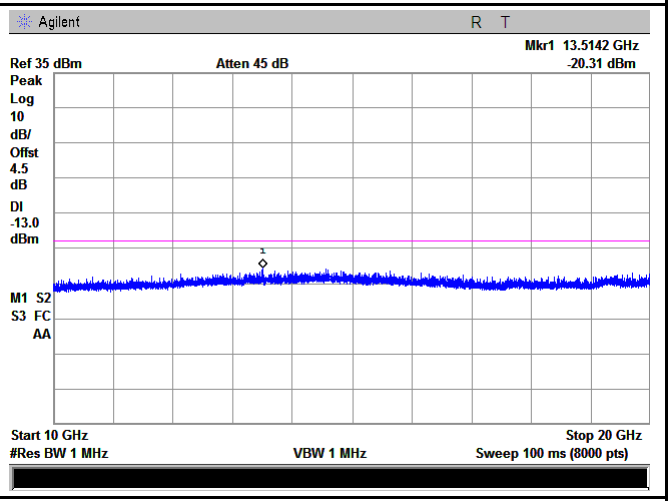

Band IV - Middle Channel-1




Band IV - Middle Channel-2




Band IV - High Channel-1

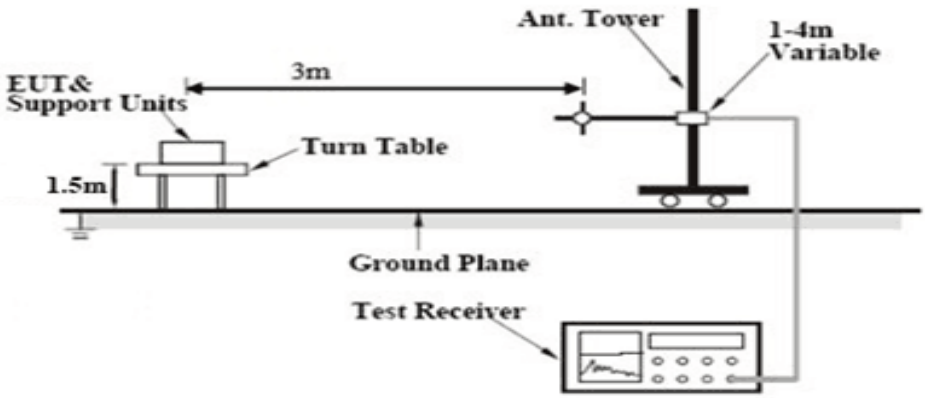



Band IV - High Channel-2

## 6.6 Spurious Radiated Emissions

| | |
|---|---|
| Temperature | 25 °C |
| Relative Humidity | 57% |
| Atmospheric Pressure | 1014mbar |
| Test date : | October 20, 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 | -43.7 | V | 7.95 | 0.67 | -36.42 | -13 | -23.42 |
| 1648.4 | -43.28 | H | 7.95 | 0.67 | -36 | -13 | -23 |
| 745.5 | -53.11 | V | 6.36 | 0.41 | -47.16 | -13 | -34.16 |
| 631.1 | -53.79 | H | 6.1 | 0.39 | -48.08 | -13 | -35.08 |

### 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 | -44.33 | V | 7.95 | 0.67 | -37.05 | -13 | -24.05 |
| 1673.2 | -43.88 | H | 7.95 | 0.67 | -36.6 | -13 | -23.6 |
| 145.8 | -52.32 | V | 1.01 | 0.17 | -51.48 | -13 | -38.48 |
| 655.3 | -53.14 | H | 6.06 | 0.37 | -47.45 | -13 | -34.45 |

### 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 | -42.71 | V | 7.95 | 0.68 | -35.44 | -13 | -22.44 |
| 1697.6 | -44.5 | H | 7.95 | 0.68 | -37.23 | -13 | -24.23 |
| 461.3 | -52.06 | V | 6.02 | 0.3 | -46.34 | -13 | -33.34 |
| 200 | -52.06 | H | 5.99 | 0.24 | -46.31 | -13 | -33.31 |

**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 | -48.38 | V | 10.25 | 1 | -39.13 | -13 | -26.13 |
| 3700.4 | -49.89 | H | 10.25 | 1 | -40.64 | -13 | -27.64 |
| 542.5 | -52.27 | V | 6.38 | 0.38 | -46.27 | -13 | -33.27 |
| 569.1 | -52.95 | H | 6.39 | 0.37 | -46.93 | -13 | -33.93 |

### 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 | -49.09 | V | 10.25 | 1.01 | -39.85 | -13 | -26.85 |
| 3760 | -49.94 | H | 10.25 | 1.01 | -40.7 | -13 | -27.7 |
| 324 | -52.4 | V | 5.58 | 0.24 | -47.06 | -13 | -34.06 |
| 605.8 | -53.78 | H | 6.08 | 0.36 | -48.06 | -13 | -35.06 |

### 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 | -47.59 | V | 10.36 | 1.02 | -38.25 | -13 | -25.25 |
| 3819.6 | -50.27 | H | 10.36 | 1.02 | -40.93 | -13 | -27.93 |
| 937.1 | -53.83 | V | 6.19 | 0.42 | -48.06 | -13 | -35.06 |
| 849.4 | -51.95 | H | 6.8 | 0.37 | -45.52 | -13 | -32.52 |

**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.*
*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 | -46.01 | V | 7.95 | 0.67 | -38.73 | -13 | -25.73 |
| 1652.8 | -45.55 | H | 7.95 | 0.67 | -38.27 | -13 | -25.27 |
| 603.4 | -53.51 | V | 6.06 | 0.37 | -47.82 | -13 | -34.82 |
| 152.1 | -53.95 | H | 0.99 | 0.19 | -53.15 | -13 | -40.15 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1670 | -46.51 | V | 7.95 | 0.67 | -39.23 | -13 | -26.23 |
| 1670 | -46.46 | H | 7.95 | 0.67 | -39.18 | -13 | -26.18 |
| 256.5 | -52.28 | V | 5.96 | 0.26 | -46.58 | -13 | -33.58 |
| 827 | -53.36 | H | 6.8 | 0.37 | -46.93 | -13 | -33.93 |

### 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 | -46.43 | V | 7.95 | 0.68 | -39.16 | -13 | -26.16 |
| 1693.2 | -44.99 | H | 7.95 | 0.68 | -37.72 | -13 | -24.72 |
| 185.7 | -53.33 | V | 5.6 | 0.25 | -47.98 | -13 | -34.98 |
| 445.3 | -52.08 | H | 6 | 0.27 | -46.35 | -13 | -33.35 |

**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 | -48.6 | V | 10.25 | 1 | -39.35 | -13 | -26.35 |
| 3704.8 | -50.72 | H | 10.25 | 1 | -41.47 | -13 | -28.47 |
| 510.2 | -53.1 | V | 6.39 | 0.35 | -47.06 | -13 | -34.06 |
| 224.6 | -52.39 | H | 6.04 | 0.22 | -46.57 | -13 | -33.57 |

### 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 | -49.51 | V | 10.25 | 1.01 | -40.27 | -13 | -27.27 |
| 3760 | -49.8 | H | 10.25 | 1.01 | -40.56 | -13 | -27.56 |
| 634.6 | -54.29 | V | 6.08 | 0.39 | -48.6 | -13 | -35.6 |
| 256.1 | -53.79 | H | 5.98 | 0.23 | -48.04 | -13 | -35.04 |

### 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 | -49.6 | V | 10.36 | 1.02 | -40.26 | -13 | -27.26 |
| 3815.2 | -49.04 | H | 10.36 | 1.02 | -39.7 | -13 | -26.7 |
| 609 | -53.7 | V | 6.05 | 0.39 | -48.04 | -13 | -35.04 |
| 684.5 | -54.42 | H | 6.05 | 0.38 | -48.75 | -13 | -35.75 |

**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*
*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 | -44.28 | V | 10.07 | 0.96 | -35.17 | -13 | -22.17 |
| 3424.8 | -44.18 | H | 10.07 | 0.96 | -35.07 | -13 | -22.07 |
| 612.8 | -52.05 | V | 6.38 | 0.41 | -46.08 | -13 | -33.08 |
| 166 | -53.29 | H | 1.02 | 0.23 | -52.5 | -13 | -39.5 |

### 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 | -43.55 | V | 10.09 | 0.96 | -34.42 | -13 | -21.42 |
| 3480 | -43.4 | H | 10.09 | 0.96 | -34.27 | -13 | -21.27 |
| 182.8 | -53.31 | V | 1 | 0.22 | -52.53 | -13 | -39.53 |
| 787.9 | -52.83 | H | 6.35 | 0.46 | -46.94 | -13 | -33.94 |

### 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 | -44.32 | V | 10.09 | 0.97 | -35.2 | -13 | -22.2 |
| 3505.2 | -43.11 | H | 10.09 | 0.97 | -33.99 | -13 | -20.99 |
| 714.3 | -52.6 | V | 6.41 | 0.43 | -46.62 | -13 | -33.62 |
| 178.6 | -51.74 | H | 1.01 | 0.22 | -50.95 | -13 | -37.95 |

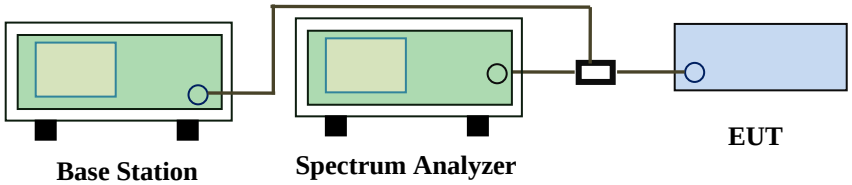
**Note:**

*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 | 57% |
| Atmospheric Pressure | 1018mbar |
| Test date : | October 19, 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) |
| --- | --- | --- |
| 823.984 | -14.67 | -13 |
| 849.020 | -16.04 | -13 |

## PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.980 | -16.14 | -13 |
| 1910.024 | -17.07 | -13 |

GPRS:

## Cellular Band (Part 22H) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.982 | -15.67 | -13 |
| 849.016 | -15.11 | -13 |

## PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.978 | -15.8 | -13 |
| 1910.022 | -17.54 | -13 |

EGPRS (MCS1):

Cellular Band (Part 22H) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.984 | -15.04 | -13 |
| 849.006 | -16.06 | -13 |

PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.978 | -15.84 | -13 |
| 1910.023 | -18.14 | -13 |

RCM:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.95 | -24.51 | -13 |
| 849.06 | -26.39 | -13 |

UMTS-FDD Band II (Part 24E)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.01 | -15.37 | -13 |
| 1910.76 | -23.61 | -13 |

UMTS-FDD Band IV (Part 27)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1708.95 | -23.32 | -13 |
| 1756.17 | -21.32 | -13 |

HSUPA:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.95 | -23.93 | -13 |
| 849.04 | -25.13 | -13 |

UMTS-FDD Band II (Part 24E)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.08 | -16.33 | -13 |
| 1910.02 | -22.04 | -13 |

UMTS-FDD Band IV (Part 27)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1709.13 | -23.51 | -13 |
| 1756.18 | -22.41 | -13 |

HSDPA:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.07 | -23.91 | -13 |
| 849.01 | -23.42 | -13 |

UMTS-FDD Band II (Part 24E)

