# RF TEST REPORT

Report No.: 17070343-FCC-R1

Supersede Report No.: N/A

| | |
|---|---|
| Applicant | SMT TELECOMM HK LIMITED |
| Product Name | Mobile Phone |
| Model No. | X422 |
| Serial No. | N/A |
| Test Standard | FCC Part 22(H):2016 ;FCC Part 24(E):2016; ANSI/TIA-603-D: 2010 |
| Test Date | May 06 to May 22, 2017 |
| Issue Date | May 23, 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 | |

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


Issued by:

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# Laboratories Introduction

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## 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 |

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# 1. Report Revision History

| Report No. | Report Version | Description | Issue Date |
| --- | --- | --- | --- |
| 17070343-FCC-R1 | NONE | Original | May 23, 2017 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# 2. Customer information

| | |
| --- | --- |
| Applicant Name | SMT TELECOMM HK LIMITED |
| Applicant Add | Unit C 8/F, CHARMHILL CTR 50 HILLWOOD RD TST KL |
| Manufacturer | SMT TELECOMM HK LIMITED |
| Manufacturer Add | Unit C 8/F, CHARMHILL CTR 50 HILLWOOD RD TST KL |

# 3. Test site information

| | |
| --- | --- |
| 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. | 718246 |
| IC Test Site No. | 4842E-1 |
| Test Software | Radiated Emission Program-To Shenzhen(ICP-03A1) |

# 4. Equipment under Test (EUT) Information

| | |
| --- | --- |
| Description of EUT: | Mobile Phone |
| Main Model: | X422 |
| Serial Model: | N/A |
| Date EUT received: | May 05, 2017 |
| Test Date(s): | May 06 to May 22, 2017 |
| Equipment Category： | PCE |
| Antenna Gain: | GSM850: -1.5dBi<br>PCS1900: -0.6dBi<br>UMTS-FDD Band V: -1.5dBi<br>UMTS-FDD Band II: -0.6dBi<br>Bluetooth/BLE: -0.5dBi<br>WIFI: -0.5dBi |
| Antenna Type: | PIFA antenna |
| Type of Modulation: | GSM / GPRS: GMSK<br>EGPRS: GMSK<br>UMTS-FDD: QPSK<br>802.11b/g/n: DSSS, OFDM<br>Bluetooth: GFSK, π /4DQPSK, 8DPSK<br>BLE: GFSK |
| 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 II TX:1852.4 ~ 1907.6 MHz;<br>RX: 1932.4 ~ 1987.6 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 |

| | |
| --- | --- |
| Maximum Conducted AV Power to Antenna: | GSM Vioce:GSM850: 32.68 dBm<br>PCS1900: 30.35 dBm<br>GPRS:GSM850: 32.66 dBm<br>PCS1900: 30.36 dBm<br>EGPRS(MCS1):GSM850: 32.65 dBm<br>PCS1900: 30.32 dBm<br>RMC:UMTS-FDD Band 5: 23.38 dBm<br>UMTS-FDD Band 2: 24.28 dBm<br>HSUPA:UMTS-FDD Band 5: 22.36 dBm<br>UMTS-FDD Band 2: 23.10 dBm<br>HSDPA:UMTS-FDD Band 5: 22.46 dBm<br>UMTS-FDD Band 2: 22.89 dBm |
| ERP/EIRP: | GSM Vioce:GSM850: 29.03 dBm / ERP<br>PCS1900: 29.75 dBm / EIRP<br>GPRS:GSM850: 29.01 dBm / ERP<br>PCS1900: 29.76 dBm / EIRP<br>EGPRS(MCS1):GSM850: 29.00 dBm / ERP<br>PCS1900: 29.72 dBm / EIRP<br>RMC:UMTS-FDD Band 5: 19.73 dBm / ERP<br>UMTS-FDD Band 2: 23.68 dBm / EIRP<br>HSDPA:UMTS-FDD Band 5: 18.81 dBm / ERP<br>UMTS-FDD Band 2: 22.29 dBm / EIRP<br>HSUPA:UMTS-FDD Band 5: 18.71 dBm / ERP<br>UMTS-FDD Band 2: 22.50 dBm / EIRP |
| Number of Channels: | GSM 850: 124CH<br>PCS1900: 299CH<br>UMTS-FDD Band V: 102CH<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 |
| Port: | USB Port, Earphone Port |

| | |
| --- | --- |
| Input Power: | Adapter:<br>Model: PCX422<br>Input: AC100-240V~50/60Hz,0.15A<br>Output: DC 5.0V,500mA<br>Battery:<br>Model: BPX422<br>Spec : 3.7V,1300mAh<br>Maximum chargeable voltage: 4.2V |
| Trade Name : | N/A |
| GPRS/ EGPRS Multi-slot class | 8/10/12 |
| FCC ID: | 2AIMEX422 |

# 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) ; | RF Output Power | Compliance |
| § 24.232 (d) ; | Peak-Average Ratio | Compliance |
| § 2.1049; § 22.905; § 22.917; § 24.238; | 99% & -26 dB Occupied Bandwidth | Compliance |
| § 2.1051; § 22.917(a); § 24.238(a); | Spurious Emissions at Antenna Terminal | Compliance |
| § 2.1053; § 22.917(a); § 24.238(a); | Field Strength of Spurious Radiation | Compliance |
| § 22.917(a); § 24.238(a); | Out of band emission, Band Edge | Compliance |
| § 2.1055; § 22.355; § 24.235; | 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

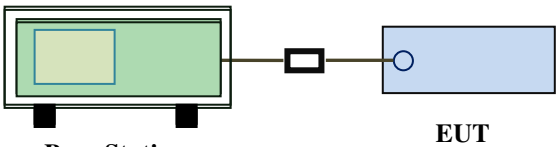
The EUT is a portable device, thus requires SAR evaluation;

Please refer to RF Exposure Evaluation Report: 17070343-FCC-H.

## 6.2 RF Output Power

| | |
| --- | --- |
| Temperature | 23 °C |
| Relative Humidity | 55% |
| Atmospheric Pressure | 1022mbar |
| Test date : | May 22, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
| --- | --- | --- | --- |
| §22.913 (a) | a) | ERP:38.45dBm | ☑ |
| §24.232 (c) | b) | EIRP:33dBm | ☑ |
| 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. | | |

| | |
| --- | --- |
| | - 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 | **32.68** | 32.66 | 32.64 | 32.5±1 | **30.35** | 30.18 | 30.15 | 30±1 |
| GPRS Multi-Slot Class 8 (1 uplink),GMSK | **32.66** | 32.64 | 32.63 | 32.5±1 | **30.36** | 30.15 | 30.11 | 30±1 |
| GPRS Multi-Slot Class 10 (2 uplink) GMSK | 32.07 | 31.96 | 31.94 | 32±1 | 30.07 | 29.93 | 29.78 | 30±1 |
| GPRS Multi-Slot Class 12 (4 uplink) GMSK | 29.47 | 29.07 | 28.8 | 29±1 | 28.12 | 27.97 | 27.73 | 28±1 |
| EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS1 | **32.65** | 32.62 | 32.59 | 32.5±1 | **30.32** | 30.09 | 30.11 | 30±1 |
| EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS1 | 32.03 | 31.94 | 31.87 | 32±1 | 30.05 | 29.89 | 29.77 | 30±1 |
| EGPRS Multi-Slot Class 12 (4 uplink) GMSK MCS1 | 29.45 | 29.03 | 28.78 | 29±1 | 27.98/ | 27.91 | 27.72 | 28±1 |
| Remark :<br>GPRS, CS1 coding scheme.<br>EGPRS, MCS1 coding scheme.<br>Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link<br>Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link<br>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 | 23.36 | 23±1 |
| | 4175 | 835 | **23.38** | 23±1 |
| | 4233 | 846.6 | 23.17 | 23±1 |
| HSDPA Subtest1 | 4132 | 826.4 | 22.13 | 22±1 |
| | 4175 | 835 | 22.15 | 22±1 |
| | 4233 | 846.6 | 22.15 | 22±1 |
| HSDPA Subtest2 | 4132 | 826.4 | 22.03 | 22±1 |
| | 4175 | 835 | 22.02 | 22±1 |
| | 4233 | 846.6 | 22.05 | 22±1 |
| HSDPA Subtest3 | 4132 | 826.4 | 22.39 | 22±1 |
| | 4175 | 835 | 22.41 | 22±1 |
| | 4233 | 846.6 | **22.46** | 22±1 |
| HSDPA Subtest4 | 4132 | 826.4 | 22.01 | 22±1 |
| | 4175 | 835 | 22.06 | 22±1 |
| | 4233 | 846.6 | 22.09 | 22±1 |
| HSUPA Subtest1 | 4132 | 826.4 | 22.35 | 22±1 |
| | 4175 | 835 | 22.31 | 22±1 |
| | 4233 | 846.6 | **22.36** | 22±1 |
| HSUPA Subtest2 | 4132 | 826.4 | 22.05 | 22±1 |
| | 4175 | 835 | 22.03 | 22±1 |
| | 4233 | 846.6 | 22.09 | 22±1 |
| HSUPA Subtest3 | 4132 | 826.4 | 22.13 | 22±1 |
| | 4175 | 835 | 22.15 | 22±1 |
| | 4233 | 846.6 | 22.12 | 22±1 |
| HSUPA Subtest4 | 4132 | 826.4 | 22.02 | 22±1 |
| | 4175 | 835 | 22.04 | 22±1 |
| | 4233 | 846.6 | 22.01 | 22±1 |
| HSUPA Subtest5 | 4132 | 826.4 | 22.17 | 22±1 |
| | 4175 | 835 | 22.12 | 22±1 |
| | 4233 | 846.6 | 22.11 | 22±1 |

# UMTS-FDD Band II

| Band/ Time Slot configuration | Channel | Frequency | Average power (dBm) | Tune up Power tolerant |
| --- | --- | --- | --- | --- |
| RMC 12.2kbps | 9262 | 1852.4 | 23.4 | 23.5±1 |
| | 9400 | 1880 | **24.28** | 23.5±1 |
| | 9538 | 1907.6 | 23.48 | 23.5±1 |
| HSDPA Subtest1 | 9262 | 1852.4 | 22.65 | 22.5±1 |
| | 9400 | 1880 | 22.73 | 22.5±1 |
| | 9538 | 1907.6 | 22.53 | 22.5±1 |
| HSDPA Subtest2 | 9262 | 1852.4 | 22.83 | 22.5±1 |
| | 9400 | 1880 | 22.81 | 22.5±1 |
| | 9538 | 1907.6 | **22.89** | 22.5±1 |
| HSDPA Subtest3 | 9262 | 1852.4 | 22.67 | 22.5±1 |
| | 9400 | 1880 | 22.82 | 22.5±1 |
| | 9538 | 1907.6 | 22.61 | 22.5±1 |
| HSDPA Subtest4 | 9262 | 1852.4 | 22.73 | 22.5±1 |
| | 9400 | 1880 | 22.82 | 22.5±1 |
| | 9538 | 1907.6 | 22.62 | 22.5±1 |
| HSUPA Subtest1 | 9262 | 1852.4 | 22.53 | 22.5±1 |
| | 9400 | 1880 | 22.81 | 22.5±1 |
| | 9538 | 1907.6 | 22.59 | 22.5±1 |
| HSUPA Subtest2 | 9262 | 1852.4 | 22.62 | 22.5±1 |
| | 9400 | 1880 | 22.93 | 22.5±1 |
| | 9538 | 1907.6 | 22.45 | 22.5±1 |
| HSUPA Subtest3 | 9262 | 1852.4 | 22.83 | 22.5±1 |
| | 9400 | 1880 | **23.1** | 22.5±1 |
| | 9538 | 1907.6 | 22.61 | 22.5±1 |
| HSUPA Subtest4 | 9262 | 1852.4 | 22.88 | 22.5±1 |
| | 9400 | 1880 | 22.85 | 22.5±1 |
| | 9538 | 1907.6 | 22.81 | 22.5±1 |
| HSUPA Subtest5 | 9262 | 1852.4 | 22.86 | 22.5±1 |
| | 9400 | 1880 | 22.92 | 22.5±1 |
| | 9538 | 1907.6 | 22.86 | 22.5±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 | 22.76 | V | 6.8 | 0.53 | **29.03** | 38.45 |
| 824.2 | 21.64 | H | 6.8 | 0.53 | 27.91 | 38.45 |
| 836.6 | 22.74 | V | 6.8 | 0.53 | 29.01 | 38.45 |
| 836.6 | 21.68 | H | 6.8 | 0.53 | 27.95 | 38.45 |
| 848.8 | 22.62 | V | 6.9 | 0.53 | 28.99 | 38.45 |
| 848.8 | 21.52 | H | 6.9 | 0.53 | 27.89 | 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 | 22.72 | V | 7.88 | 0.85 | **29.75** | 33 |
| 1850.2 | 21.5 | H | 7.88 | 0.85 | 28.53 | 33 |
| 1880 | 22.55 | V | 7.88 | 0.85 | 29.58 | 33 |
| 1880 | 21.43 | H | 7.88 | 0.85 | 28.46 | 33 |
| 1909.8 | 22.54 | V | 7.86 | 0.85 | 29.55 | 33 |
| 1909.8 | 21.4 | H | 7.86 | 0.85 | 28.41 | 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 | 22.74 | V | 6.8 | 0.53 | **29.01** | 38.45 |
| 824.2 | 21.58 | H | 6.8 | 0.53 | 27.85 | 38.45 |
| 836.6 | 22.72 | V | 6.8 | 0.53 | 28.99 | 38.45 |
| 836.6 | 21.56 | H | 6.8 | 0.53 | 27.83 | 38.45 |
| 848.8 | 22.61 | V | 6.9 | 0.53 | 28.98 | 38.45 |
| 848.8 | 21.5 | H | 6.9 | 0.53 | 27.87 | 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 | 22.73 | V | 7.88 | 0.85 | **29.76** | 33 |
| 1850.2 | 21.66 | H | 7.88 | 0.85 | 28.69 | 33 |
| 1880 | 22.52 | V | 7.88 | 0.85 | 29.55 | 33 |
| 1880 | 21.39 | H | 7.88 | 0.85 | 28.42 | 33 |
| 1909.8 | 22.5 | V | 7.86 | 0.85 | 29.51 | 33 |
| 1909.8 | 21.37 | H | 7.86 | 0.85 | 28.38 | 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 | 22.73 | V | 6.8 | 0.53 | **29** | 38.45 |
| 824.2 | 21.51 | H | 6.8 | 0.53 | 27.78 | 38.45 |
| 836.6 | 22.7 | V | 6.8 | 0.53 | 28.97 | 38.45 |
| 836.6 | 21.57 | H | 6.8 | 0.53 | 27.84 | 38.45 |
| 848.8 | 22.57 | V | 6.9 | 0.53 | 28.94 | 38.45 |
| 848.8 | 21.38 | H | 6.9 | 0.53 | 27.75 | 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 | 22.69 | V | 7.88 | 0.85 | **29.72** | 33 |
| 1850.2 | 21.58 | H | 7.88 | 0.85 | 28.61 | 33 |
| 1880 | 22.46 | V | 7.88 | 0.85 | 29.49 | 33 |
| 1880 | 20.23 | H | 7.88 | 0.85 | 27.26 | 33 |
| 1909.8 | 22.5 | V | 7.86 | 0.85 | 29.51 | 33 |
| 1909.8 | 21.33 | H | 7.86 | 0.85 | 28.34 | 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 | 13.44 | V | 6.8 | 0.53 | 19.71 | 38.45 |
| 826.4 | 12.39 | H | 6.8 | 0.53 | 18.66 | 38.45 |
| 835 | 13.46 | V | 6.8 | 0.53 | **19.73** | 38.45 |
| 835 | 12.35 | H | 6.8 | 0.53 | 18.62 | 38.45 |
| 846.6 | 13.15 | V | 6.9 | 0.53 | 19.52 | 38.45 |
| 846.6 | 12 | H | 6.9 | 0.53 | 18.37 | 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 | 15.77 | V | 7.88 | 0.85 | 22.8 | 33 |
| 1852.4 | 14.43 | H | 7.88 | 0.85 | 21.46 | 33 |
| 1880 | 16.65 | V | 7.88 | 0.85 | **23.68** | 33 |
| 1880 | 15.32 | H | 7.88 | 0.85 | 22.35 | 33 |
| 1907.6 | 15.87 | V | 7.86 | 0.85 | 22.88 | 33 |
| 1907.6 | 14.62 | H | 7.86 | 0.85 | 21.63 | 33 |

## 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 | 12.47 | V | 6.8 | 0.53 | 18.74 | 38.45 |
| 826.4 | 11.38 | H | 6.8 | 0.53 | 17.65 | 38.45 |
| 835 | 12.49 | V | 6.8 | 0.53 | 18.76 | 38.45 |
| 835 | 11.22 | H | 6.8 | 0.53 | 17.49 | 38.45 |
| 846.6 | 12.44 | V | 6.9 | 0.53 | **18.81** | 38.45 |
| 846.6 | 11.25 | H | 6.9 | 0.53 | 17.62 | 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 | 15.2 | V | 7.88 | 0.85 | 22.23 | 33 |
| 1852.4 | 14.02 | H | 7.88 | 0.85 | 21.05 | 33 |
| 1880 | 15.19 | V | 7.88 | 0.85 | 22.22 | 33 |
| 1880 | 14.07 | H | 7.88 | 0.85 | 21.1 | 33 |
| 1907.6 | 15.28 | V | 7.86 | 0.85 | **22.29** | 33 |
| 1907.6 | 14.06 | H | 7.86 | 0.85 | 21.07 | 33 |