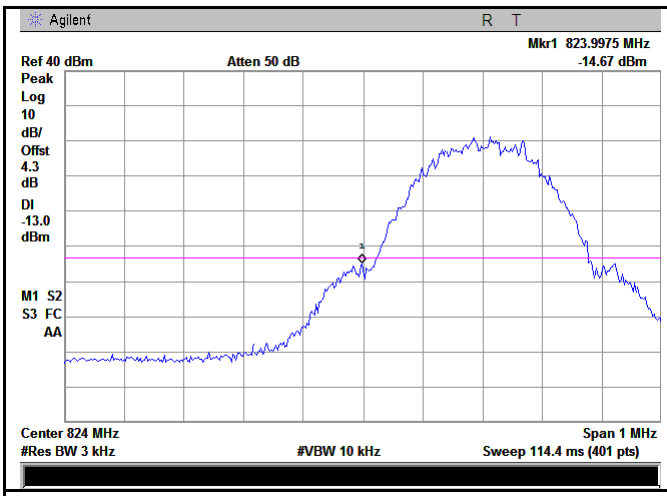
| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.10 | -16.31 | -13 |
| 1910.04 | -23.56 | -13 |

## UMTS-FDD Band IV (Part 27)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1709.14 | -22.69 | -13 |
| 1756.18 | -22.28 | -13 |

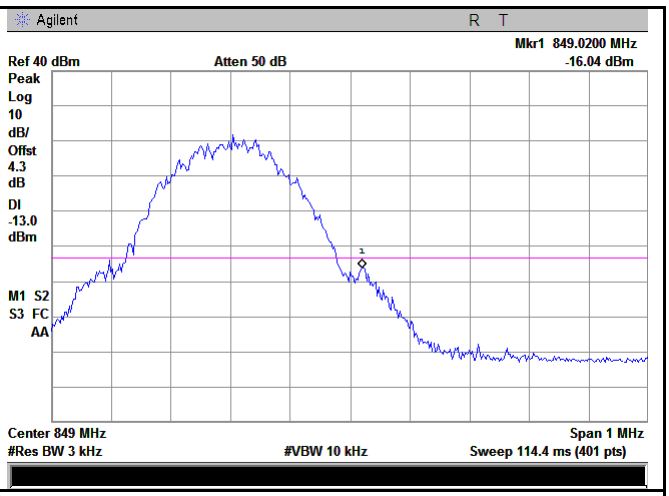
## GSM Voice:

### Test Plots



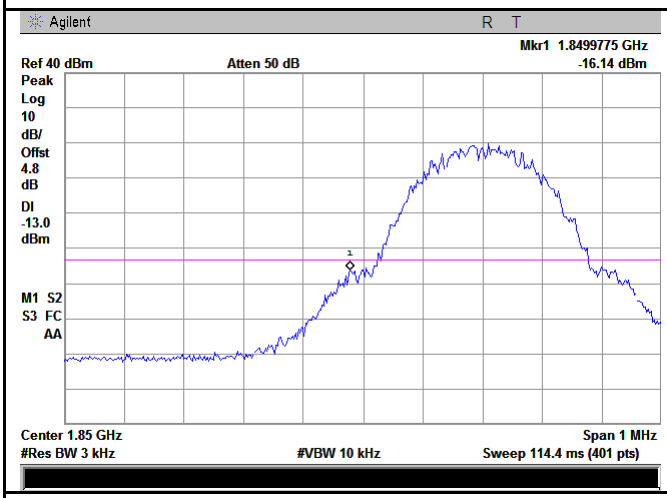

Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.0+0.3=4.3dB



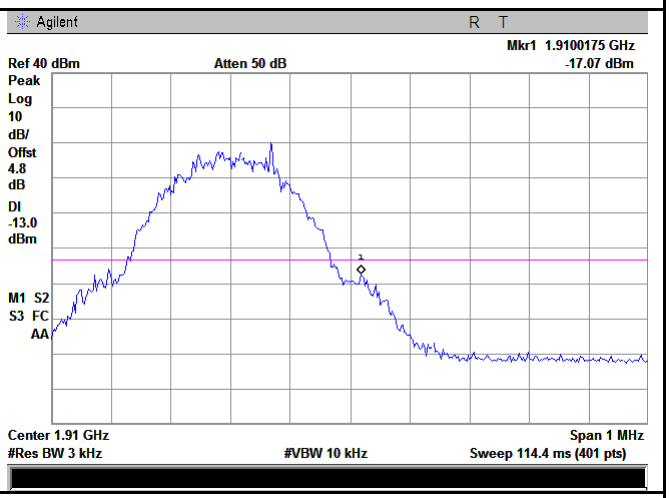

Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.0+0.3=4.3dB




PCS Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.5+0.3=4.8dB

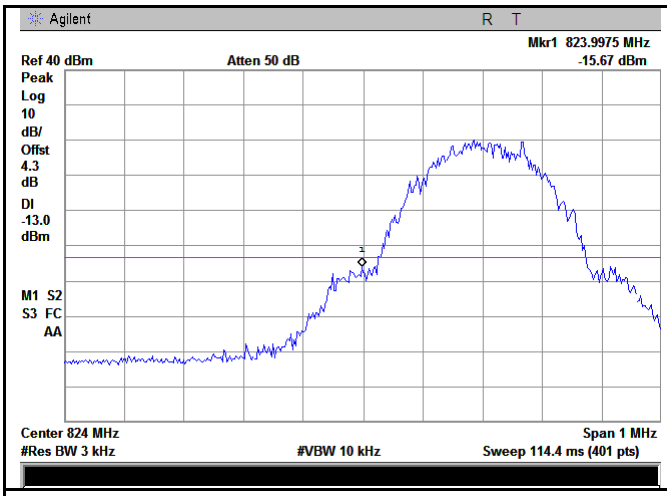



PCS Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.5+0.3=4.8dB

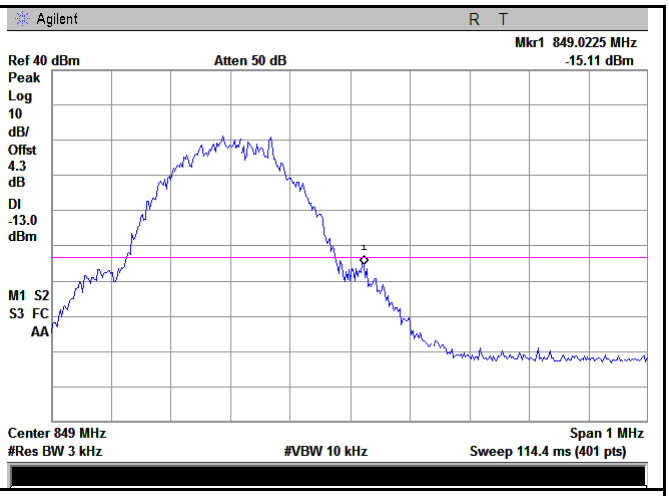
## GPRS:

### Test Plots



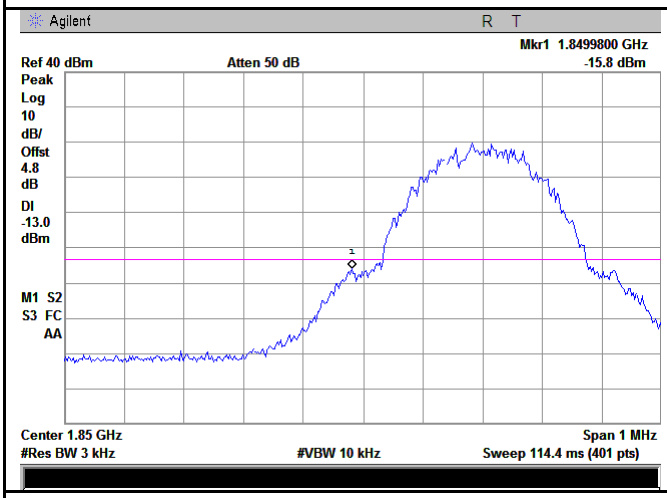

Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.0+0.3=4.3dB



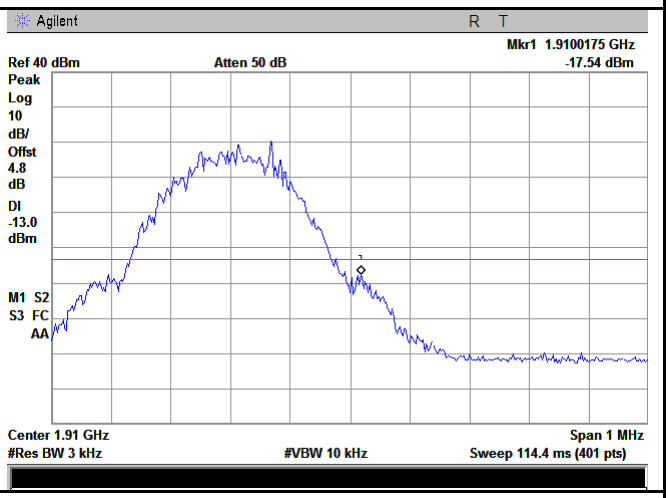

Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.19/3)=4.0+0.3=4.3dB




PCS Band - Low Channel

Note: Offset=Cable loss (4.5) + 10log (3.20/3)=4.5+0.3=4.8dB

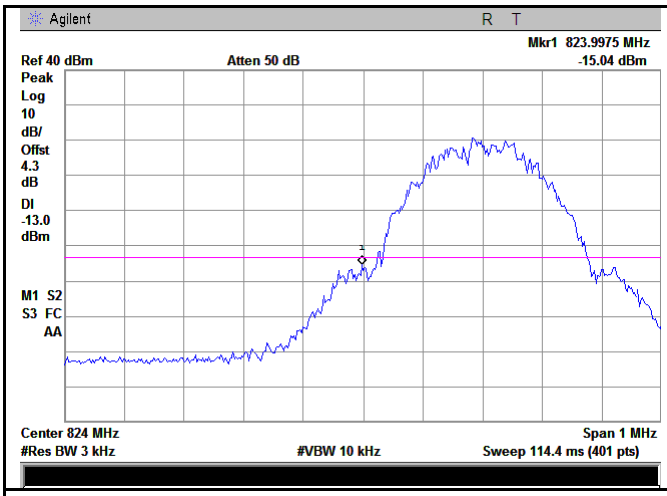



PCS Band - High Channel

Note: Offset=Cable loss (4.5) + 10log (3.20/3)=4.5+0.3=4.8dB

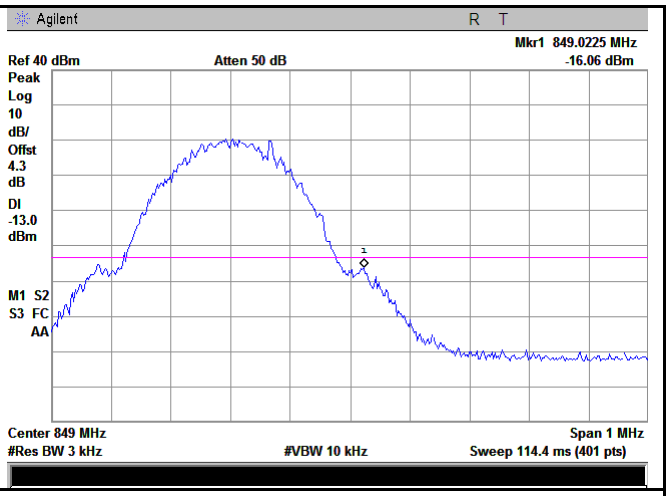
## EGPRS (MCS1):

### Test Plots



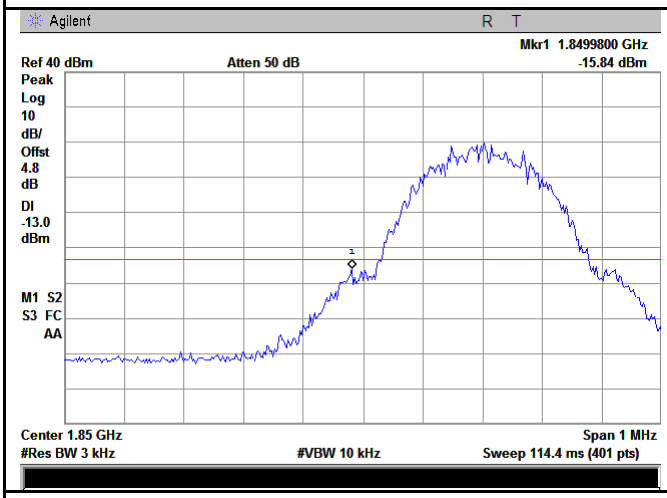

Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.20/3)=4.0+0.3=4.3dB



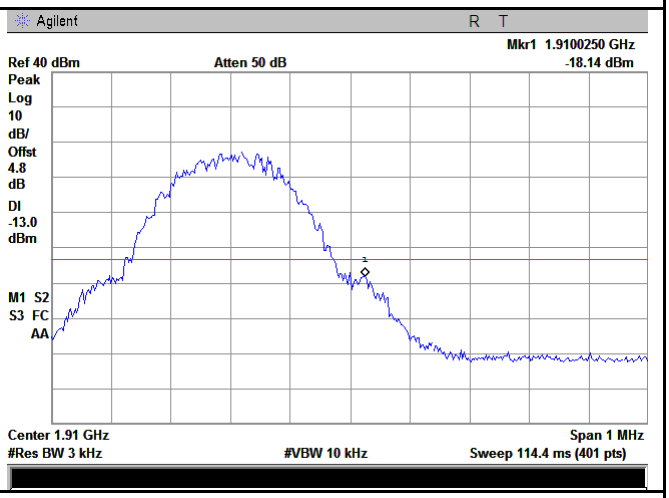

Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.19/3)=4.0+0.3=4.3dB




PCS Band - Low Channel

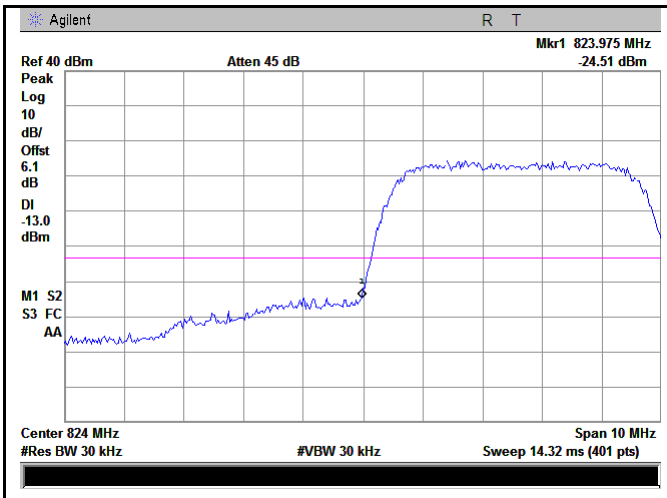
Note: Offset=Cable loss (4.5) + 10log (3.20/3)=4.5+0.3=4.8dB




PCS Band - High Channel

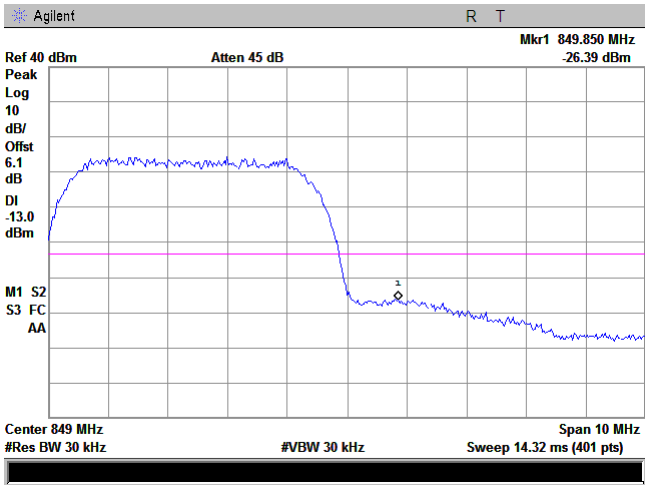
Note: Offset=Cable loss (4.5) + 10log (3.20/3)=4.5+0.3=4.8dB

**RMC:**



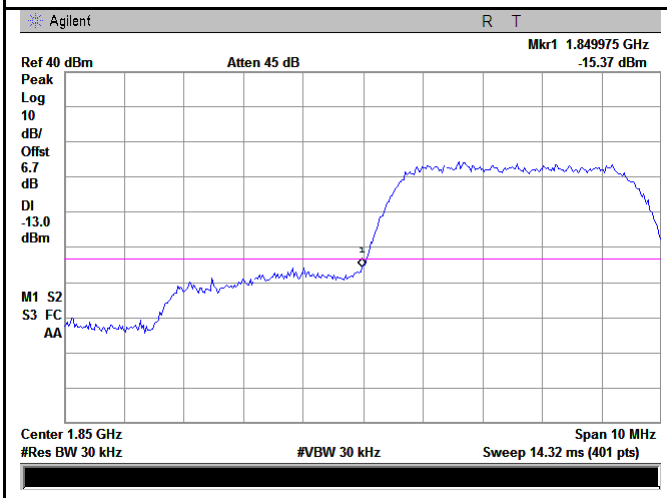

UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (48.83/30)=4.0+2.1=6.1 dB



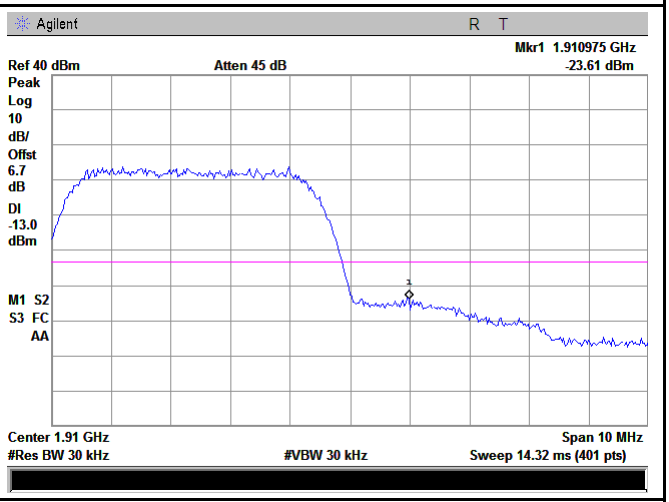

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (48.80/30)=4.0+2.1=6.1 dB



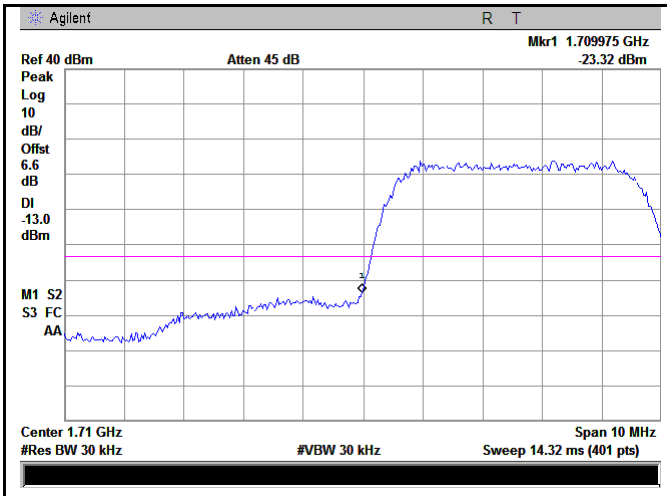

UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log (49.67/30)=4.5+2.2=6.7 dB



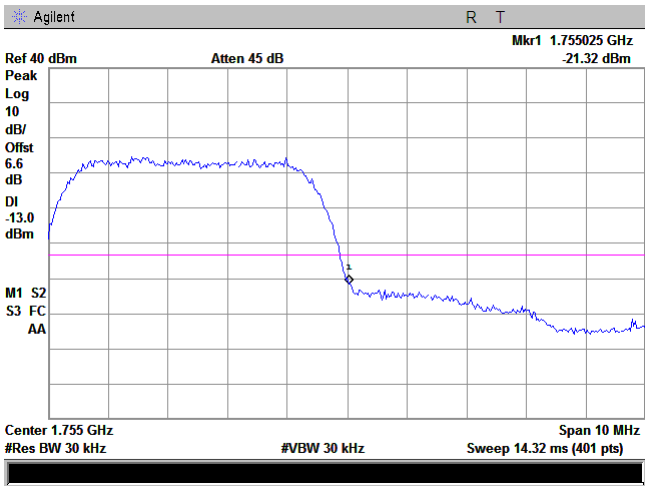

UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log (49.49/30)=4.5+2.2=6.7 dB




UMTS-FDD Band IV - Low Channel

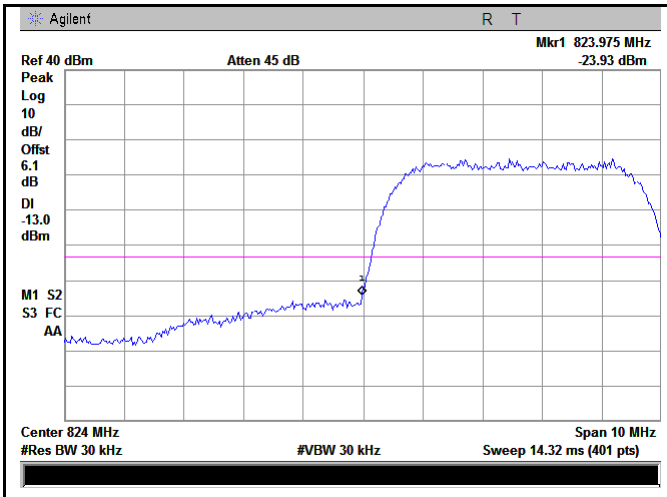
Note: Offset=Cable loss (4.5) + 10log (48.83/30)=4.5+2.1=6.6 dB




UMTS-FDD Band IV - High Channel

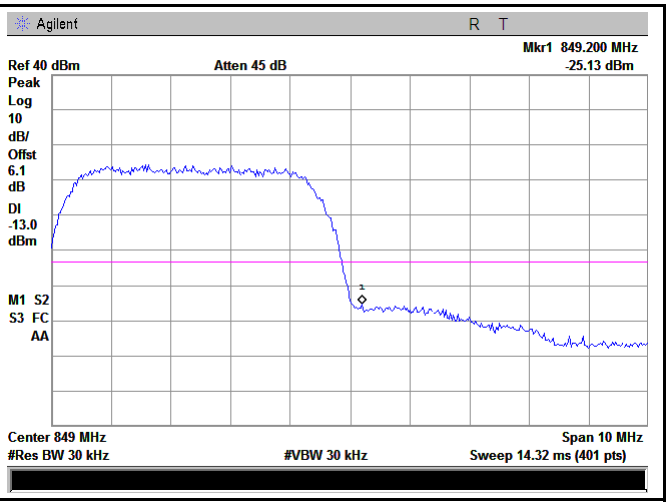
Note: Offset=Cable loss (4.0) + 10log (48.82/30)=4.5+2.1=6.6 dB