## 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 | 12.43 | V | 6.8 | 0.53 | 18.7 | 38.45 |
| 826.4 | 11.27 | H | 6.8 | 0.53 | 17.54 | 38.45 |
| 835 | 12.39 | V | 6.8 | 0.53 | 18.66 | 38.45 |
| 835 | 11.32 | H | 6.8 | 0.53 | 17.59 | 38.45 |
| 846.6 | 12.34 | V | 6.9 | 0.53 | **18.71** | 38.45 |
| 846.6 | 11.11 | H | 6.9 | 0.53 | 17.48 | 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 | 15.25 | V | 7.88 | 0.85 | 22.28 | 33 |
| 1852.4 | 14 | H | 7.88 | 0.85 | 21.03 | 33 |
| 1880 | 15.47 | V | 7.88 | 0.85 | **22.5** | 33 |
| 1880 | 14.33 | H | 7.88 | 0.85 | 21.36 | 33 |
| 1907.6 | 15.25 | V | 7.86 | 0.85 | 22.26 | 33 |
| 1907.6 | 14.03 | H | 7.86 | 0.85 | 21.04 | 33 |

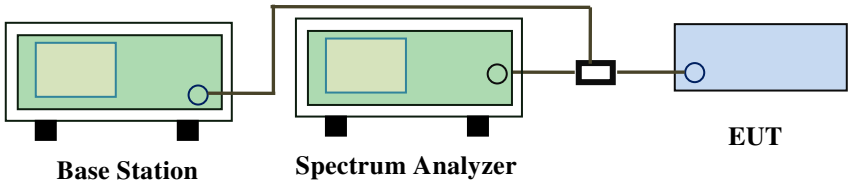
## 6.3 Peak-Average Ratio

| | |
|---|---|
| Temperature | 23 °C |
| Relative Humidity | 55% |
| Atmospheric Pressure | 1022mbar |
| Test date : | May 22, 2017 |
| Tested By : | Loren Luo |

Requirement(s):

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §24.232(d) | a) | The peak-to-average ratio (PAR) of the transmission may not exceed 13dB. | ☑ |

Test Setup




Test Procedure

According with KDB 971168 v02r02

5.7.2 Alternate procedure for PAPR

5.1.2 Peak power measurements with a peak power meter

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.

5.2.3 Average power measurement with average power meter

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

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 | 30.96 | 30.35 | 0.61 |
| 1880 | 30.86 | 30.18 | 0.68 |
| 1909.8 | 30.76 | 30.15 | 0.61 |

GPRS 1900 PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
|---|---|---|---|
| | Peak | Average | |
| 1850.2 | 30.95 | 30.36 | 0.59 |
| 1880 | 30.73 | 30.15 | 0.58 |
| 1909.8 | 30.69 | 30.11 | 0.58 |

RMC ：UMTS-FDD Band 2 PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
|---|---|---|---|
| | Peak | Average | |
| 1852.4 | 23.79 | 23.4 | 0.39 |
| 1880 | 24.93 | 24.28 | 0.65 |
| 1907.6 | 23.95 | 23.48 | 0.47 |

HSDPA ：UMTS-FDD Band 2 PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
|---|---|---|---|
| | Peak | Average | |
| 1852.4 | 23.13 | 22.65 | 0.48 |
| 1880 | 23.38 | 22.73 | 0.65 |
| 1907.6 | 23.22 | 22.53 | 0.69 |

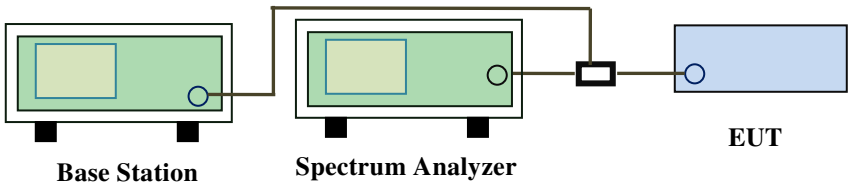
HSUPA ：UMTS-FDD Band 2 PK-AV POWER (PART 24E)

| Frequency (MHz) | Conducted power(dBm) | | Peak-Average Ratio(PAR) |
|---|---|---|---|
| | Peak | Average | |
| 1852.4 | 23.12 | 22.53 | 0.59 |
| 1880 | 23.34 | 22.81 | 0.53 |
| 1907.6 | 23.11 | 22.59 | 0.52 |

## 6.4 Occupied Bandwidth

| | |
|---|---|
| Temperature | 23 °C |
| Relative Humidity | 51% |
| Atmospheric Pressure | 1018mbar |
| Test date : | May 18, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1049, §22.917, §22.905 §24.238 | 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 | 247.4687 | 321.288 |
| 190 | 836.6 | 244.7306 | 317.597 |
| 251 | 848.8 | 250.2813 | 323.616 |

PCS Band (Part 24E) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 512 | 1850.2 | 246.2122 | 318.488 |
| 661 | 1880.0 | 246.9516 | 314.927 |
| 810 | 1909.8 | 247.1420 | 319.182 |

GPRS:

Cellular Band (Part 22H) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 128 | 824.2 | 247.8498 | 320.730 |
| 190 | 836.6 | 243.3477 | 317.964 |
| 251 | 848.8 | 248.5469 | 320.114 |

PCS Band (Part 24E) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 512 | 1850.2 | 248.5854 | 322.966 |
| 661 | 1880.0 | 247.5689 | 322.232 |
| 810 | 1909.8 | 246.6106 | 318.251 |

EGPRS (MCS 1):

Cellular Band (Part 22H) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 128 | 824.2 | 246.7195 | 323.079 |
| 190 | 836.6 | 243.4327 | 322.459 |
| 251 | 848.8 | 248.9223 | 320.420 |

PCS Band (Part 24E) result

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Bandwidth (kHz) |
| --- | --- | --- | --- |
| 512 | 1850.2 | 245.3261 | 321.248 |
| 661 | 1880.0 | 247.0987 | 322.511 |
| 810 | 1909.8 | 248.4733 | 317.834 |

RMC:

UMTS-FDD Band V (Part 22H)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 4132 | 826.4 | 4.1444 | 4.721 |
| 4175 | 835.0 | 4.1616 | 4.693 |
| 4233 | 846.6 | 4.1403 | 4.708 |

UMTS-FDD Band II (Part 24E)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 9262 | 1852.4 | 4.1856 | 4.720 |
| 9400 | 1880.0 | 4.1571 | 4.732 |
| 9538 | 1907.6 | 4.1615 | 4.735 |

HSDPA:

UMTS-FDD Band V (Part 22H)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 4132 | 826.4 | 4.1503 | 4.711 |
| 4175 | 835.0 | 4.1533 | 4.727 |
| 4233 | 846.6 | 4.1459 | 4.721 |

UMTS-FDD Band II (Part 24E)

| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 9262 | 1852.4 | 4.1653 | 4.749 |
| 9400 | 1880.0 | 4.1588 | 4.728 |
| 9538 | 1907.6 | 4.1645 | 4.733 |

HSUPA:

UMTS-FDD Band V (Part 22H)

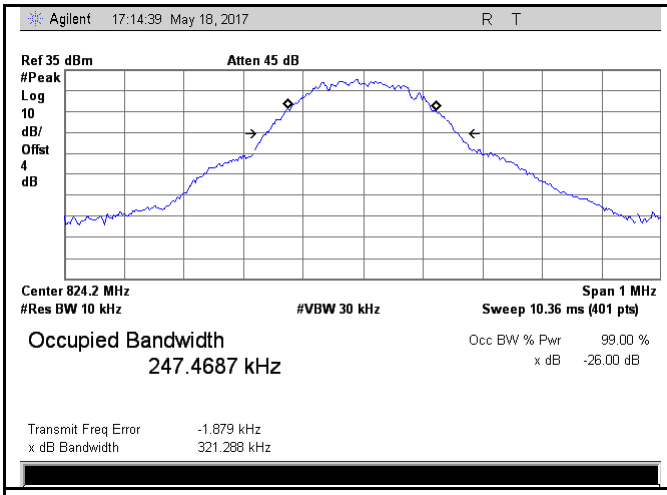
| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 4132 | 826.4 | 4.1509 | 4.729 |
| 4175 | 835.0 | 4.1554 | 4.713 |
| 4233 | 846.6 | 4.1441 | 4.731 |

UMTS-FDD Band II (Part 24E)

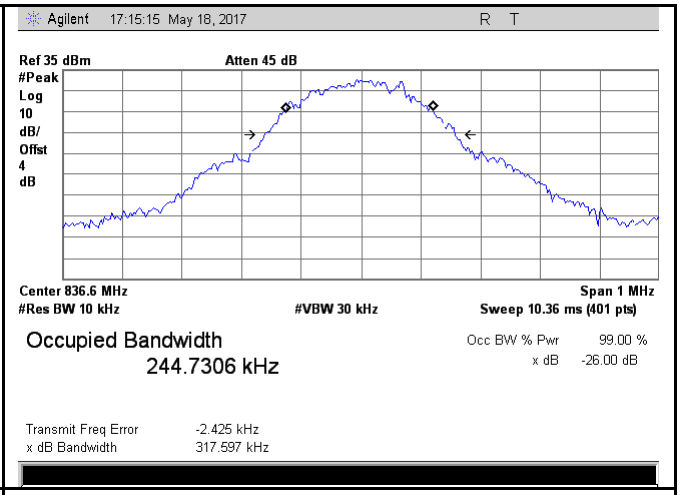
| Channel | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Bandwidth (MHz) |
| --- | --- | --- | --- |
| 9262 | 1852.4 | 4.1673 | 4.724 |
| 9400 | 1880.0 | 4.1695 | 4.734 |
| 9538 | 1907.6 | 4.1715 | 4.716 |

## Test Plots

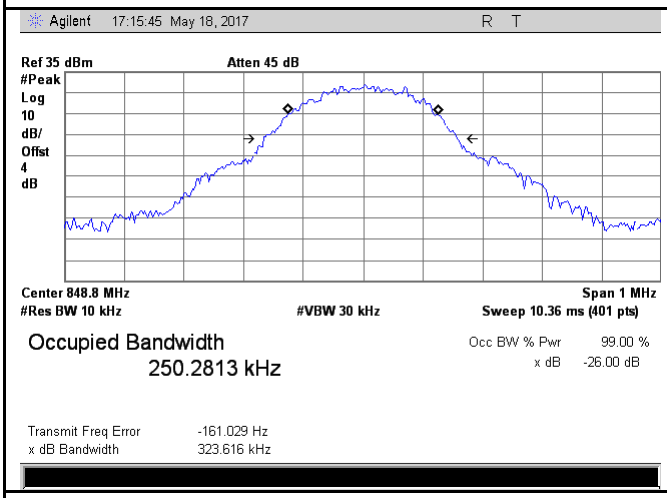
### GSM Voice:



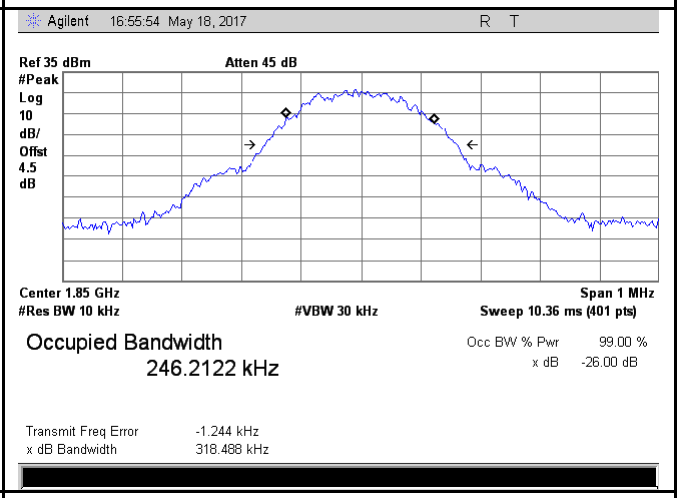

GSM 850 BW - Low CH 824.2MHz



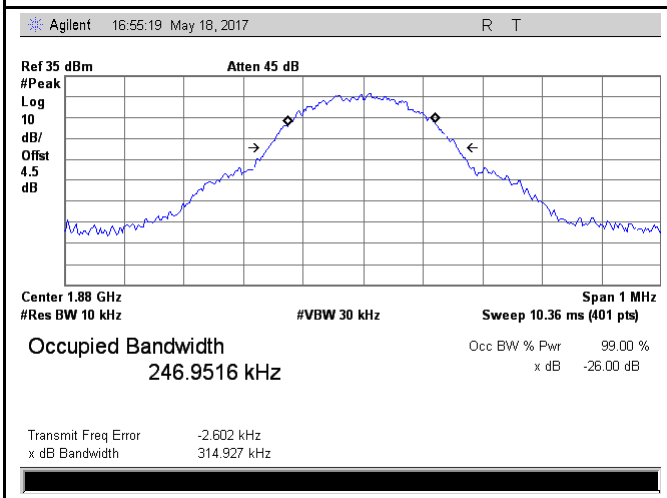

GSM 850 BW - Mid CH 836.6MHz



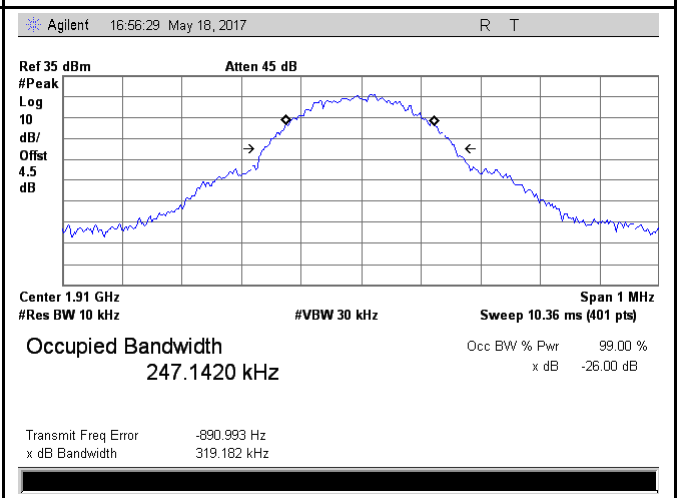

GSM 850 BW - High CH 848.8MHz




PCS 1900 BW - Low CH 1850.2MHz

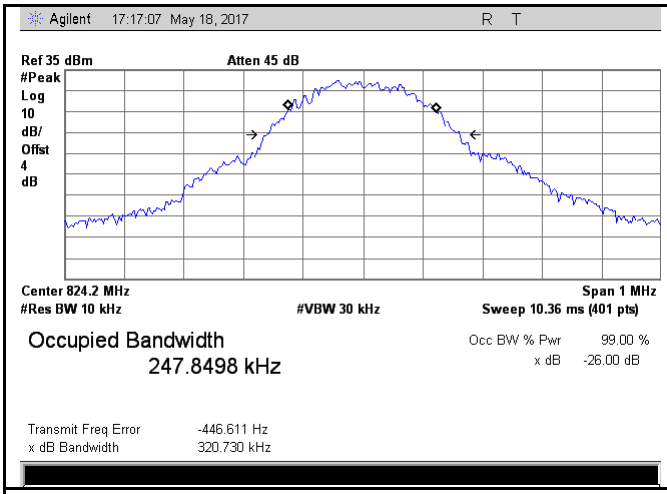



PCS 1900 BW - Mid CH 1880MHz

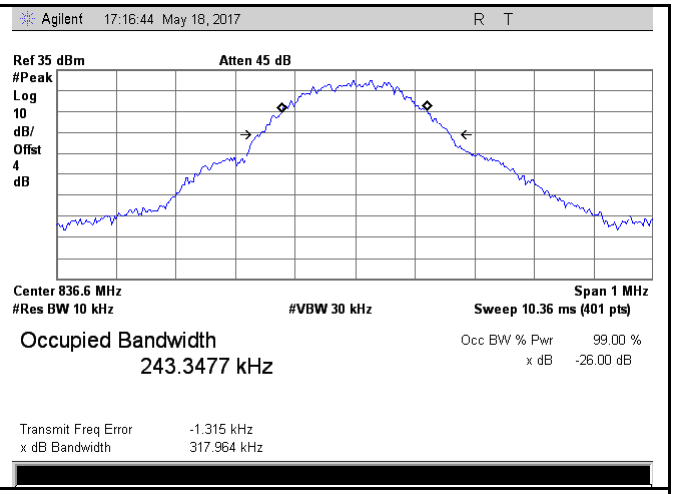



PCS 1900 BW - High CH 1909.8MHz

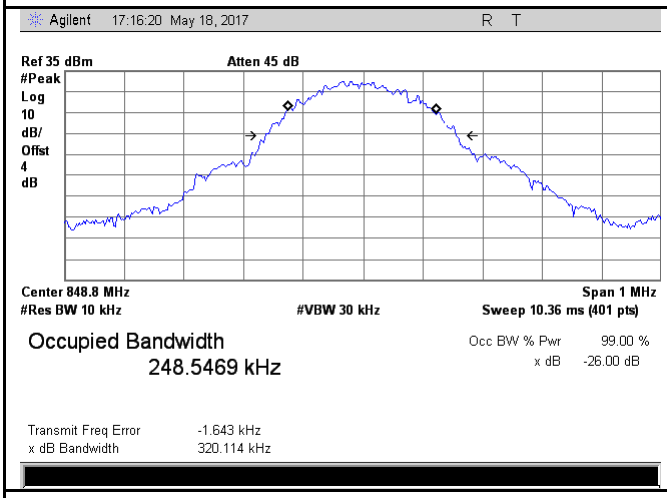
## GPRS:



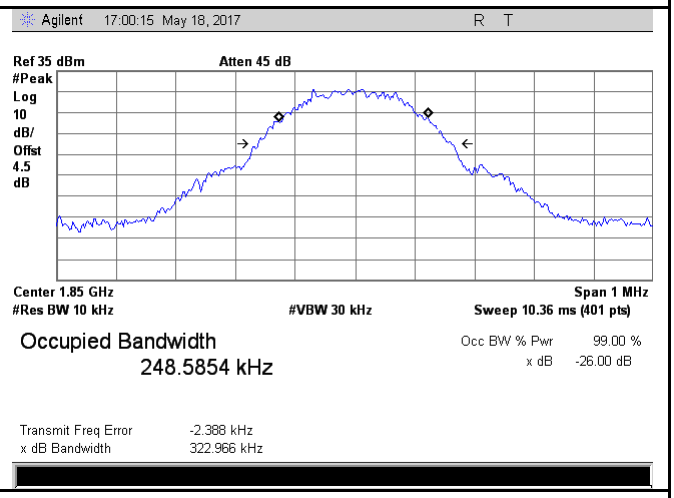

GSM 850 BW - Low CH 824.2MHz



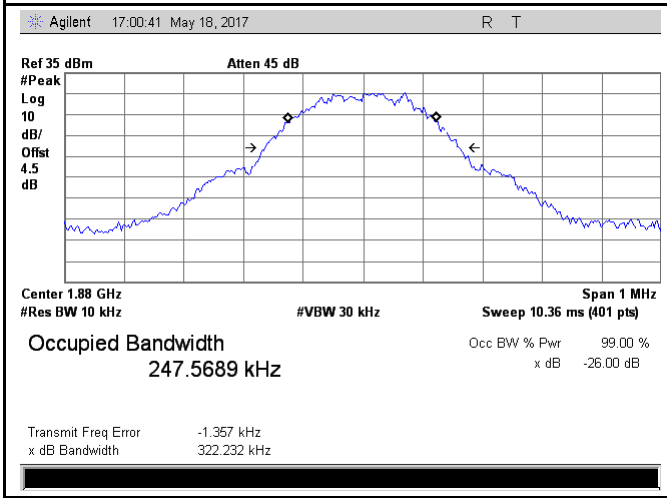

GSM 850 BW - Mid CH 836.6MHz



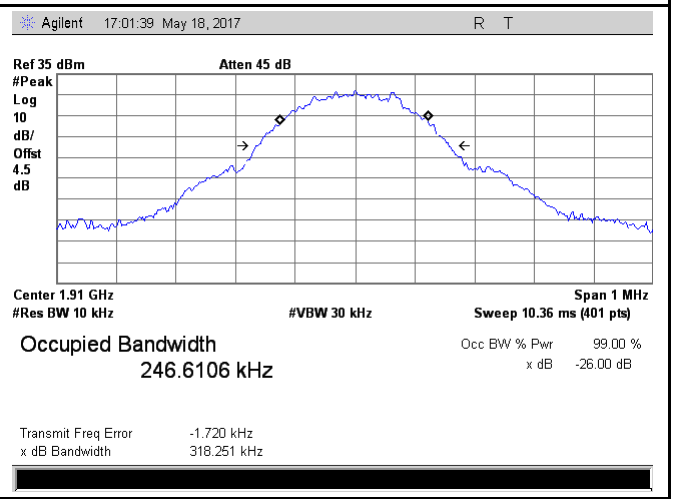

GSM 850 BW - High CH 848.8MHz




PCS 1900 BW - Low CH 1850.2MHz

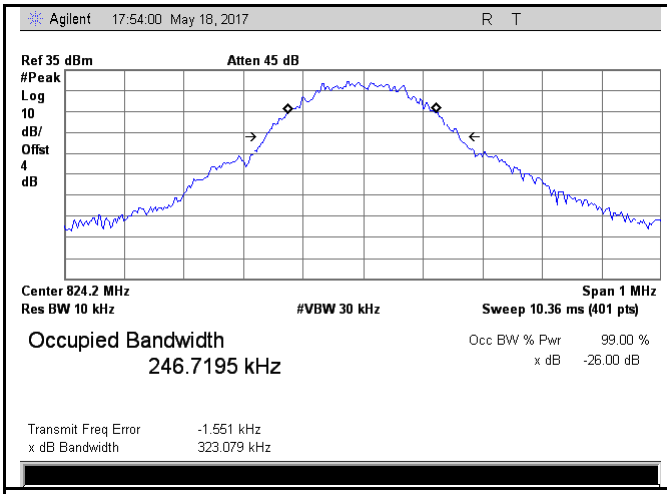



PCS 1900 BW - Mid CH 1880MHz

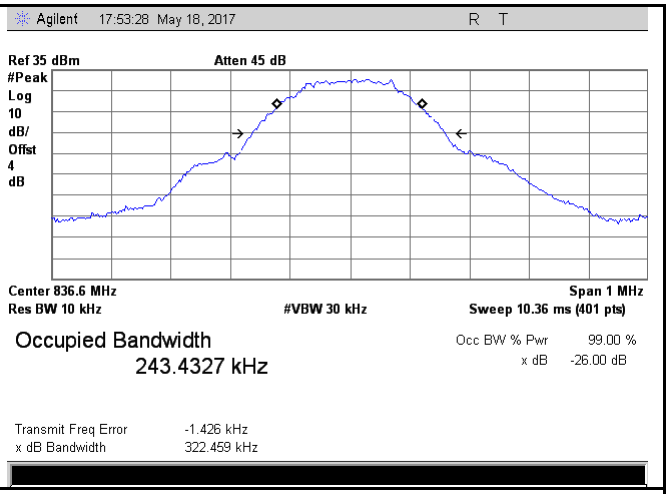



PCS 1900 BW - High CH 1909.8MHz

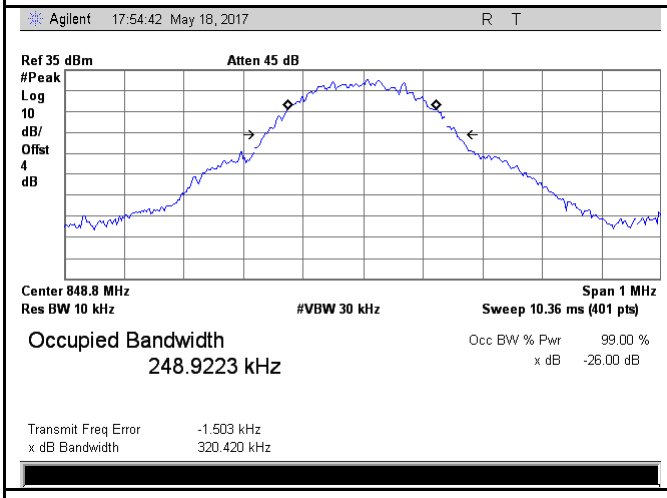
## EGPRS (MCS5):



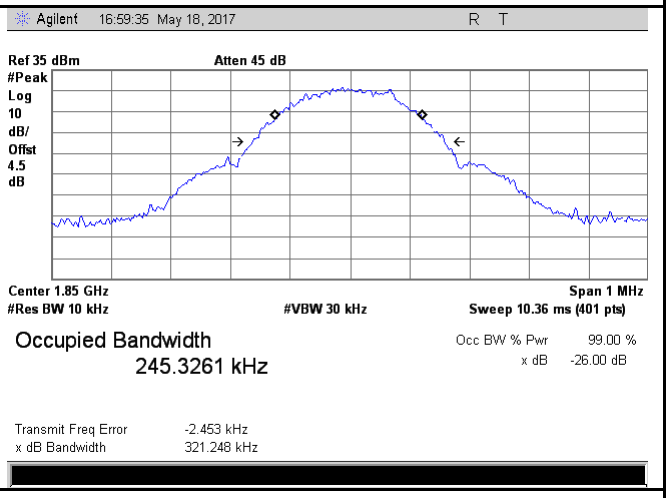

GSM 850 BW - Low CH 824.2MHz



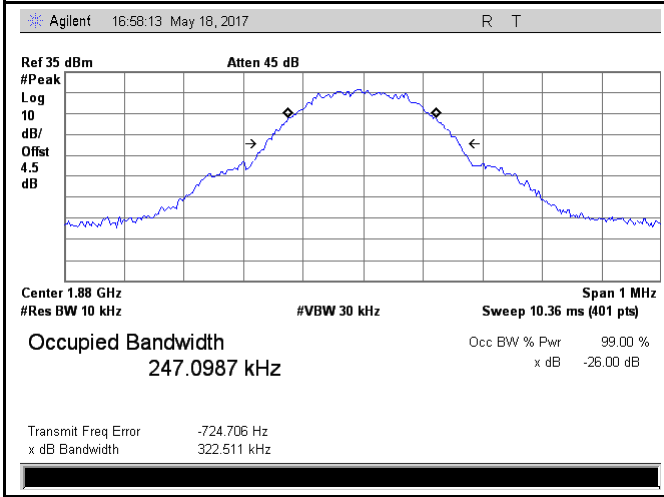

GSM 850 BW - Mid CH 836.6MHz



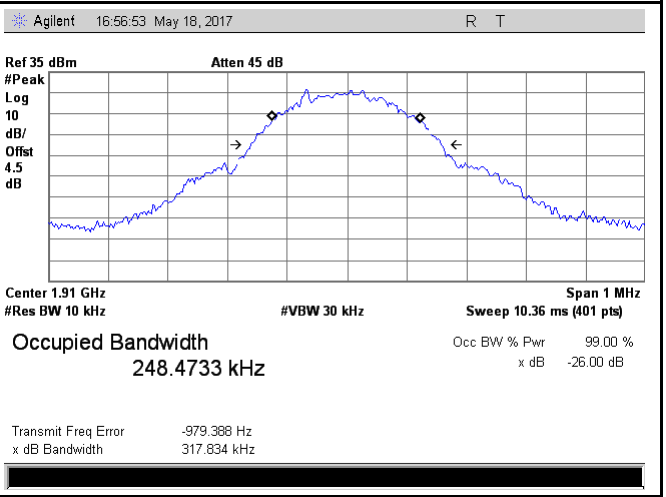

GSM 850 BW - High CH 848.8MHz




PCS 1900 BW - Low CH 1850.2MHz

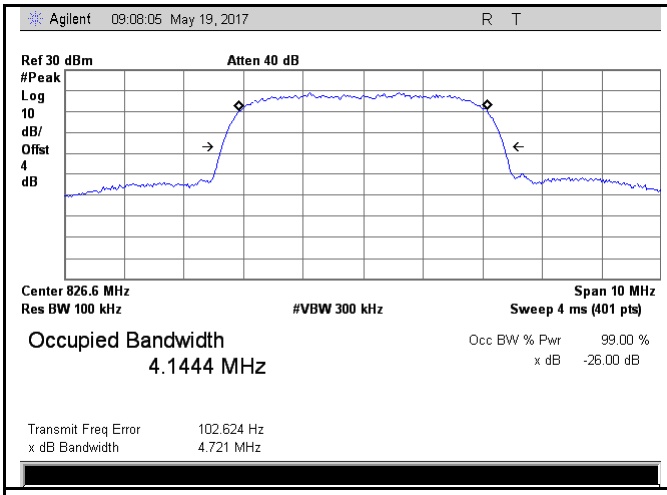



PCS 1900 BW - Mid CH 1880MHz

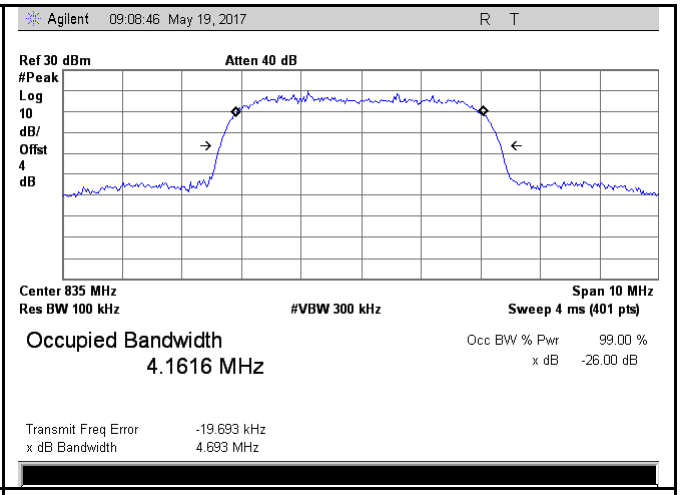



PCS 1900 BW - High CH 1909.8MHz

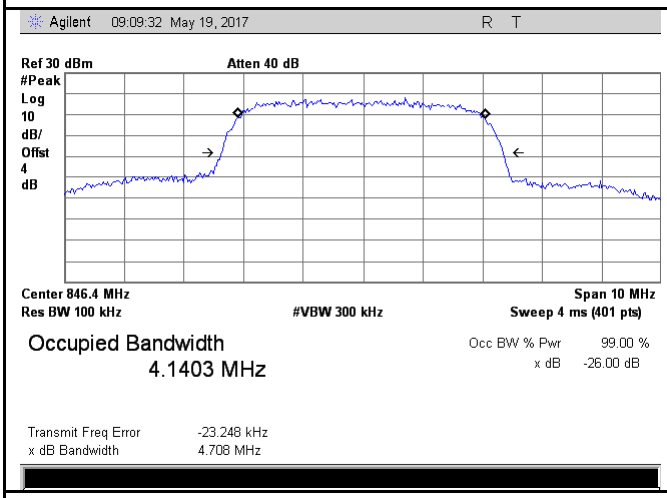
RMC:



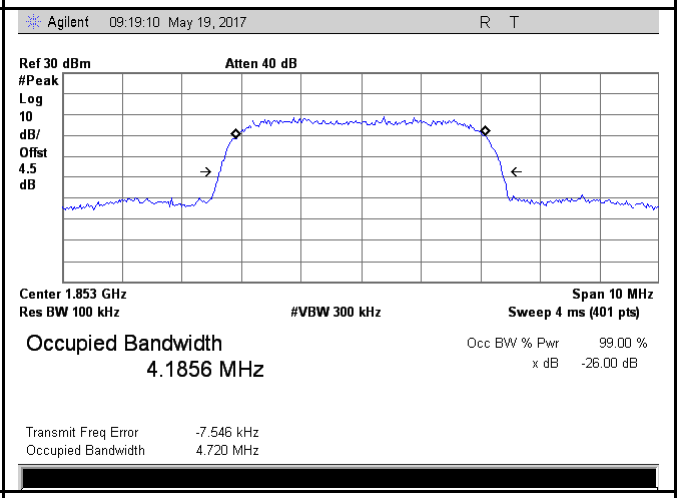

Band V BW - Low CH 826.6 MHz



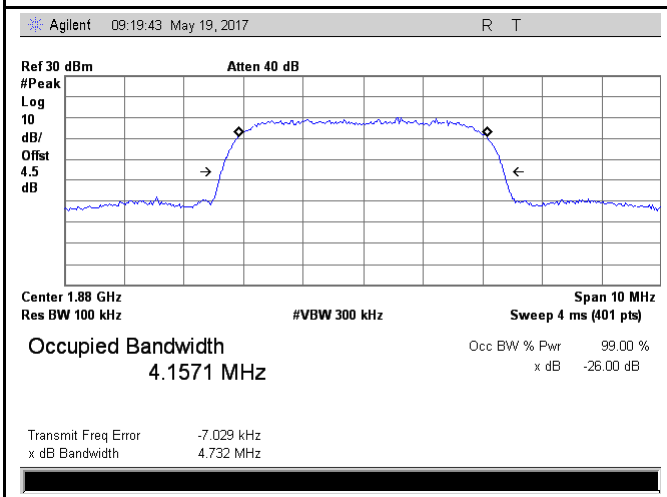

Band V BW - Mid CH 835.0 MHz



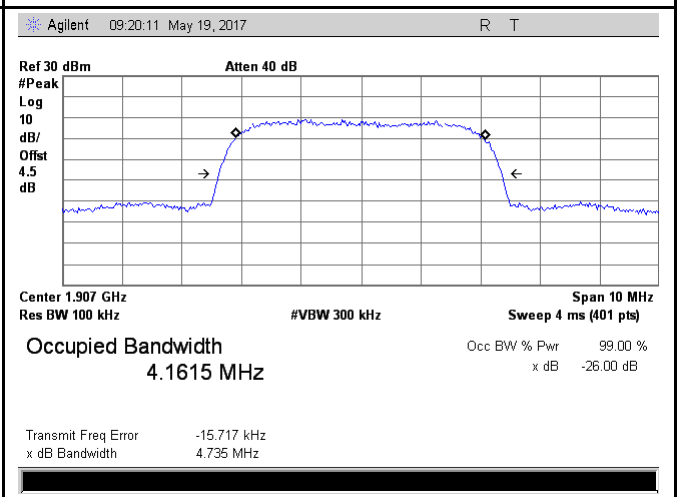

Band V BW - High CH 846.4 MHz




Band II BW - Low CH 1852.4MHz

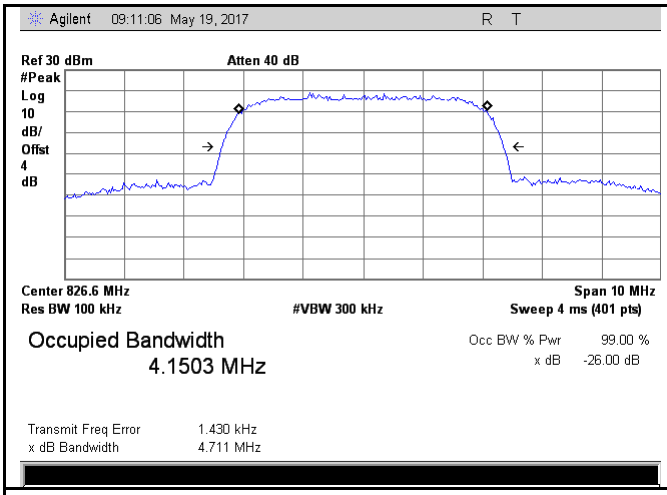



Band II BW - Mid CH 1880MHz

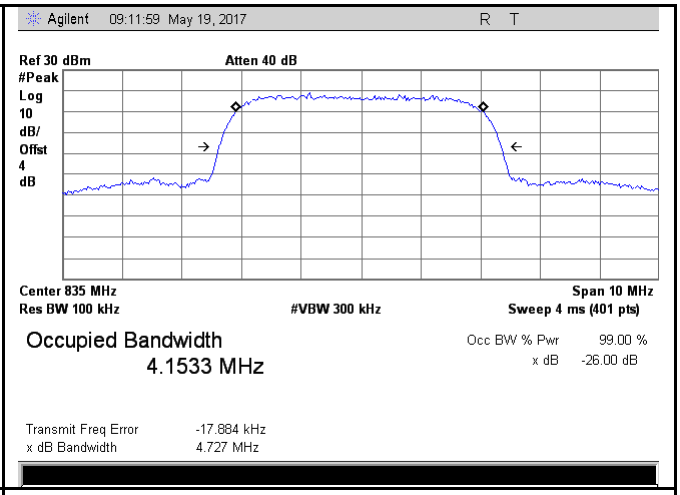



Band II BW - High CH 1907.6MHz

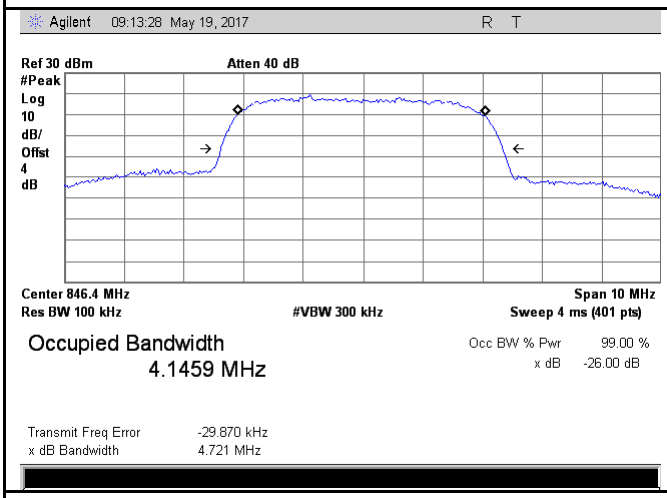
HSDPA:



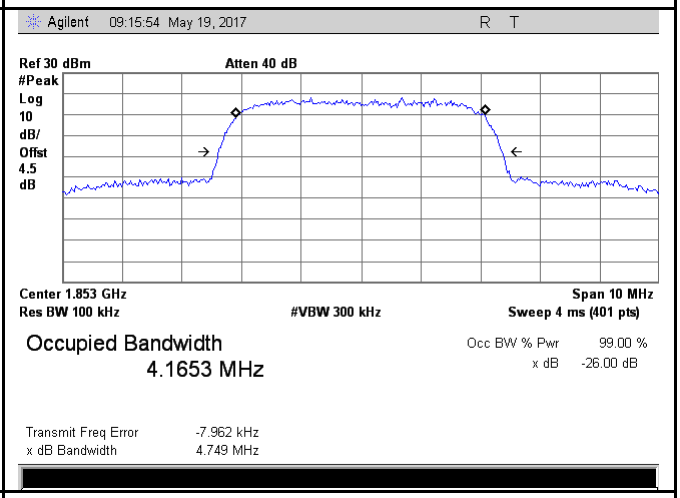

Band V BW - Low CH 826.6 MHz



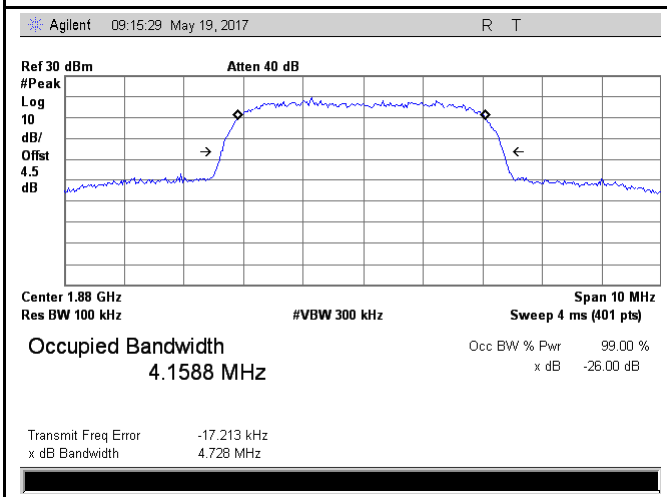

Band V BW - Mid CH 835.0 MHz



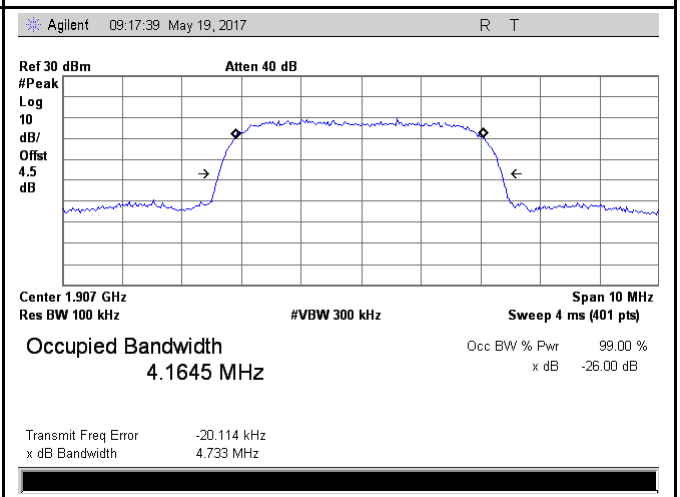

Band V BW - High CH 846.4 MHz




Band II BW - Low CH 1852.4MHz

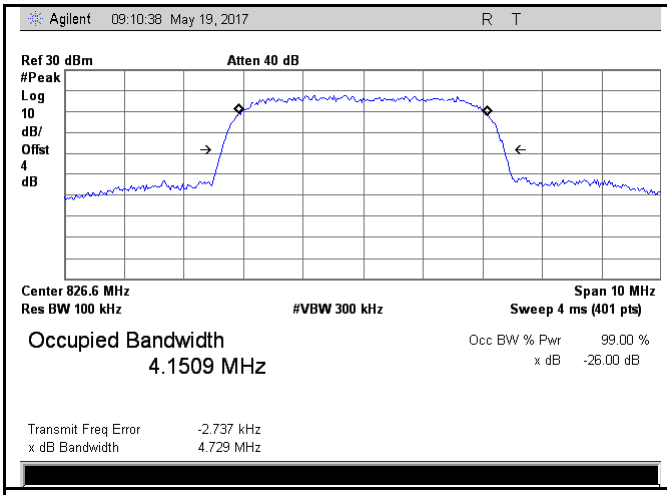



Band II BW - Mid CH 1880MHz

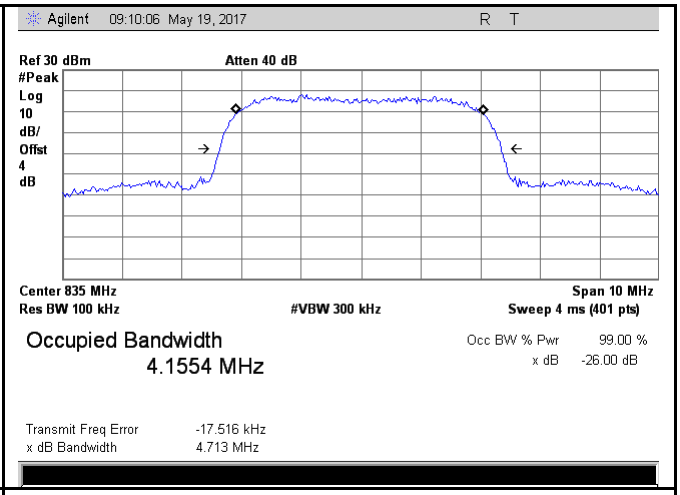



Band II BW - High CH 1907.6MHz

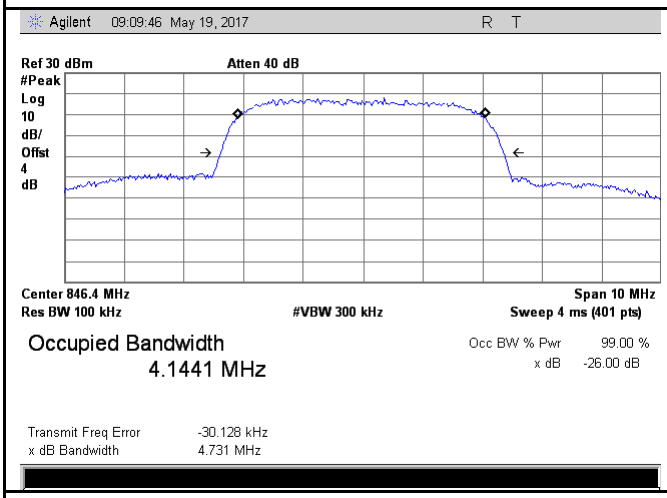
HSUPA:



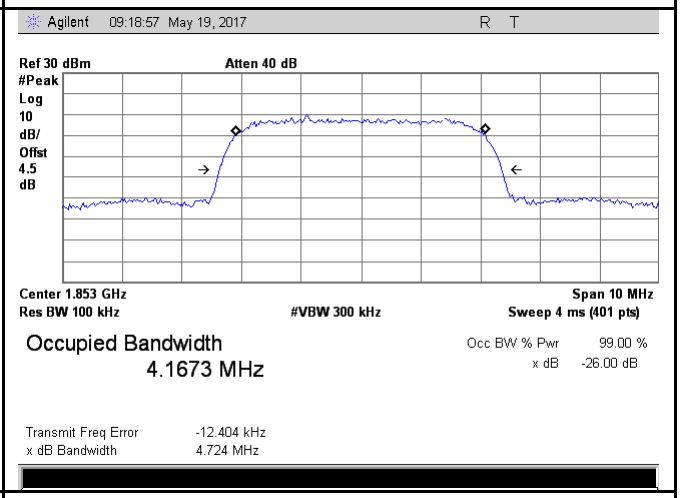

Band V BW - Low CH 826.6 MHz



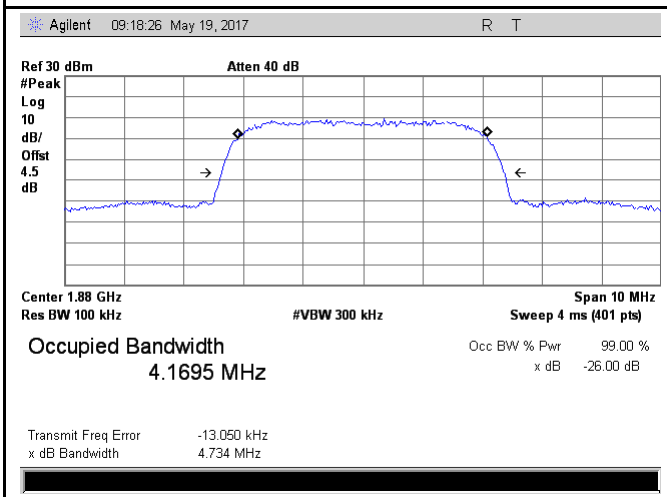

Band V BW - Mid CH 835.0 MHz



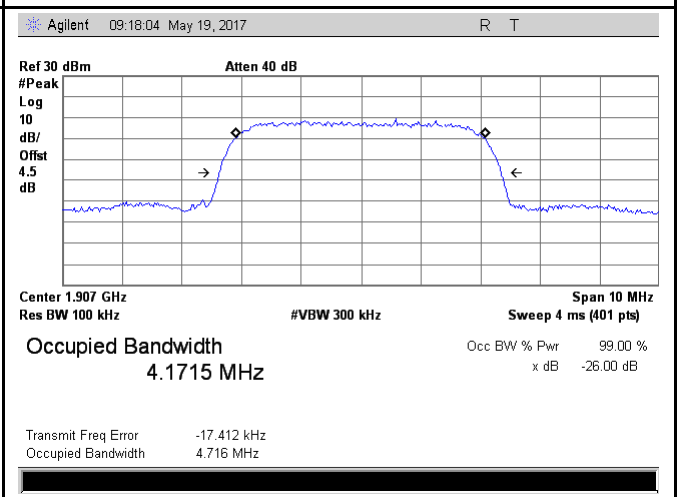

Band V BW - High CH 846.4 MHz




Band II BW - Low CH 1852.4MHz




Band II BW - Mid CH 1880MHz

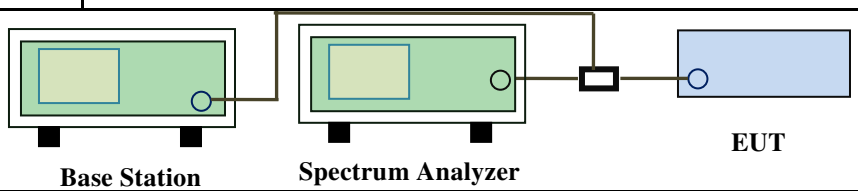



Band II BW - High CH 1907.6MHz

## 6.5 Spurious Emissions at Antenna Terminals

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

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1051, §22.917(a)& §24.238(a) | 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 | | |

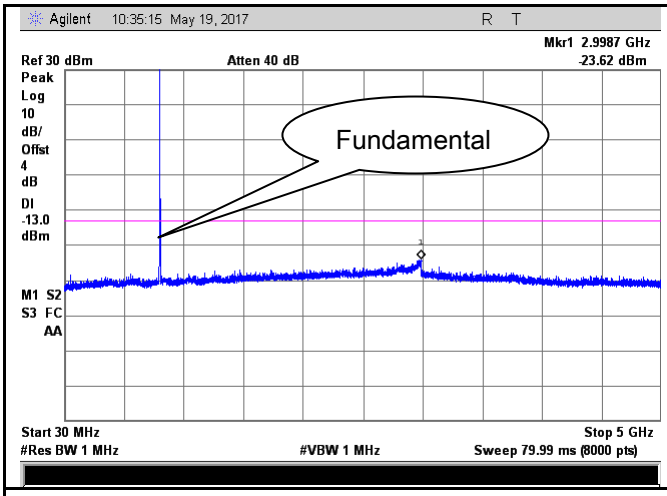
**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☑ Yes (See below) ☐ N/A