## HSUPA:



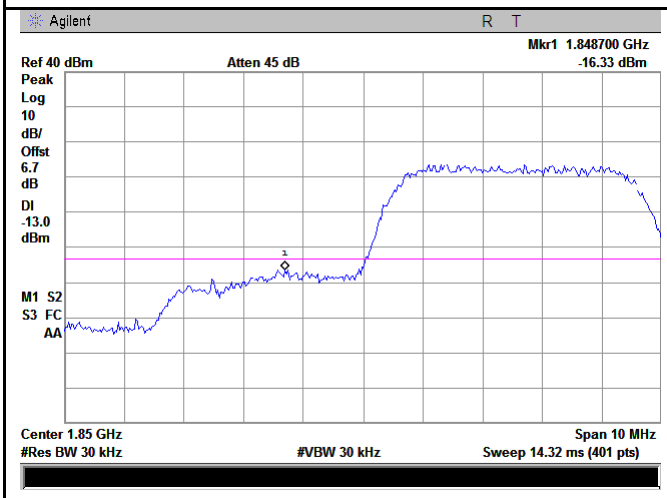

UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (48.99/30)=4.0+2.1=6.1 dB



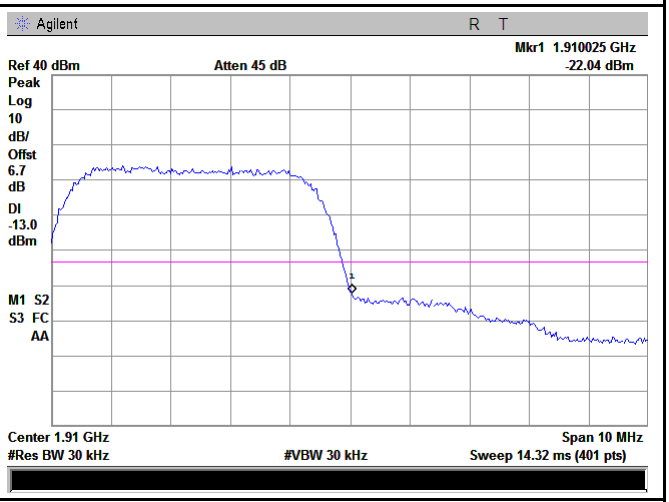

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (48.93/30)=4.0+2.1=6.1 dB



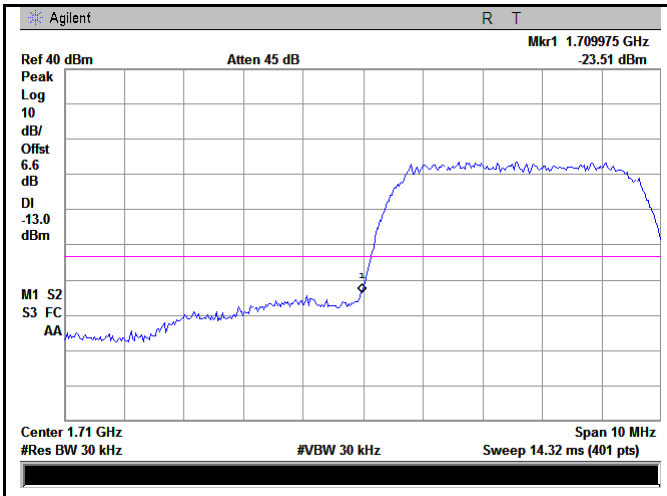

UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log (49.58 /30)=4.5+2.2=6.7dB



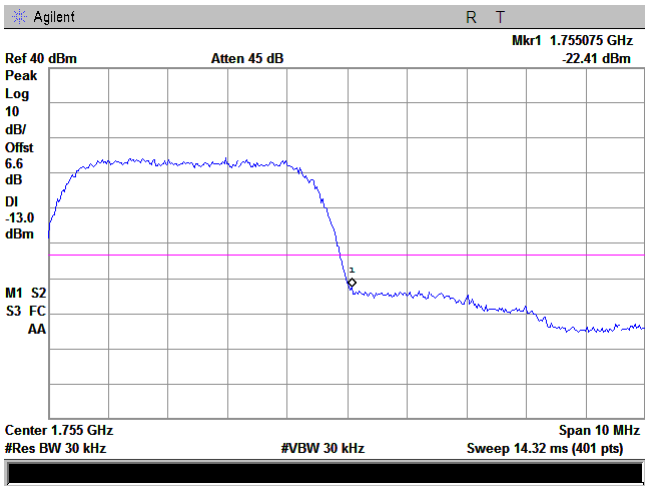

UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log (49.48/30)=4.5+2.2=6.7 dB




UMTS-FDD Band IV - Low Channel

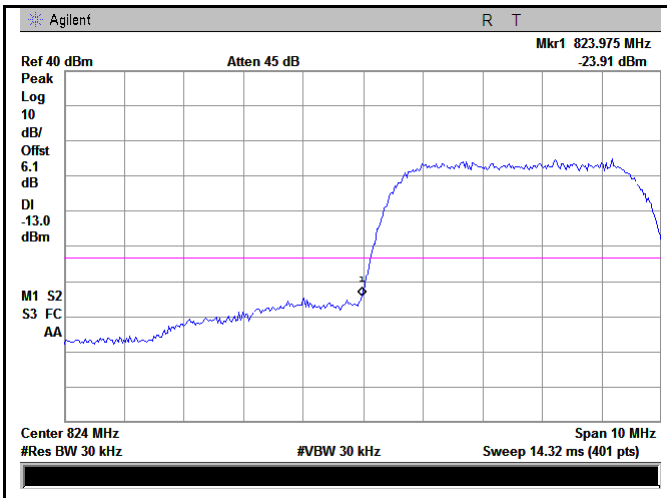
Note: Offset=Cable loss (4.5) + 10log (48.64/30)=4.5+2.1=6.6 dB




UMTS-FDD Band IV - High Channel

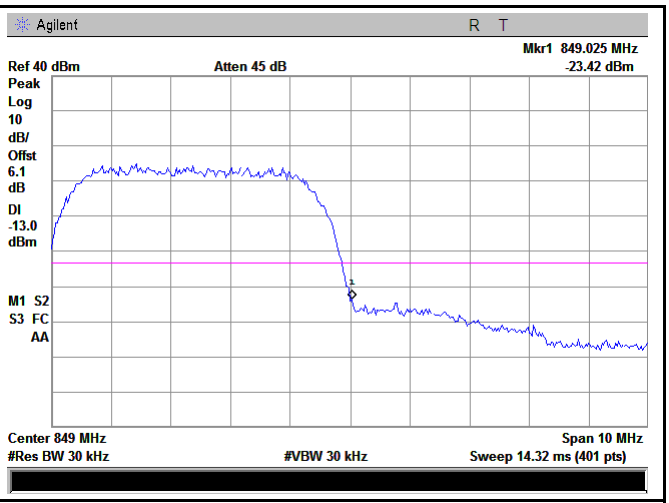
Note: Offset=Cable loss (4.5) + 10log (48.88/30)=4.5+2.1=6.6 dB

## HSDPA:



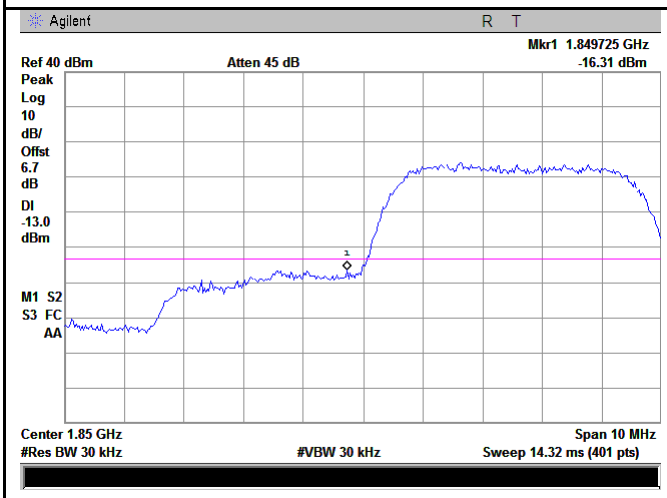

UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (48.44/30)=4.0+2.1=6.1 dB



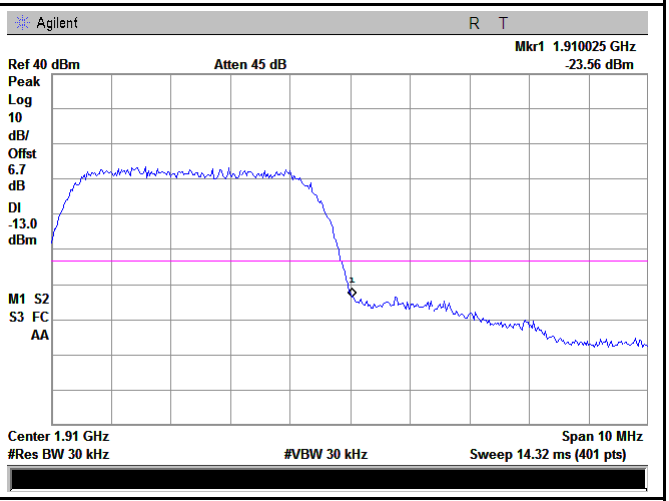

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (48.87/30)=4.0+2.1=6.1 dB



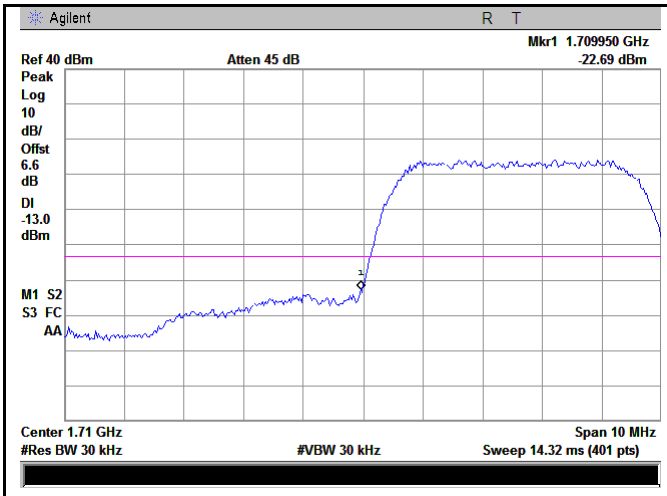

UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log (49.47/30)=4.5+2.2=6.7 dB



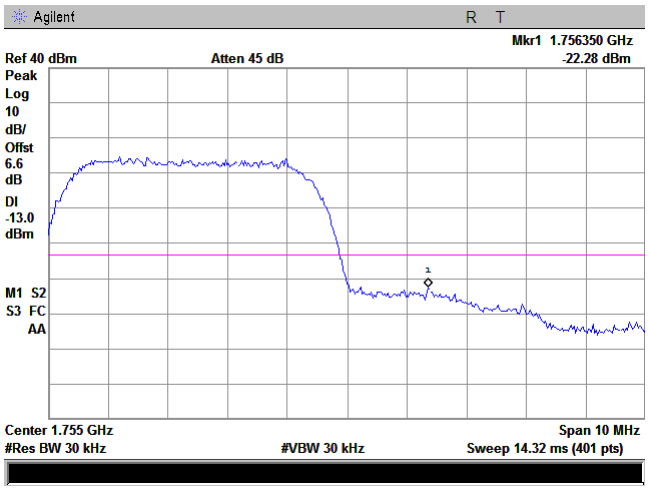

UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log (49.40/30)=4.5+2.2=6.7 dB




UMTS-FDD Band IV - Low Channel

Note: Offset=Cable loss (4.5) + 10log (48.97/30)=4.5+2.1=6.6 dB




UMTS-FDD Band IV - High Channel

Note: Offset=Cable loss (4.5) + 10log (48.95/30)=4.5+2.1=6.6 dB

## 6.8 Frequency Stability

| | |
|---|---|
| Temperature | 25 °C |
| Relative Humidity | 57% |
| Atmospheric Pressure | 1018mbar |
| Test date : | October 19, 2017 |
| Tested By : | Loren Luo |

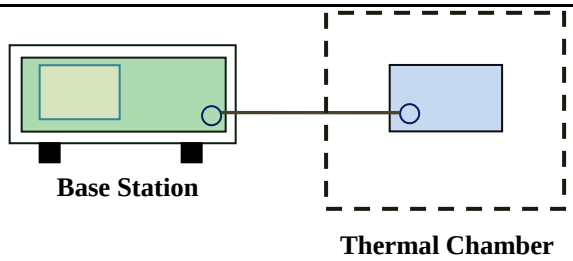
**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1055, §22.355 & §24.235 § 27.5(h); § 27.54 | a) | 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 | ☑ |

| 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 |

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.

Test setup



| | |
| --- | --- |
| 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 | 3.8 | 21 | 0.0251 | 2.5 |
| 0 | | 17 | 0.0203 | 2.5 |
| 10 | | 16 | 0.0191 | 2.5 |
| 20 | | 17 | 0.0203 | 2.5 |
| 30 | | 14 | 0.0167 | 2.5 |
| 40 | | 15 | 0.0179 | 2.5 |
| 50 | | 21 | 0.0251 | 2.5 |
| 55 | | 18 | 0.0215 | 2.5 |
| 25 | 4.3 | 19 | 0.0227 | 2.5 |
| | 3.3 | 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 | 3.8 | 15 | 0.0080 | 2.5 |
| 0 | | 12 | 0.0064 | 2.5 |
| 10 | | 13 | 0.0069 | 2.5 |
| 20 | | 11 | 0.0059 | 2.5 |
| 30 | | 14 | 0.0074 | 2.5 |
| 40 | | 15 | 0.0080 | 2.5 |
| 50 | | 15 | 0.0080 | 2.5 |
| 55 | | 18 | 0.0096 | 2.5 |
| 25 | 4.3 | 19 | 0.0101 | 2.5 |
| | 3.3 | 20 | 0.0106 | 2.5 |

RMC:

UMTS-FDD Band V (Part 22H)

| Middle Channel, $f_o$ = 835 MHz | | | | |
| --- | --- | --- | --- | --- |
| Temperature (°C) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.8 | 16 | 0.0192 | 2.5 |
| 0 | | 14 | 0.0168 | 2.5 |
| 10 | | 17 | 0.0204 | 2.5 |
| 20 | | 14 | 0.0168 | 2.5 |
| 30 | | 14 | 0.0168 | 2.5 |
| 40 | | 12 | 0.0144 | 2.5 |
| 50 | | 17 | 0.0204 | 2.5 |
| 55 | | 14 | 0.0168 | 2.5 |
| 25 | 4.3 | 14 | 0.0168 | 2.5 |
| | 3.3 | 16 | 0.0192 | 2.5 |

UMTS-FDD Band II (Part 24E)

| Middle Channel, $f_o$ = 1880 MHz | | | | |
| --- | --- | --- | --- | --- |
| Temperature (°C) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.8 | 18 | 0.0096 | 2.5 |
| 0 | | 16 | 0.0085 | 2.5 |
| 10 | | 14 | 0.0074 | 2.5 |
| 20 | | 14 | 0.0074 | 2.5 |
| 30 | | 16 | 0.0085 | 2.5 |
| 40 | | 16 | 0.0085 | 2.5 |
| 50 | | 21 | 0.0112 | 2.5 |
| 55 | | 20 | 0.0106 | 2.5 |
| 25 | 4.3 | 20 | 0.0106 | 2.5 |
| | 3.3 | 18 | 0.0096 | 2.5 |

UMTS-FDD Band IV (Part 27)

| Middle Channel, $f_o$ = 1733 MHz | | | | |
| --- | --- | --- | --- | --- |
| Temperature (°C) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.8 | 20 | 0.0240 | 2.5 |
| 0 | | 14 | 0.0168 | 2.5 |
| 10 | | 16 | 0.0192 | 2.5 |
| 20 | | 17 | 0.0204 | 2.5 |
| 30 | | 15 | 0.0180 | 2.5 |
| 40 | | 13 | 0.0156 | 2.5 |
| 50 | | 20 | 0.0240 | 2.5 |
| 55 | | 18 | 0.0216 | 2.5 |
| 25 | 4.3 | 17 | 0.0204 | 2.5 |
| | 3.3 | 16 | 0.0192 | 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 | 09/14/2017 | 09/13/2018 | ☑ |
| Power Splitter | 1# | 1# | 08/30/2017 | 08/29/2018 | ☑ |
| Universal Radio Communication Tester | CMU200 | 121393 | 09/23/2017 | 09/22/2018 | ☑ |
| Temperature/Humidity Chamber | UHL-270 | 001 | 10/07/2017 | 10/06/2018 | ☑ |
| DC Power Supply | E3640A | MY40004013 | 09/15/2017 | 09/14/2018 | ☑ |
| RF Power Sensor | Dare RPR3006C/P/W | AY554013 | 09/15/2017 | 09/14/2018 | ☑ |
| **Radiated Emissions** | | | | | |
| EMI test receiver | ESL6 | 100262 | 09/15/2017 | 09/14/2018 | ☑ |
| OPT 010 AMPLIFIER (0.1-1300MHz) | 8447E | 2727A02430 | 08/30/2017 | 08/29/2018 | ☑ |
| Horn Antenna | BBHA9170 | 3145226D1 | 09/27/2017 | 09/26/2018 | ☑ |
| Microwave Preamplifier (1 ~ 26.5GHz) | 8449B | 3008A02402 | 03/23/2017 | 03/22/2018 | ☑ |
| Bilog Antenna (30MHz~6GHz) | JB6 | A110712 | 09/19/2017 | 09/18/2018 | ☑ |
| Bilog Antenna (30MHz~2GHz) | JB1 | A112017 | 09/19/2017 | 09/18/2018 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71259 | 09/22/2017 | 09/21/2018 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71283 | 09/22/2017 | 09/21/2018 | ☑ |
| SYNTHESIZED SIGNAL GENERATOR | 8665B | 3744A01293 | 09/15/2017 | 09/14/2018 | ☑ |
| Power Amplifier | SMC150D | R1553-0313 | 03/08/2017 | 03/07/2018 | ☑ |
| Power Amplifier | S61-25 | R1553-0516 | 05/26/2017 | 05/25/2018 | ☑ |
| Power Amplifier | S41-25D | R1553-0314 | 05/26/2017 | 05/25/2018 | ☑ |

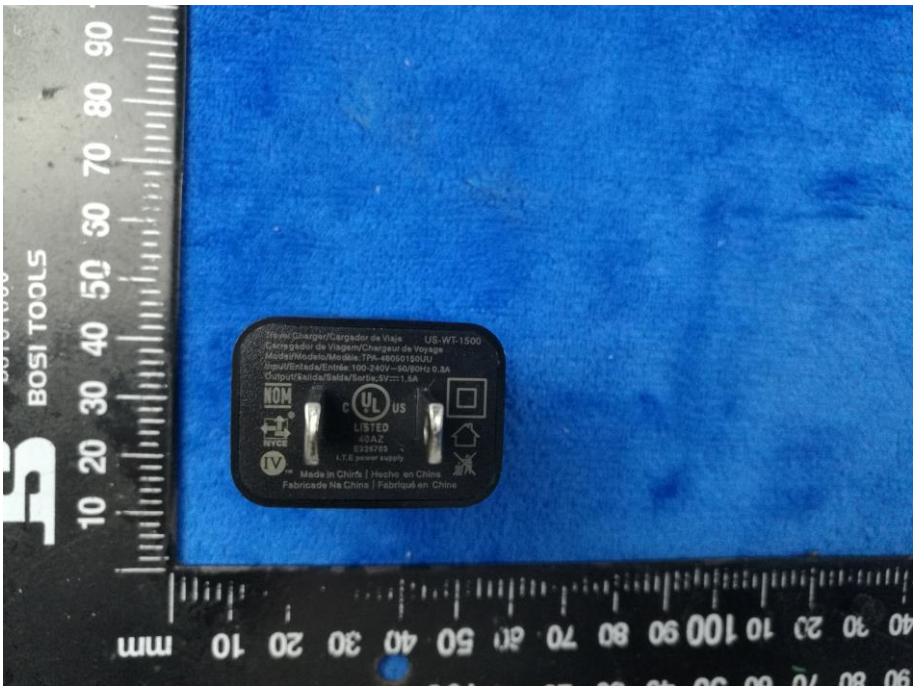
| | | | | | |
| --- | --- | --- | --- | --- | --- |
| Tunable Notch Filter | 3NF-800/1000-S | AA4 | 08/30/2017 | 08/29/2018 | ☑ |

# Annex B. EUT And Test Setup Photographs

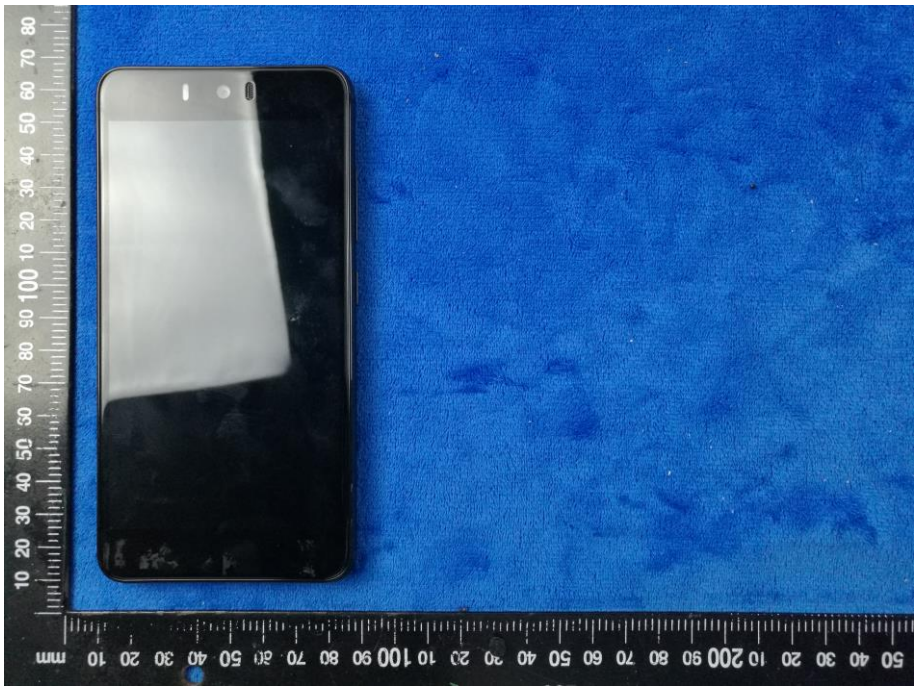
## Annex B.i. Photograph: EUT External Photo