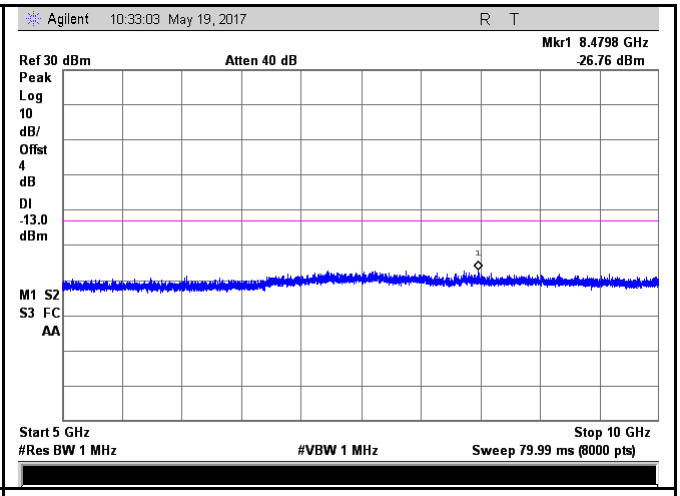
## Test Plots

### GSM Voice:

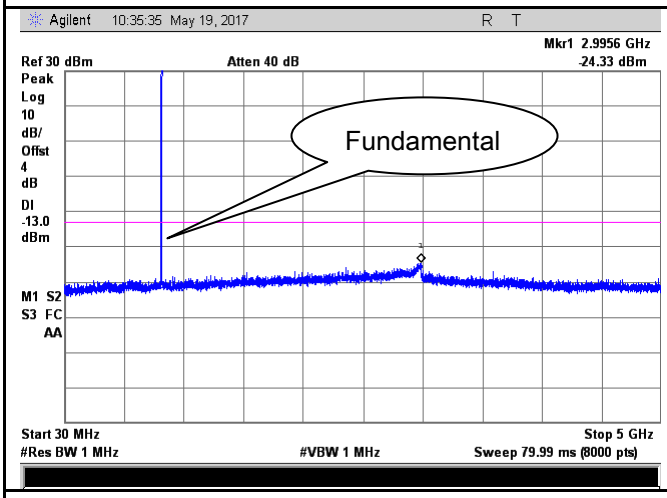
### Cellular Band (Part 22H) result



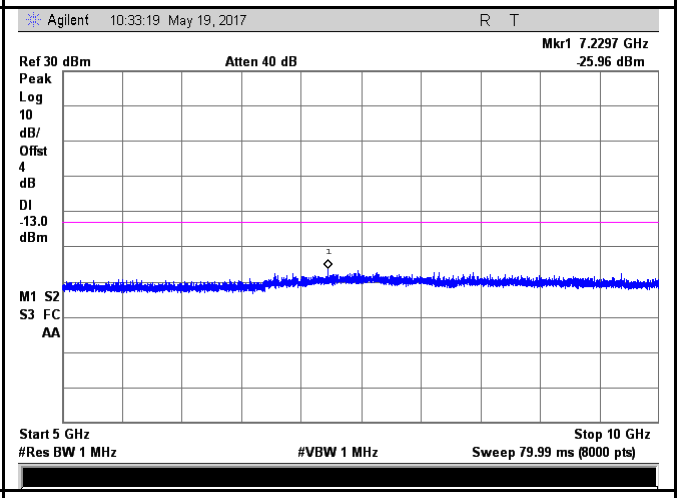

GSM 850 - Low Channel-1



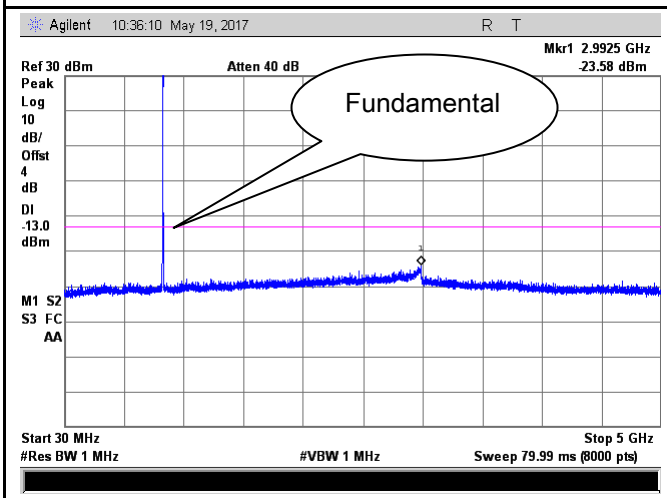

GSM 850 - Low Channel-2



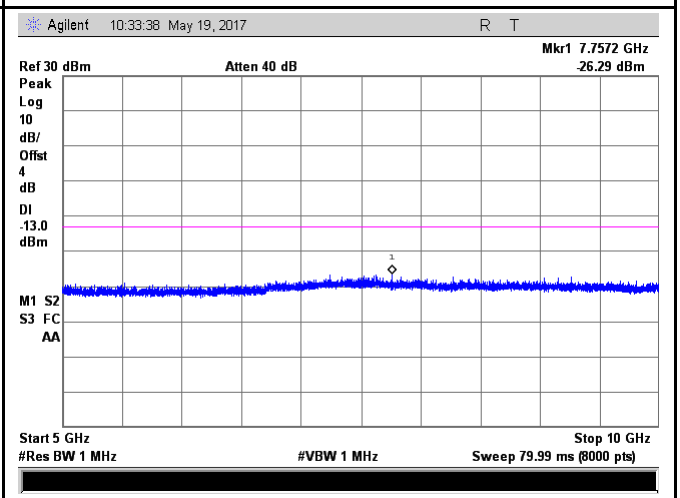

GSM 850 Middle Channel-1




GSM 850 Middle Channel-2

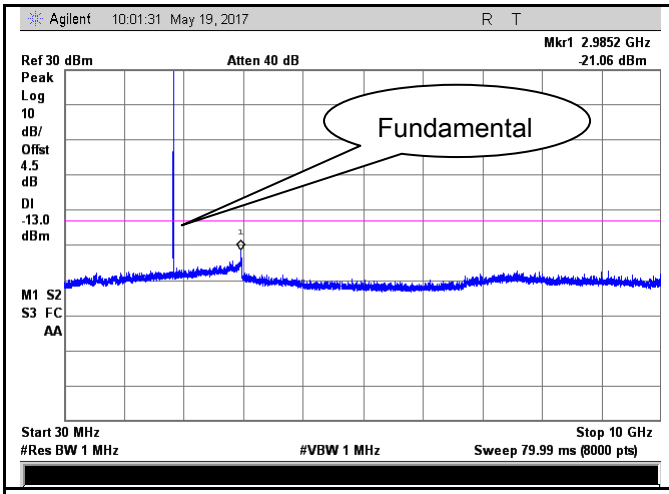



GSM 850 - High Channel-1

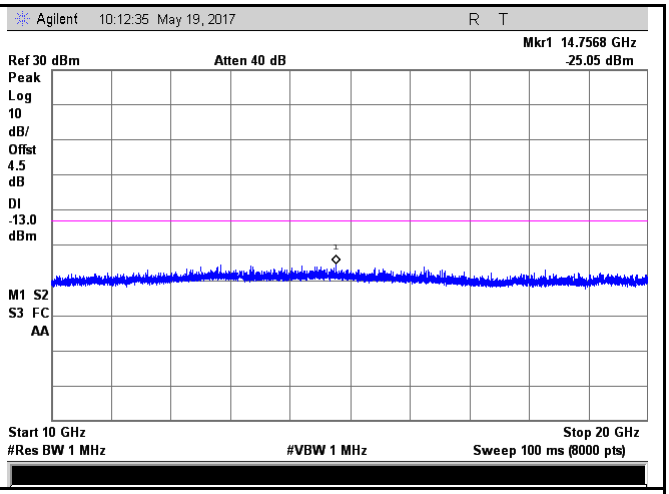



GSM 850 - High Channel-2

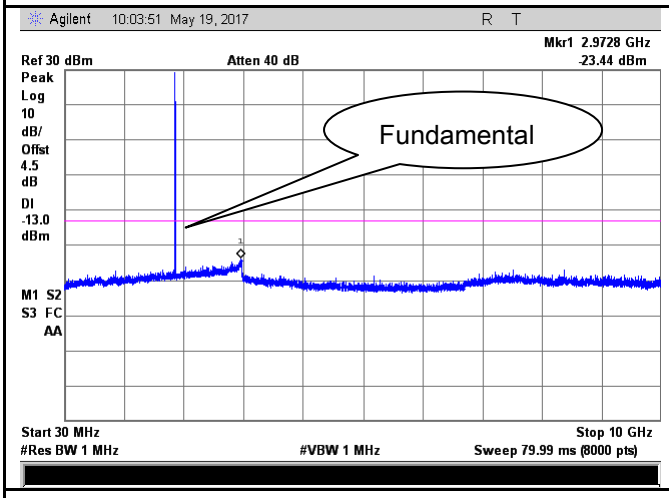
## PCS Band (Part24E) result



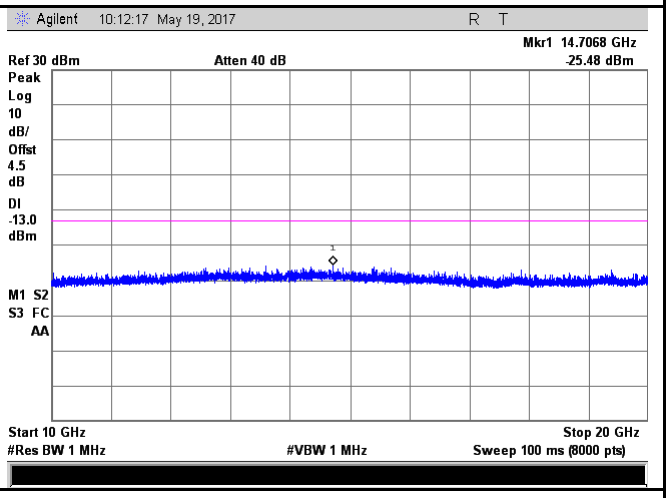

PCS1900 - Low Channel-1



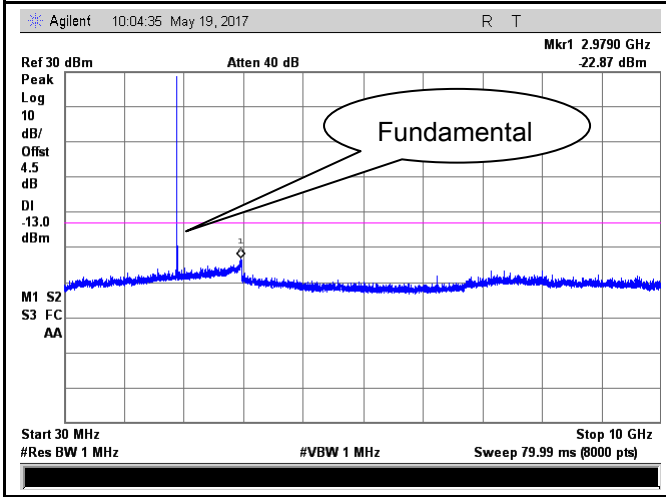

PCS 1900 - Low Channel-2



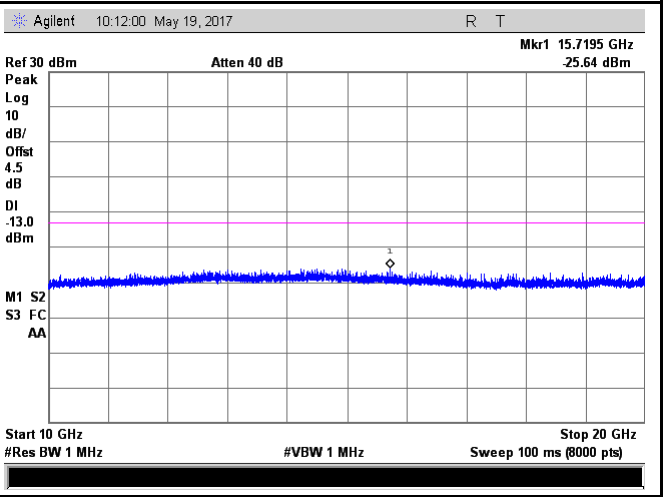

PCS1900 - Middle Channel-1




PCS 1900 - Middle Channel-2



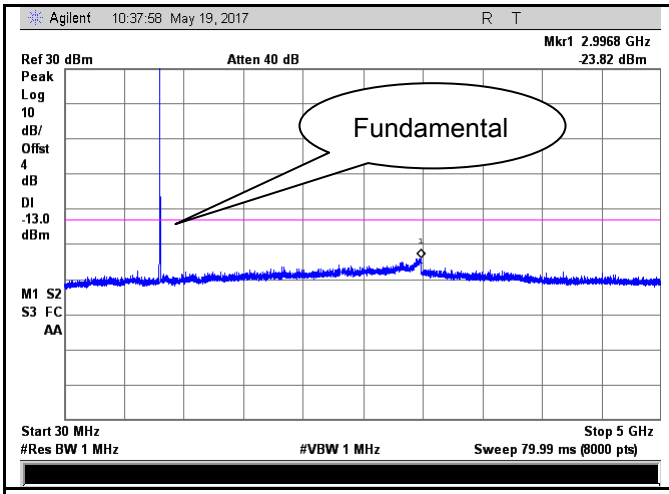

PCS1900 - High Channel-1



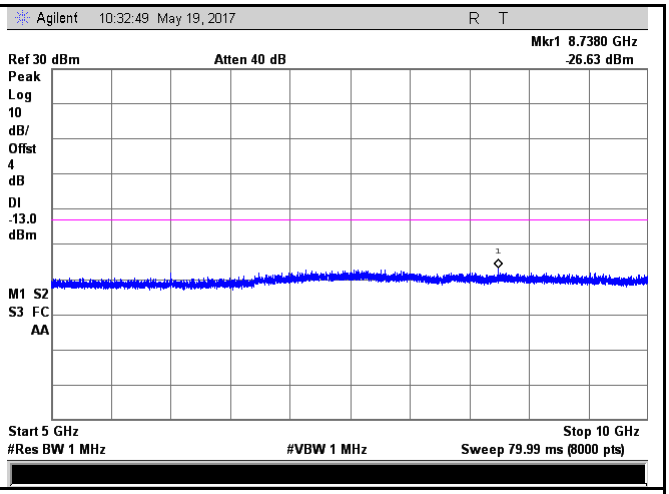

PCS 1900 - High Channel-2

## GPRS:

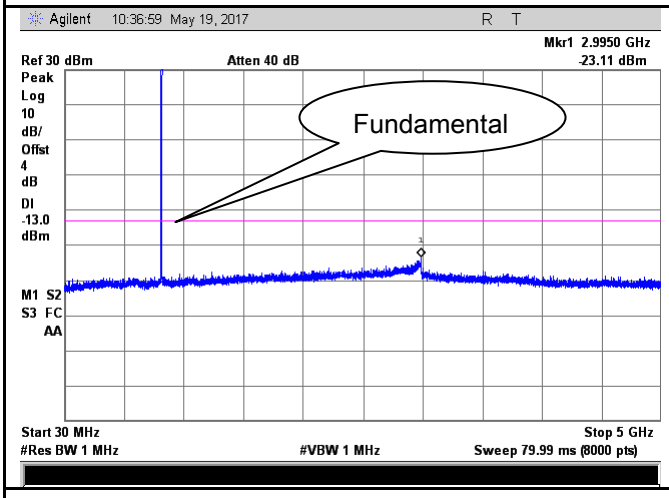
### Cellular Band (Part 22H) result



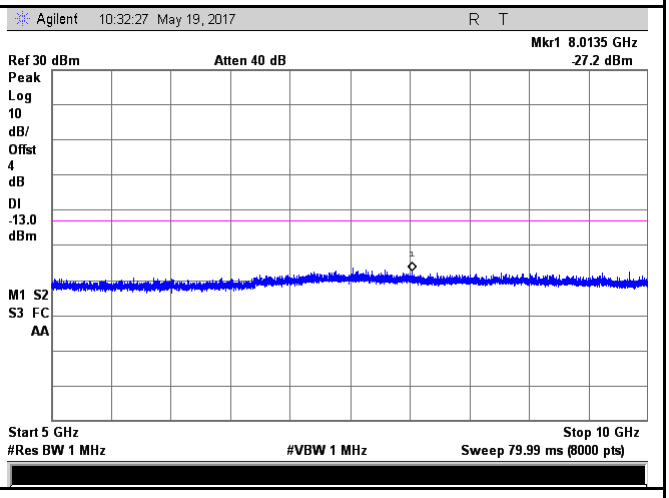