Whole Package View

Adapter - Lable View

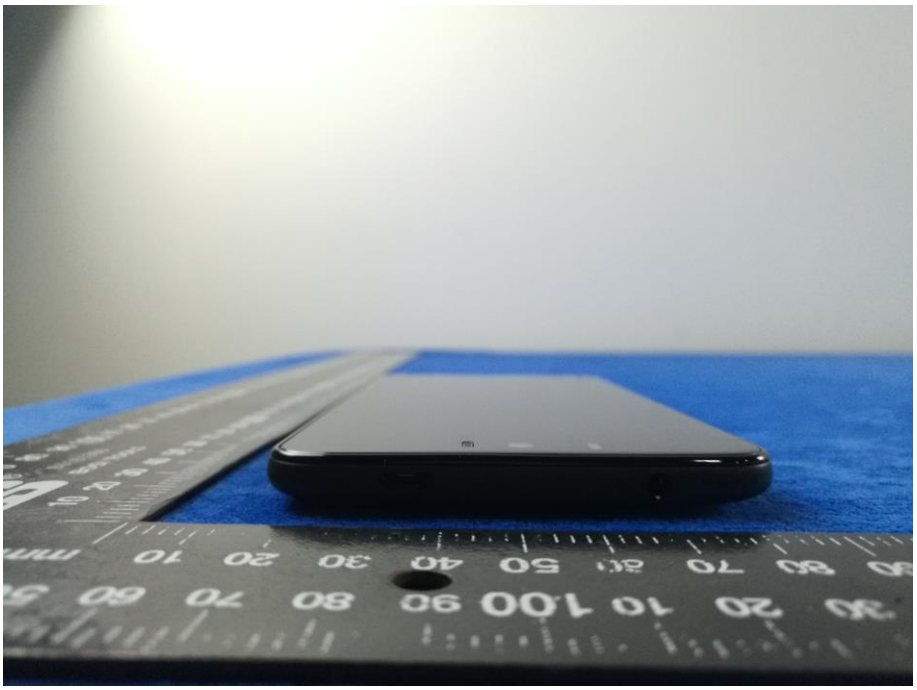


EUT - Front View

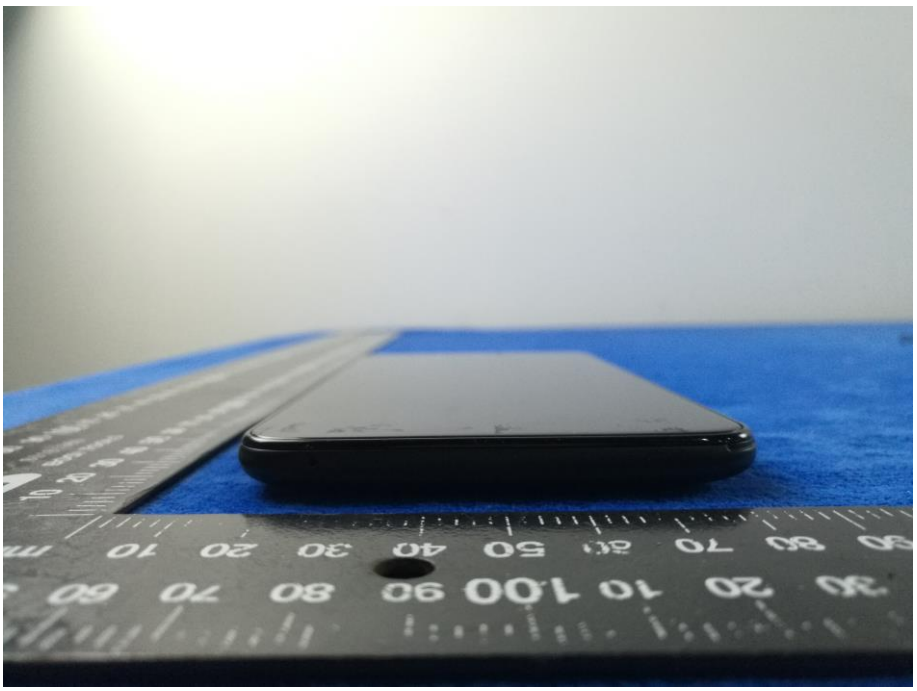


EUT - Rear View

EUT - Top View

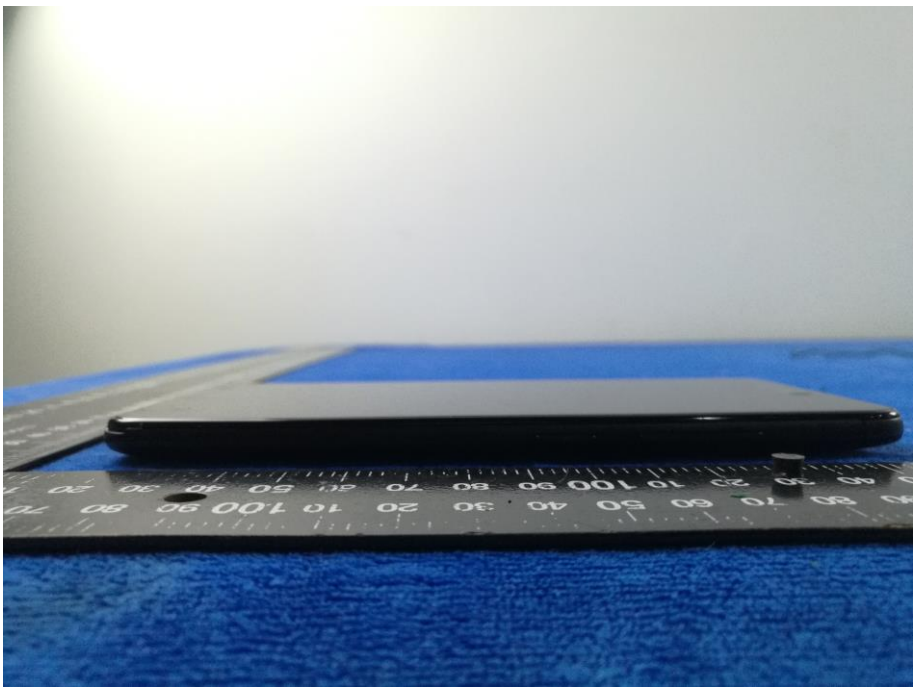


EUT - Bottom View



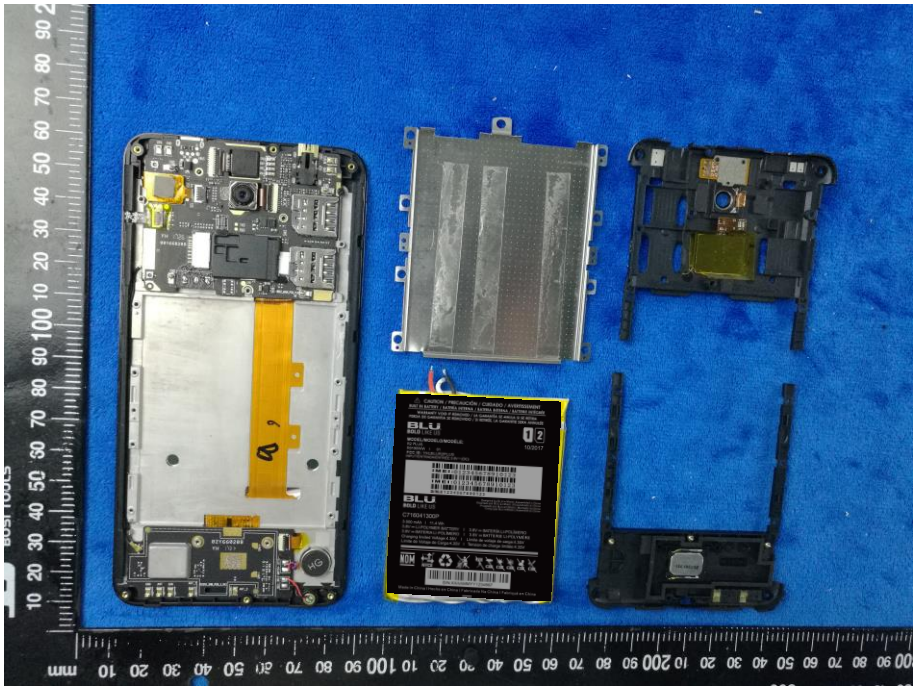
EUT - Left View

EUT - Right View



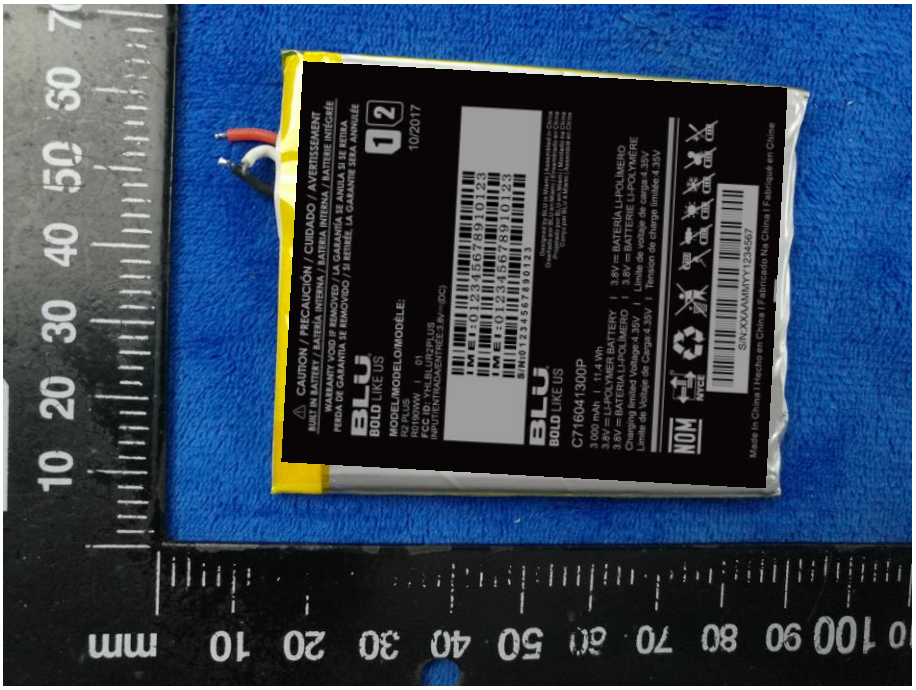
## Annex B.ii. Photograph: EUT Internal Photo

Cover Off - Top View 1

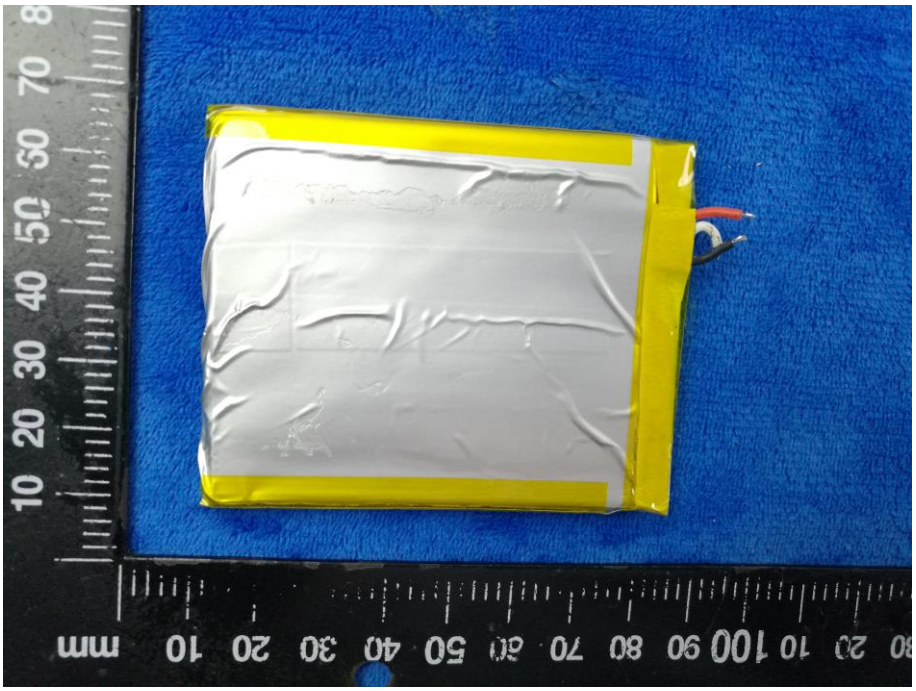


Cover Off - Top View 2

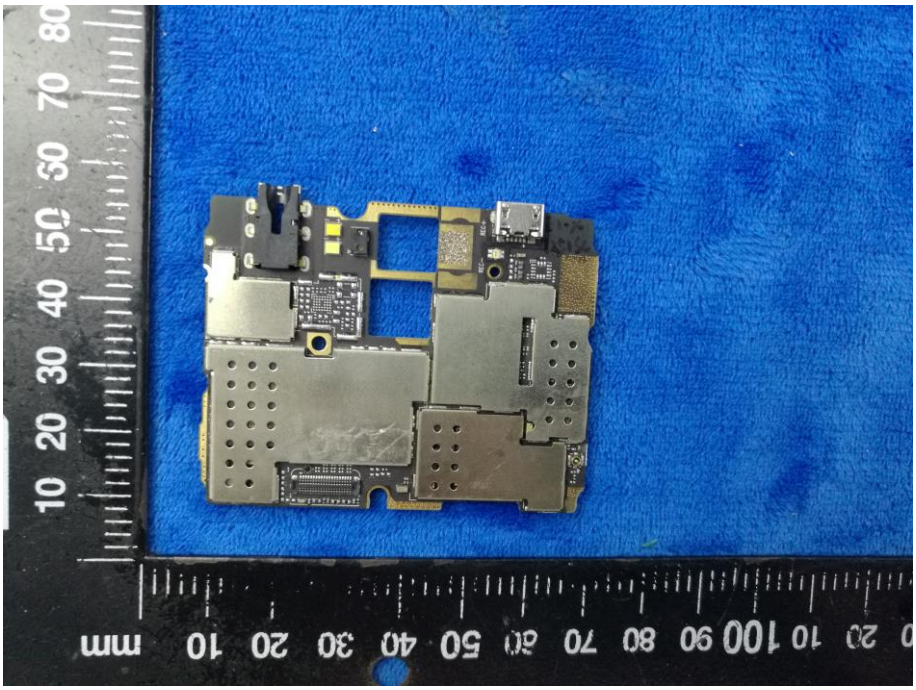
Battery - Front View



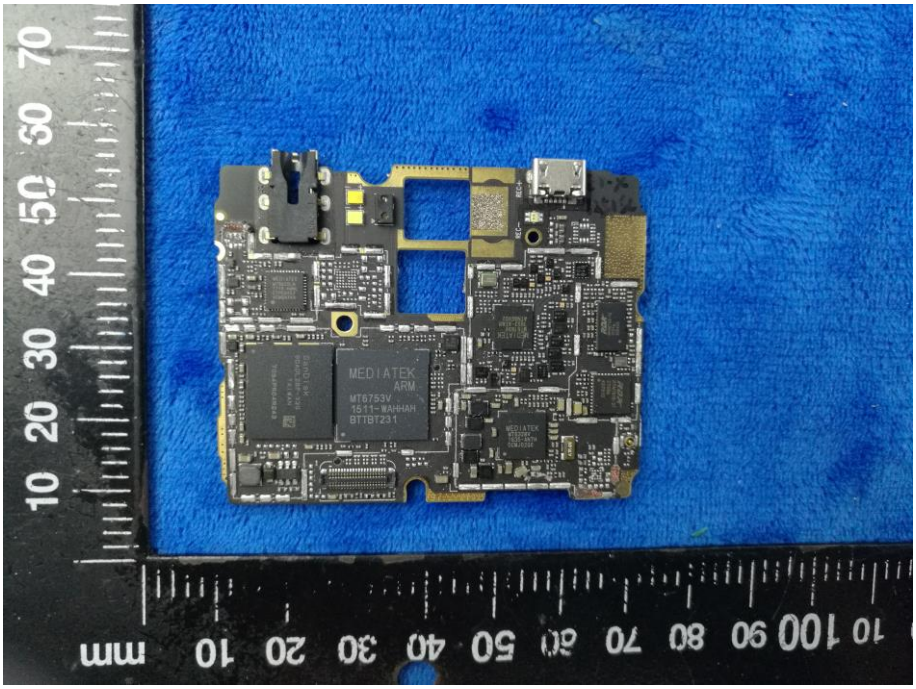

Battery - Rear View



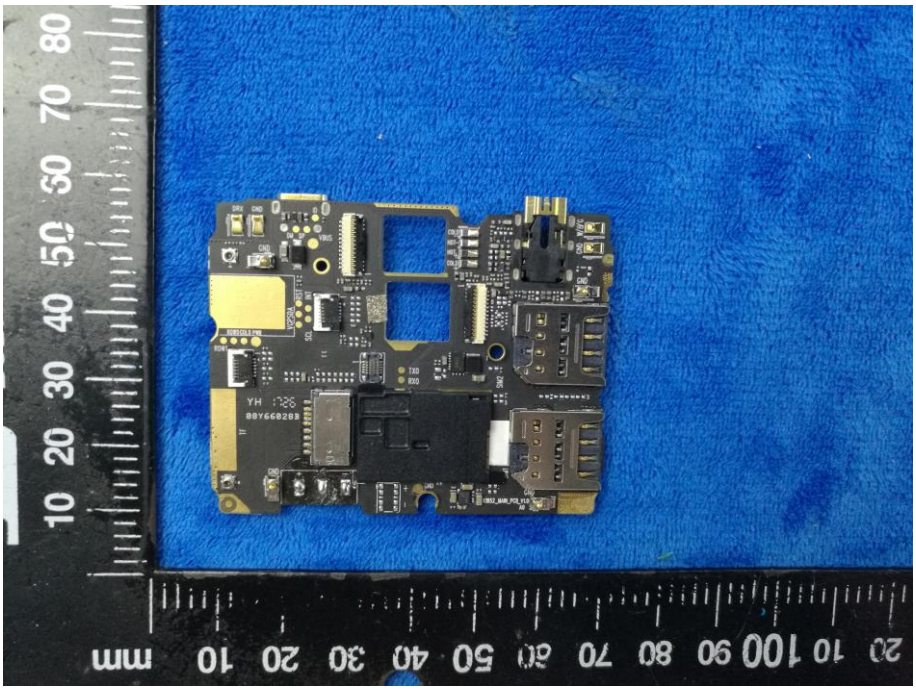
Mainboard with Shielding - Front View



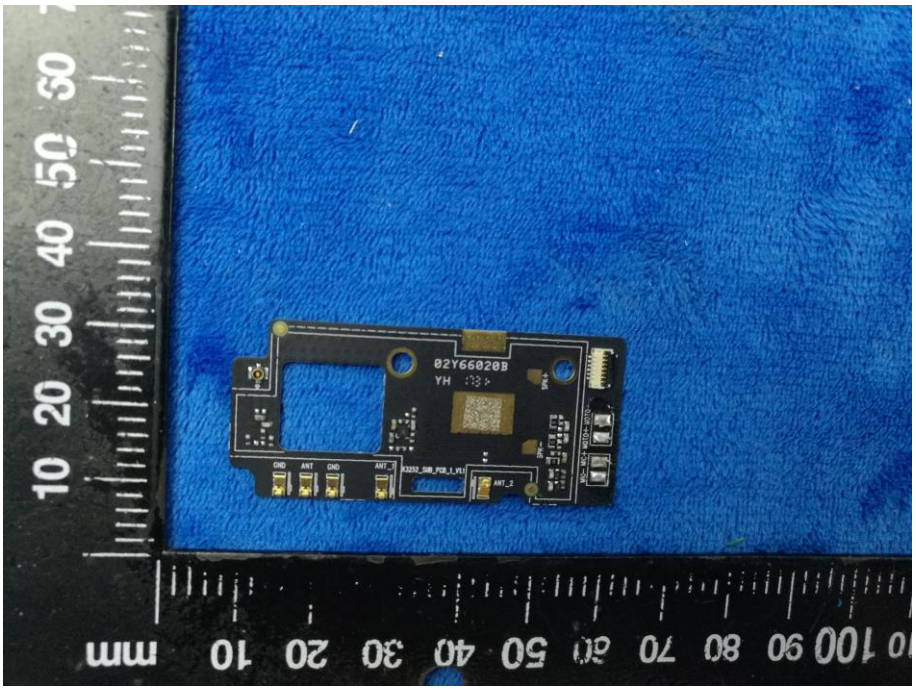
Mainboard without Shielding - Front View