GSM 850 - Low Channel-1



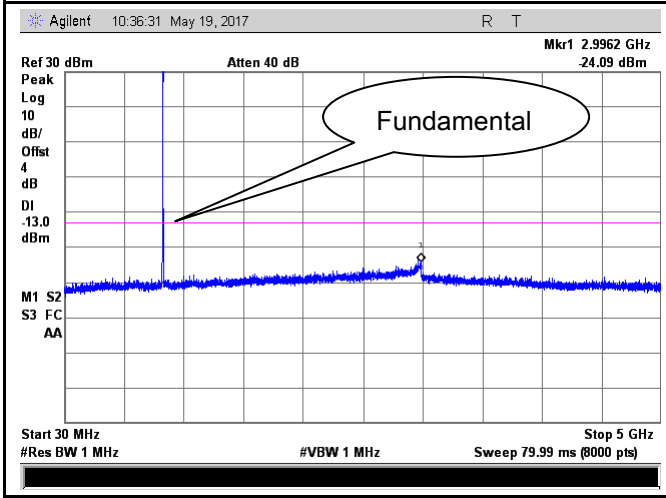

GSM 850 - Low Channel-2



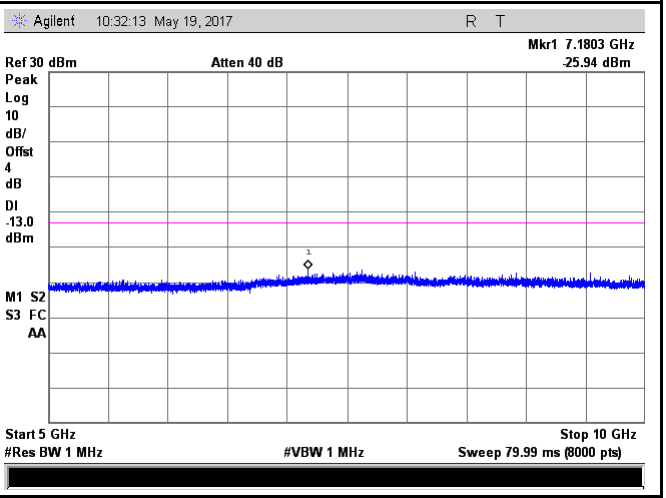

GSM 850 Middle Channel-1




GSM 850 Middle Channel-2

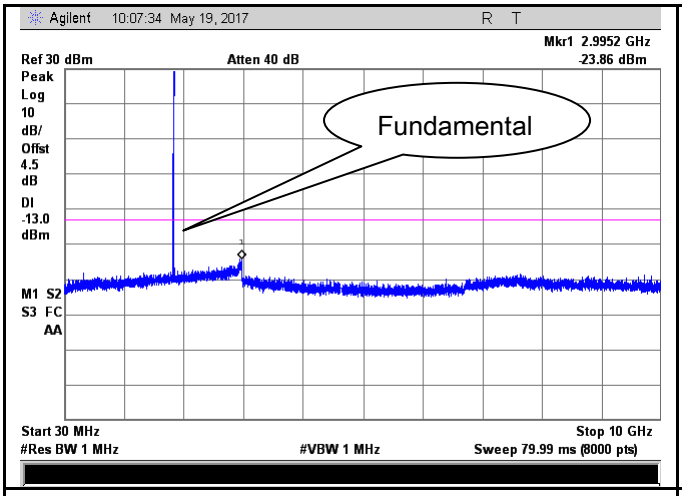



GSM 850 - High Channel-1

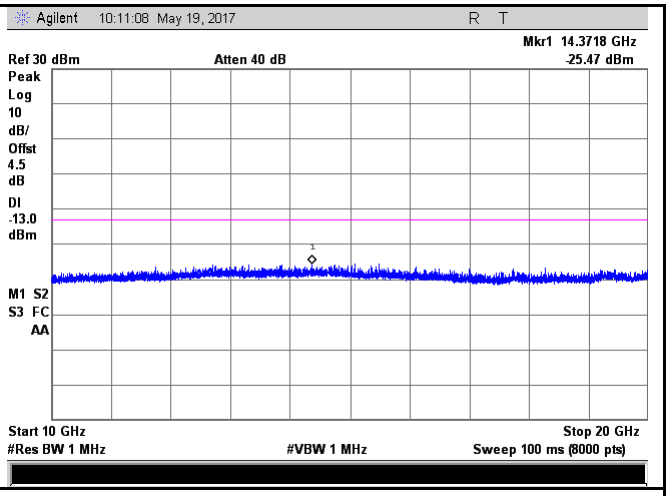



GSM 850 - High Channel-2

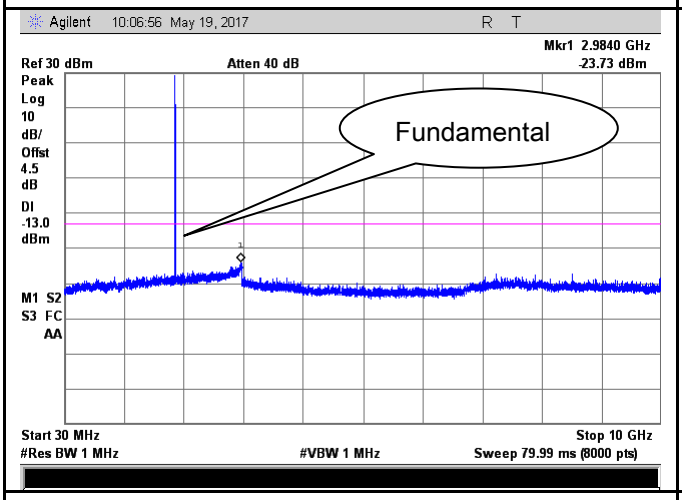
## PCS Band (Part24E) result



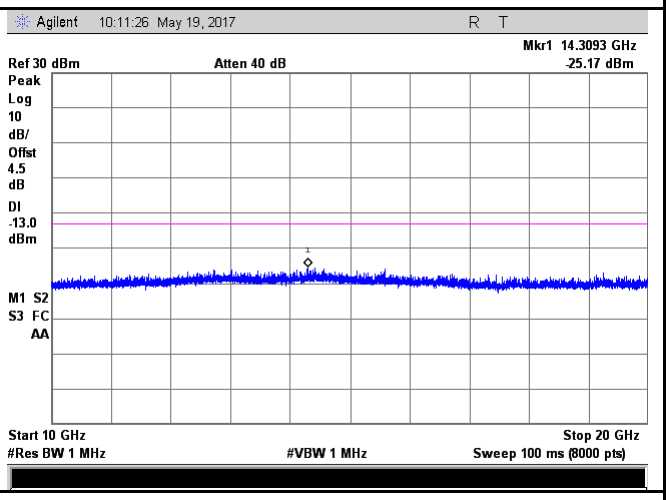

PCS1900 - Low Channel-1



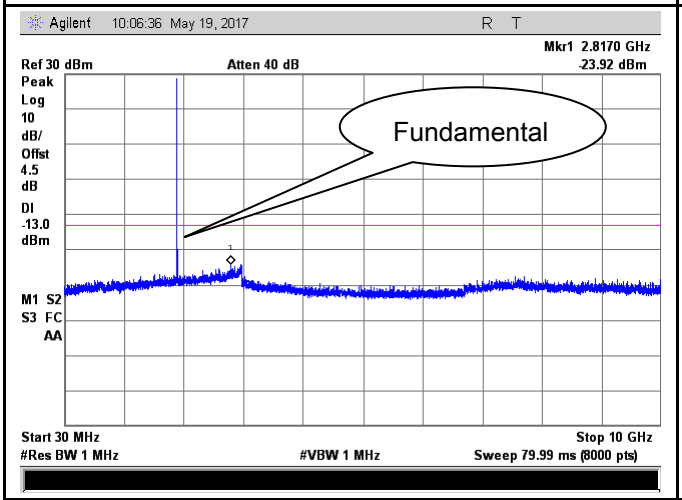

PCS 1900 - Low Channel-2



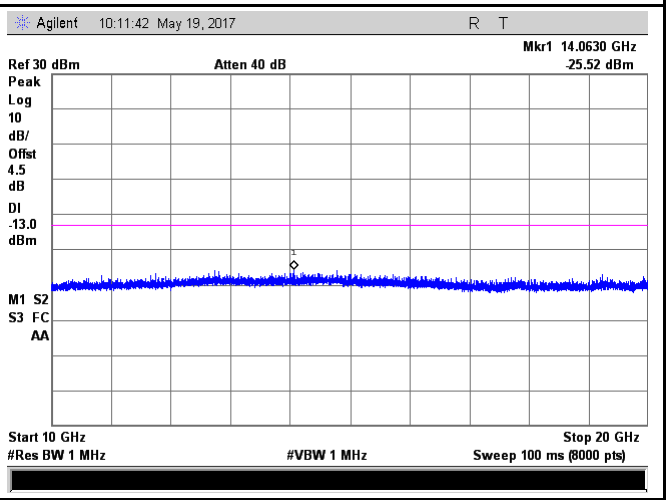

PCS1900 - Middle Channel-1




PCS 1900 - Middle Channel-2



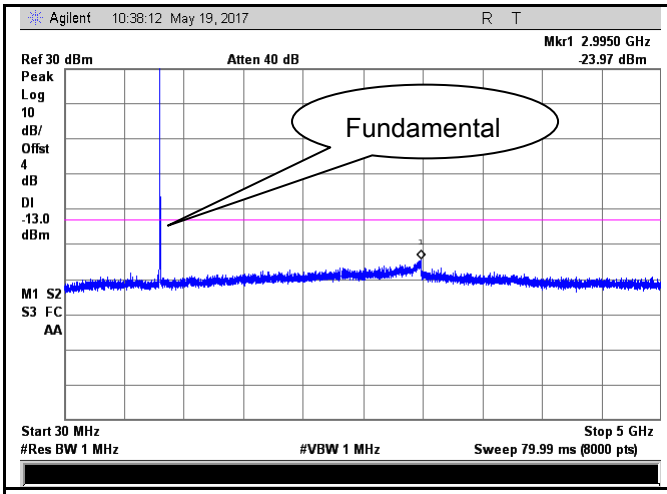

PCS1900 - High Channel-1



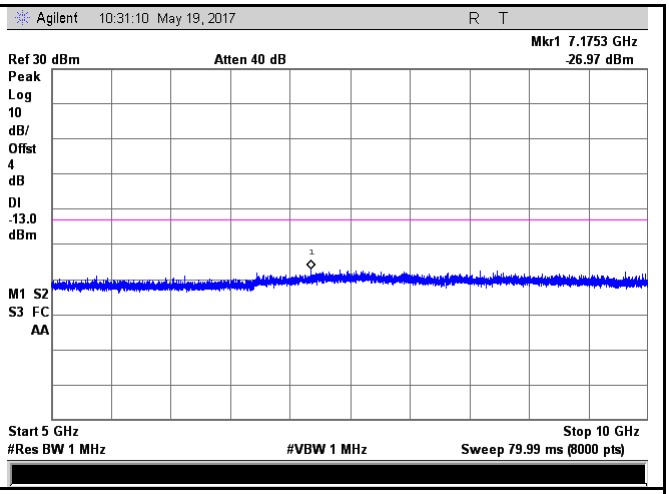

PCS 1900 - High Channel-2

## EGPRS (MCS 5):

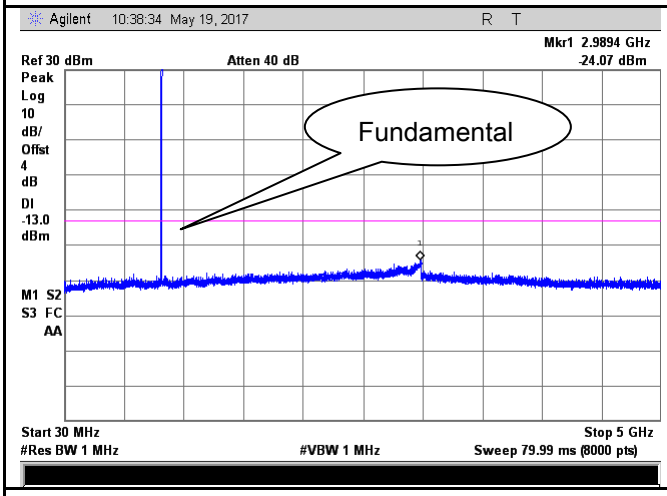
## Cellular Band (Part 22H) result



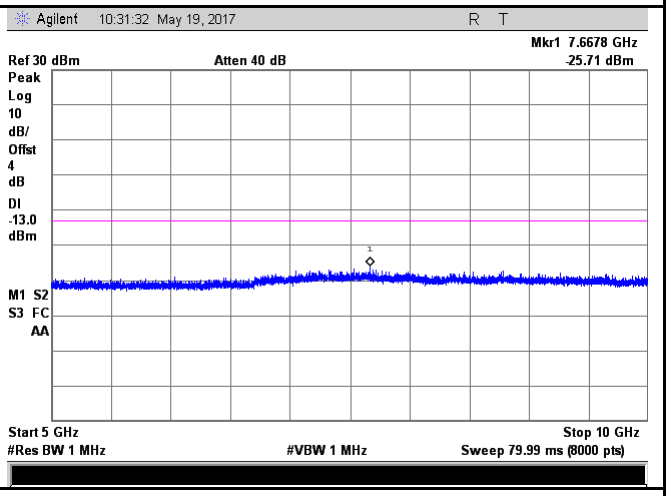

GSM 850 - Low Channel-1



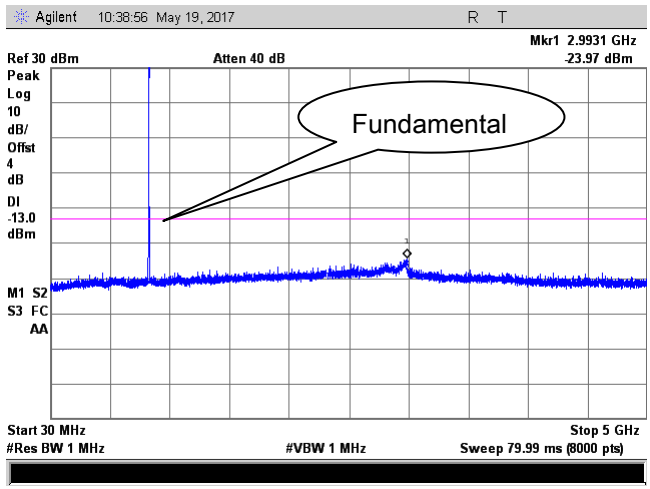

GSM 850 - Low Channel-2



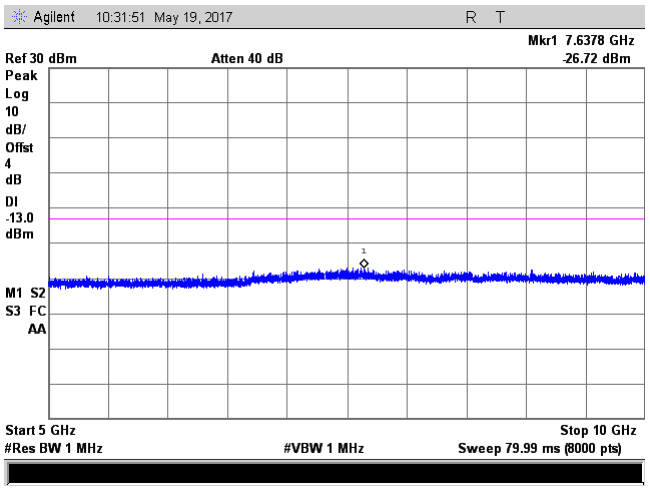

GSM 850 Middle Channel-1




GSM 850 Middle Channel-2