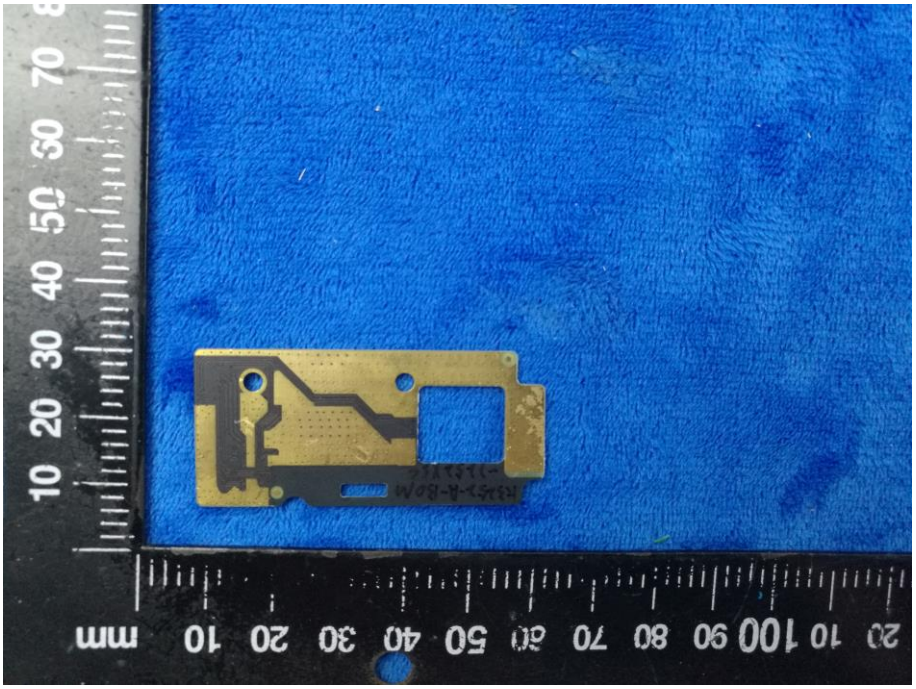
Mainboard with Shielding – Rear View



Smallboard – Front View

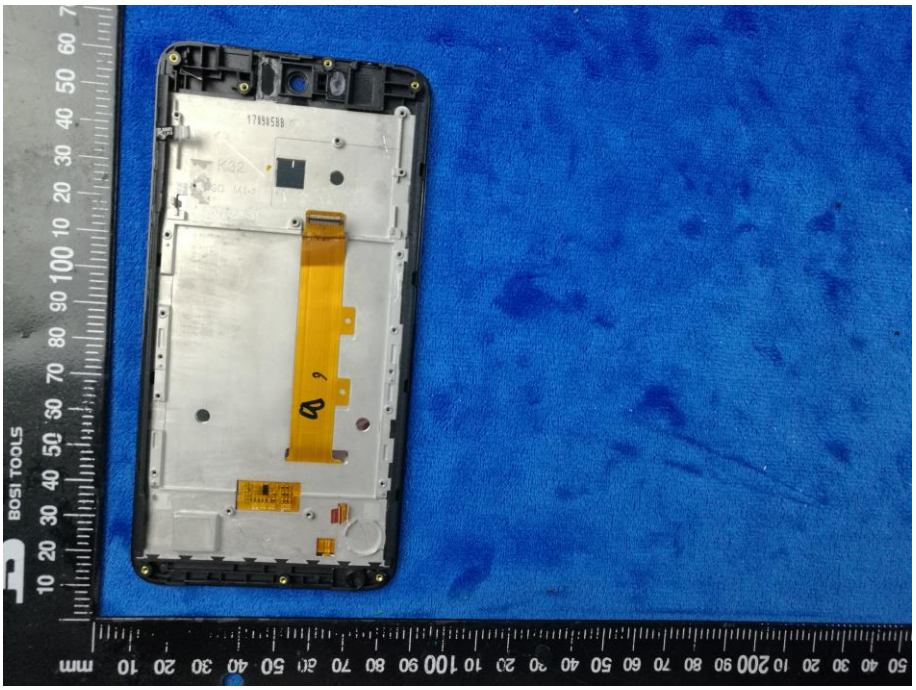


Smallboard – Rear View



LCD – Front View

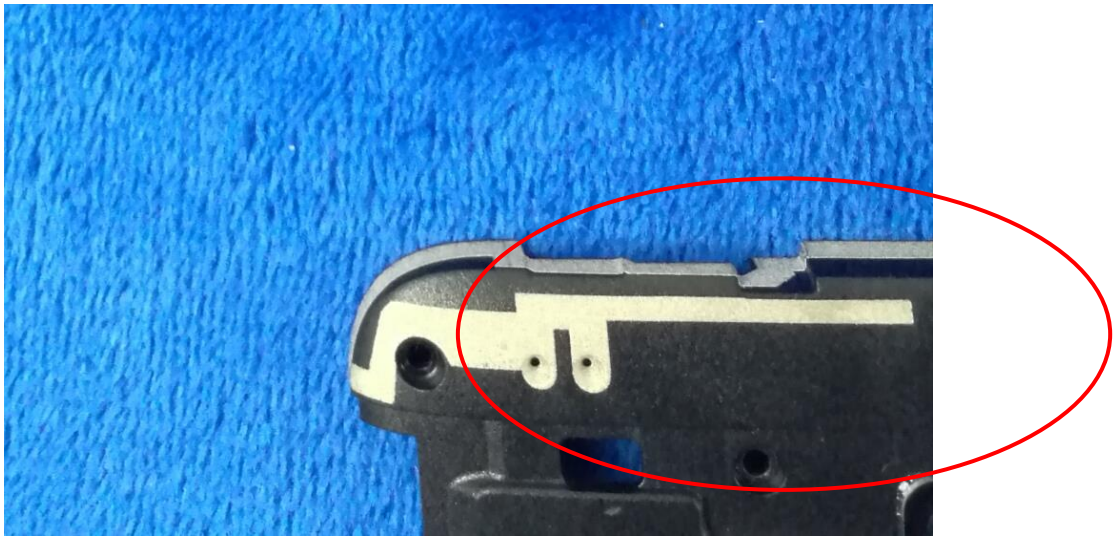
LCD – Rear View



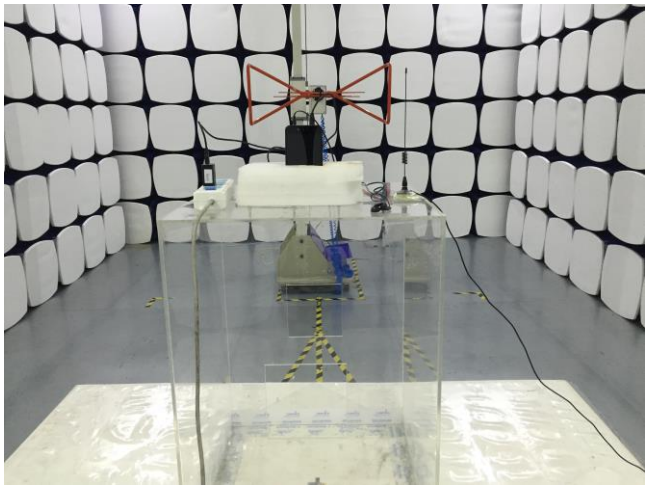
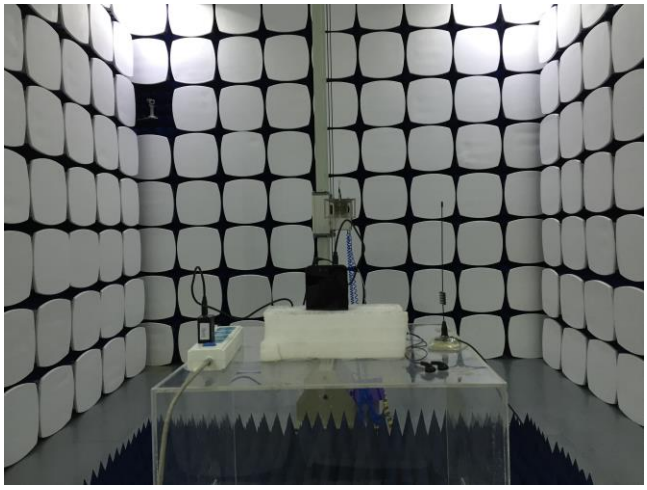

GSM/PCS/UMTS-FDD/LTE Antenna View

WIFI/BT/BLE/GPS - Antenna View

RXD- Antenna View



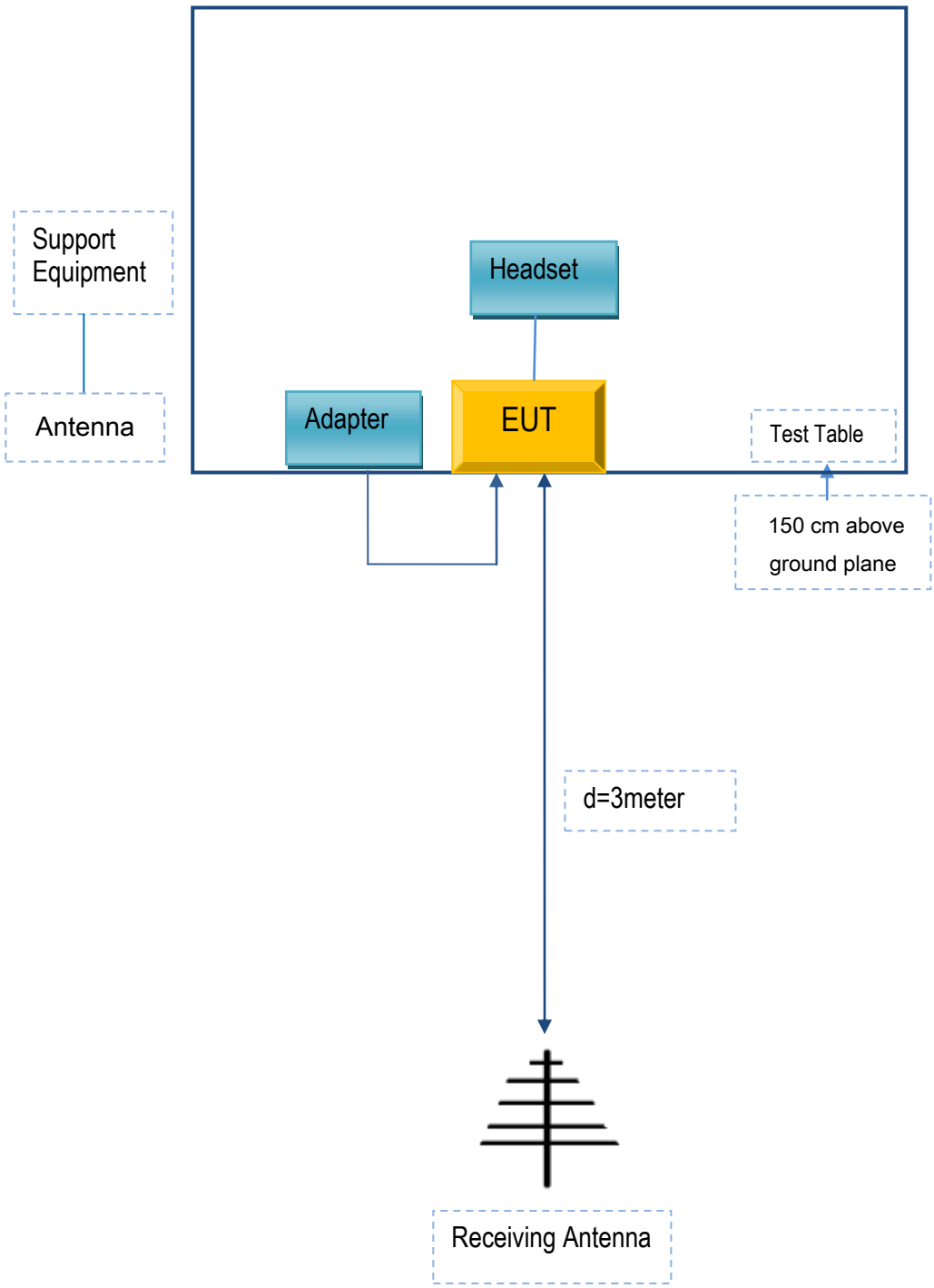
## Annex B.iii. Photograph: Test Setup Photo

| | |
|---|---|
|  |  |
| 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 |
| --- | --- | --- | --- |
| BLU Products, Inc. | Adapter | US-WT-1500 | N/A |
| SAMSUNG | headset | HS330 | N/A |
| Agilent | Wireless Connectivity Test Set | N4010A | N/A |
| OEM | omnidirectional antenna | AntSuck | 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 CONKITIONS

N/A

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

Please see the attachment

# Annex E. DECLARATION OF SIMILARITY

N/A