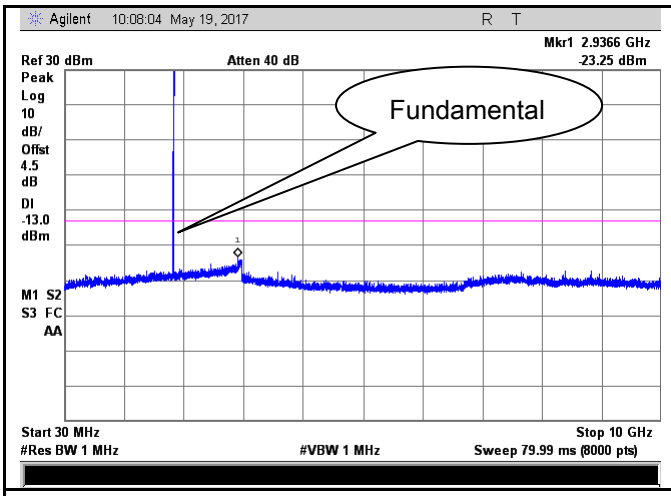



GSM 850 - High Channel-1

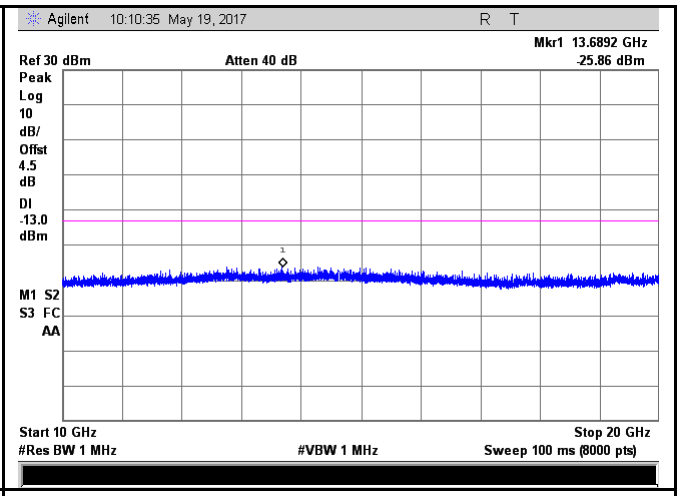



GSM 850 - High Channel-2

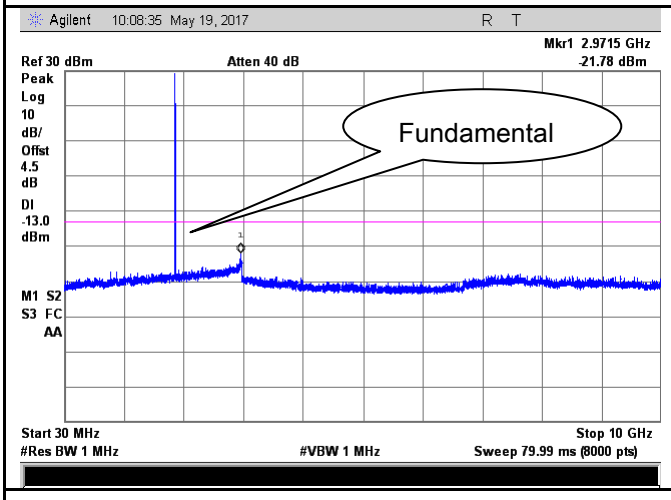
## PCS Band (Part24E) result



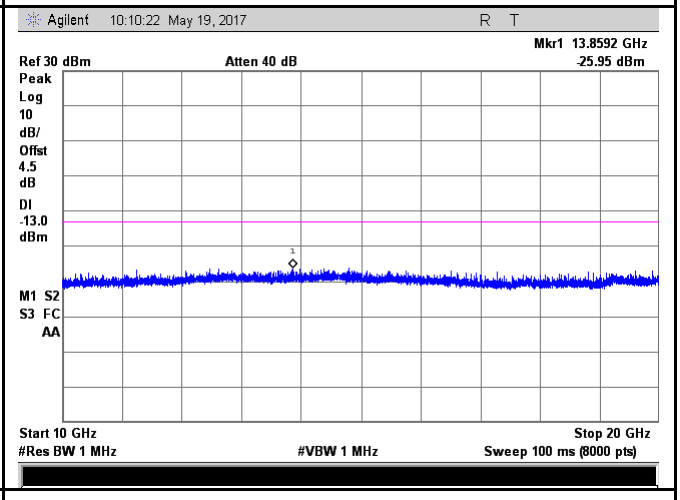

PCS1900 - Low Channel-1



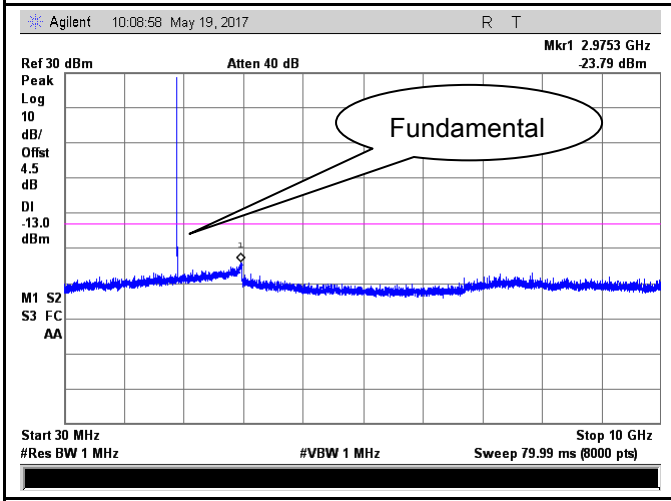

PCS 1900 - Low Channel-2



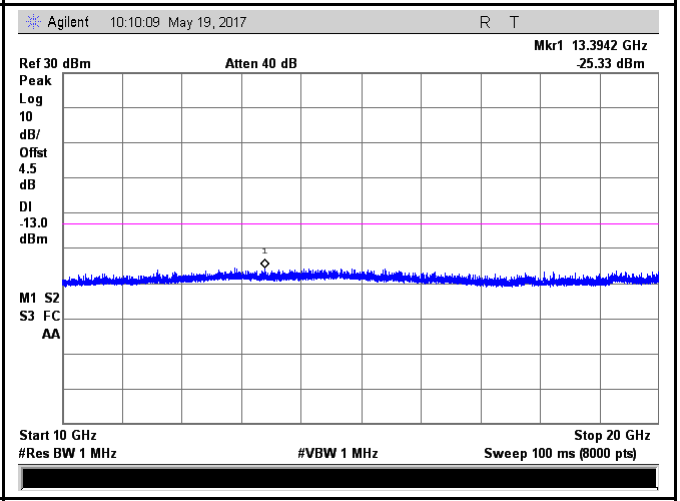

PCS1900 - Middle Channel-1




PCS 1900 - Middle Channel-2



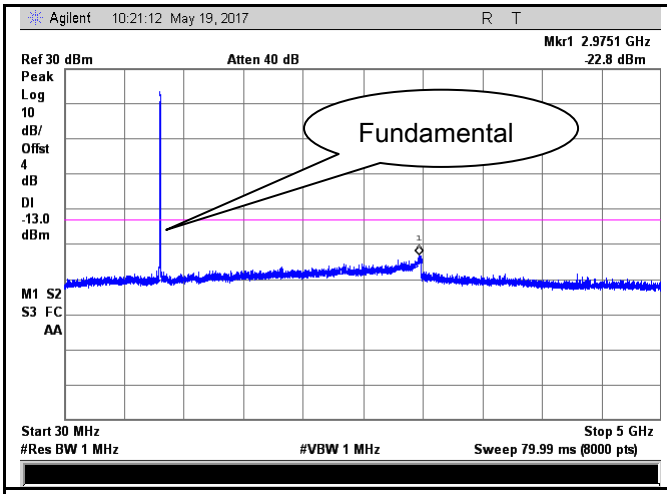

PCS1900 - High Channel-1



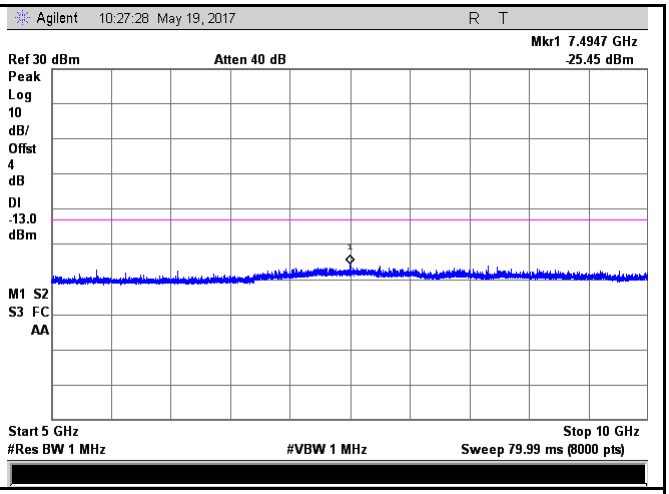

PCS 1900 - High Channel-2

## RMC

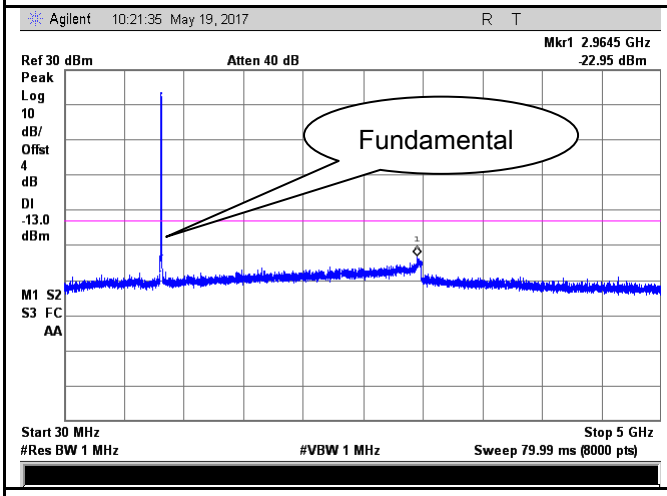
## UMTS-FDD Band V (Part 22H)



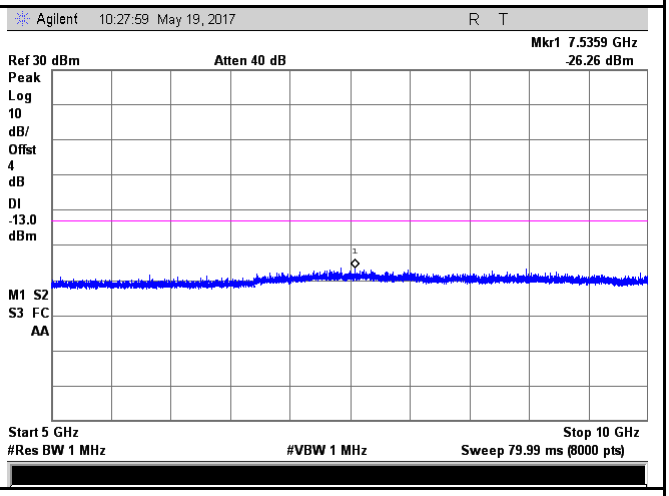

Band V - Low Channel-1



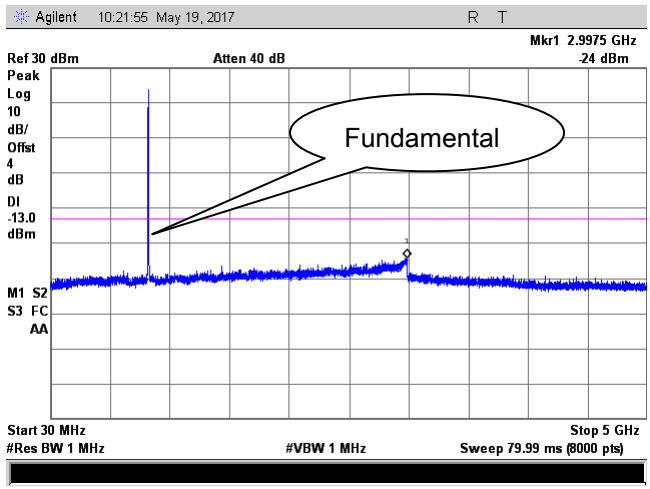

Band V - Low Channel-2



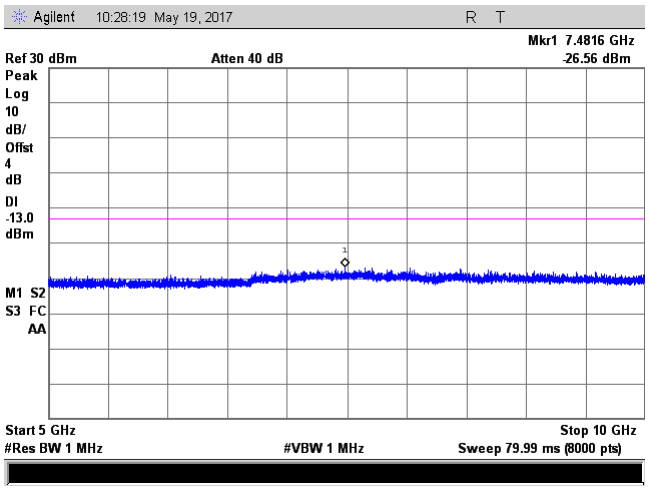

Band V - Middle Channel-1




Band V - Middle Channel-2

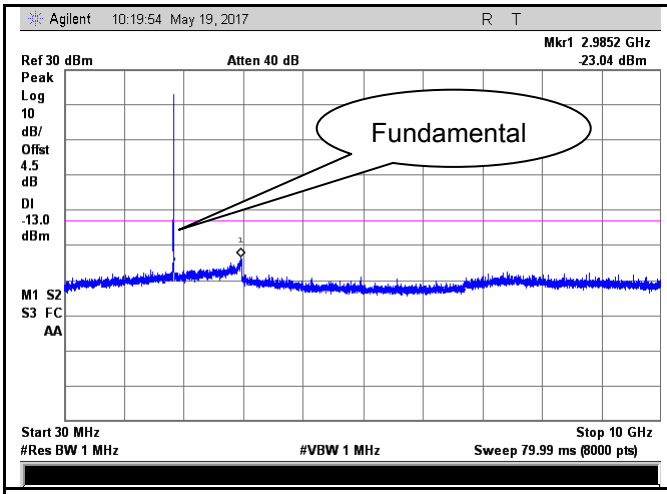



Band V - High Channel-1

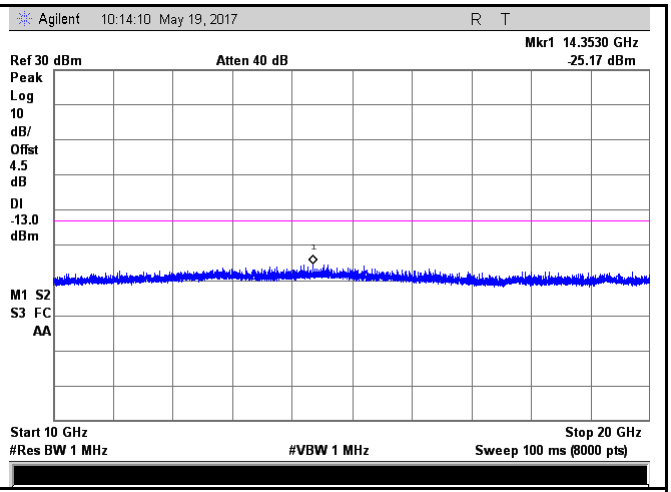



Band V - High Channel-2

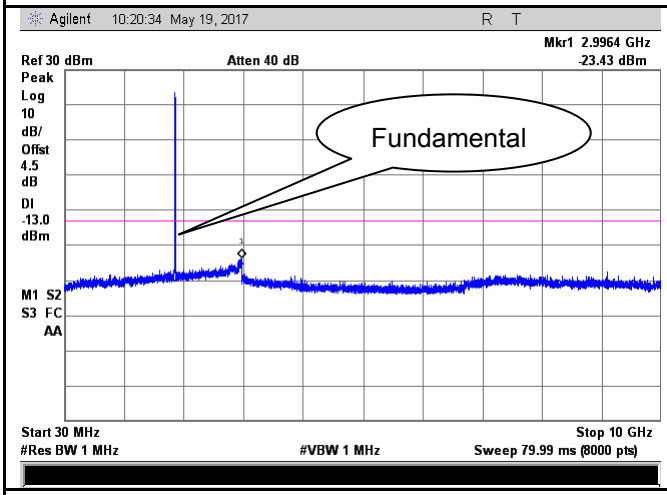
## UMTS-FDD Band II (Part 24E)



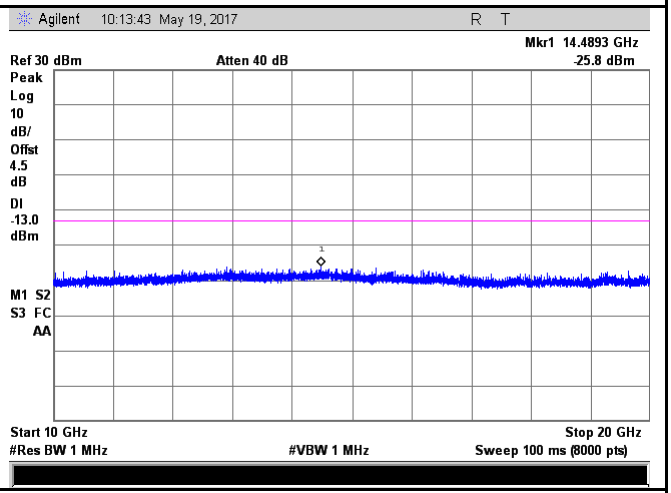

Band II - Low Channel-1



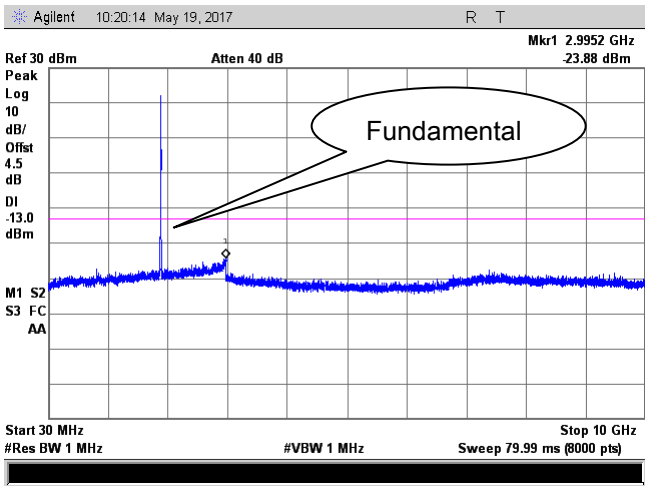

Band II - Low Channel-2



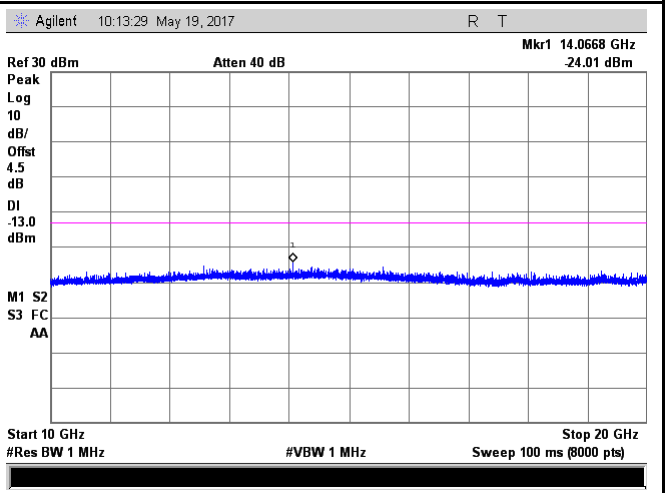

Band II - Middle Channel-1




Band II - Middle Channel-2



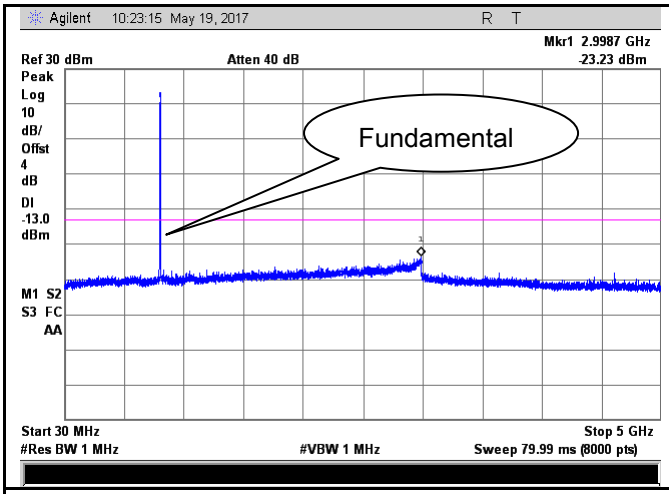

Band II - High Channel-1



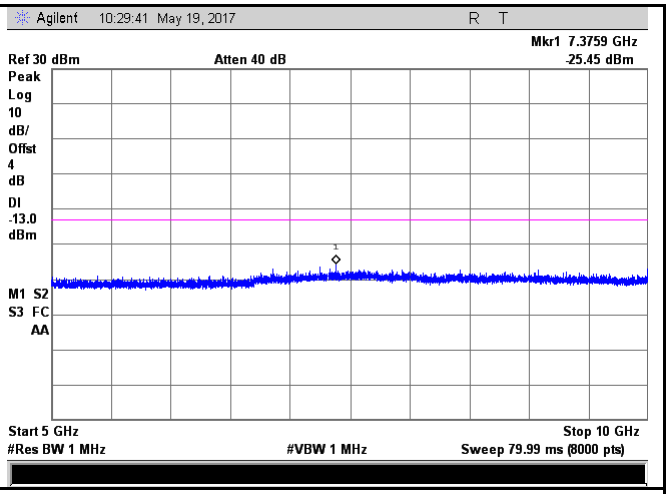

Band II - High Channel-2

## HSDPA:

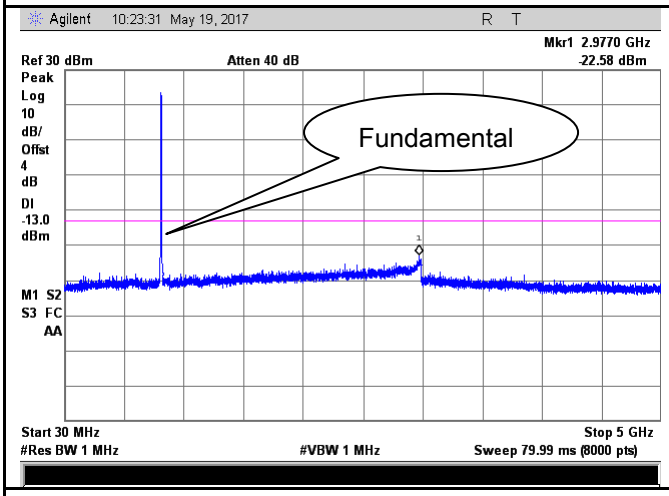
## UMTS-FDD Band V (Part 22H)



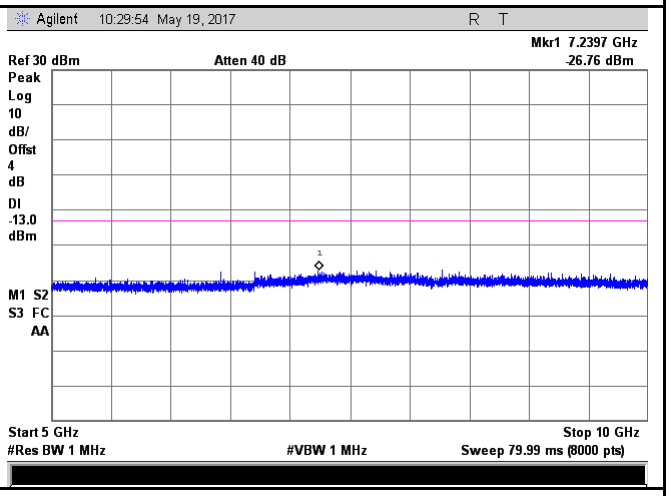

Band V - Low Channel-1



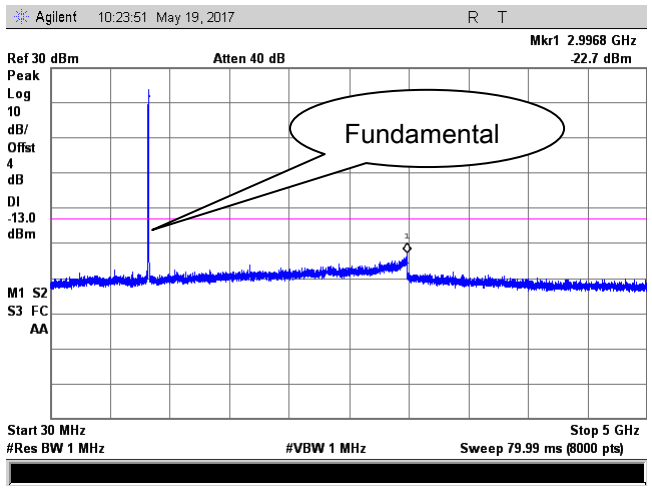

Band V - Low Channel-2



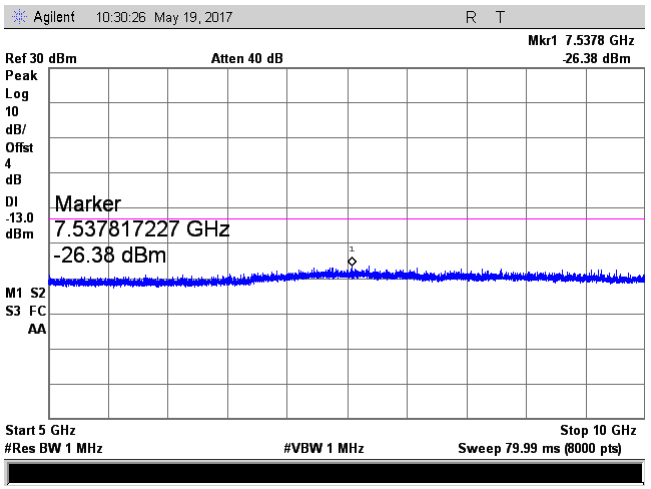

Band V - Middle Channel-1




Band V - Middle Channel-2

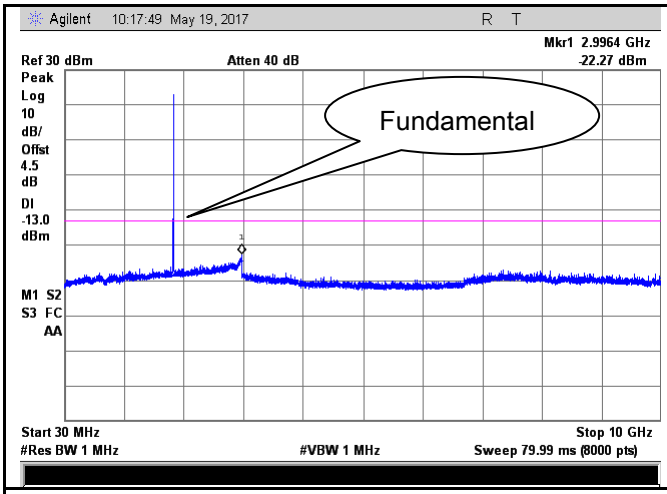



Band V - High Channel-1

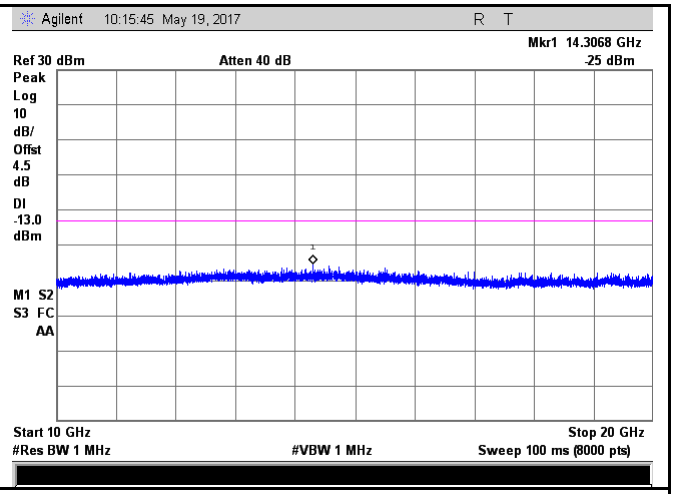



Band V - High Channel-2

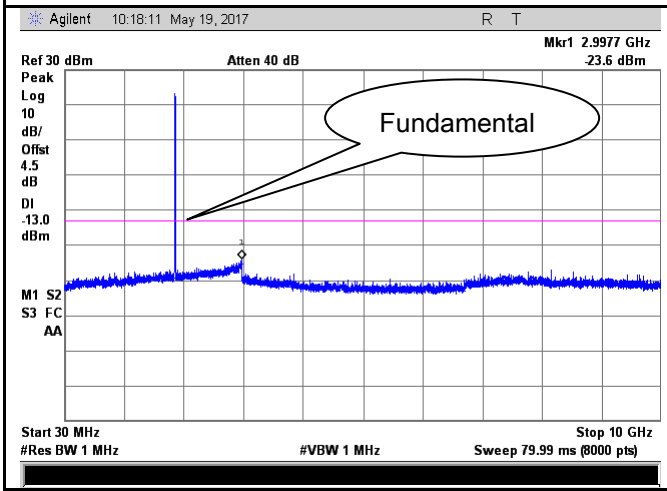
## UMTS-FDD Band II (Part 24E)



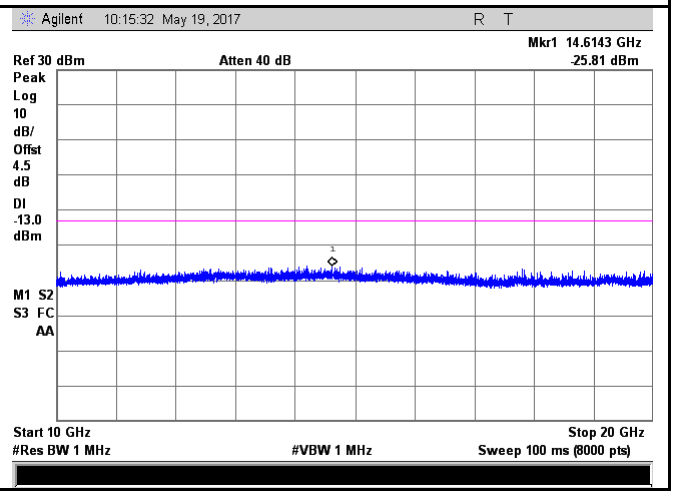

Band II - Low Channel-1



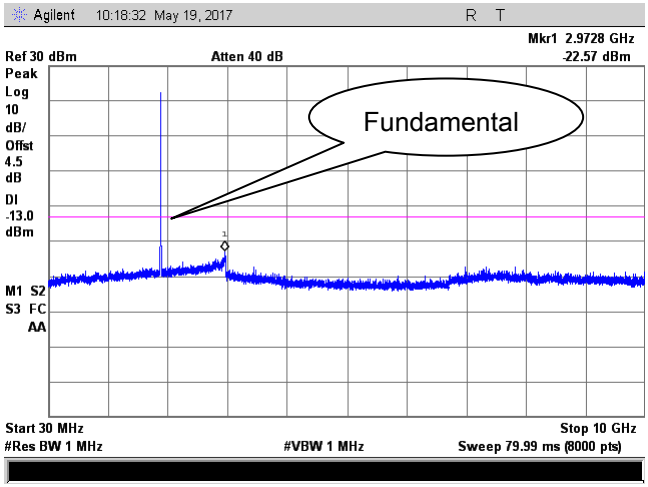

Band II - Low Channel-2



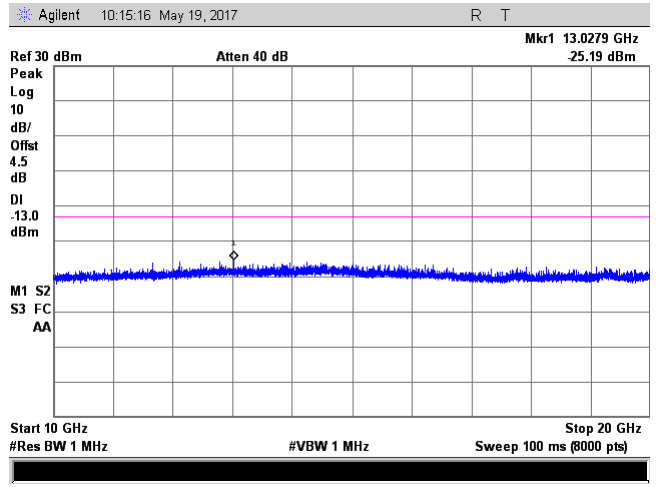

Band II - Middle Channel-1




Band II - Middle Channel-2



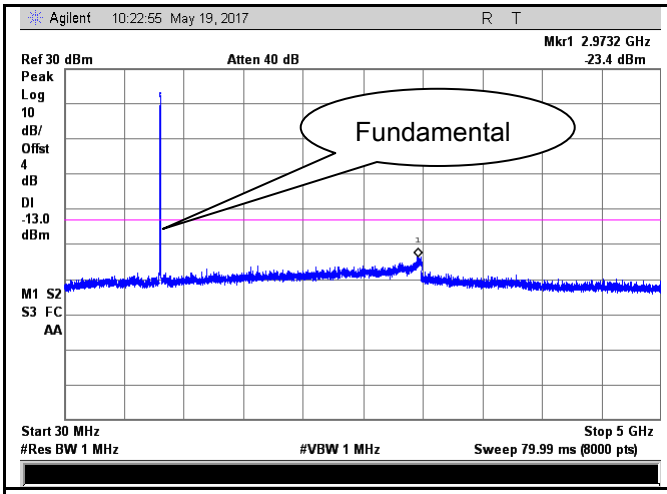

Band II - High Channel-1



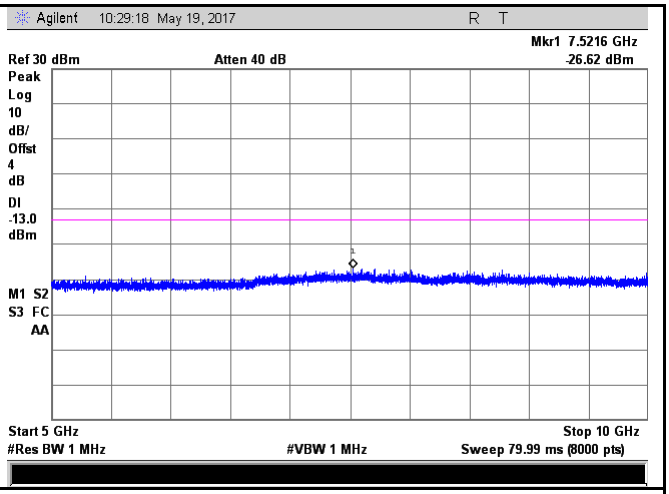

Band II - High Channel-2

## HSUPA:

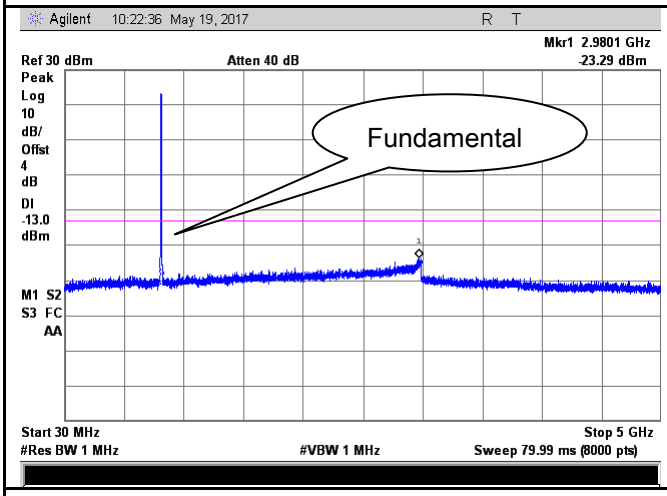
## UMTS-FDD Band V (Part 22H)



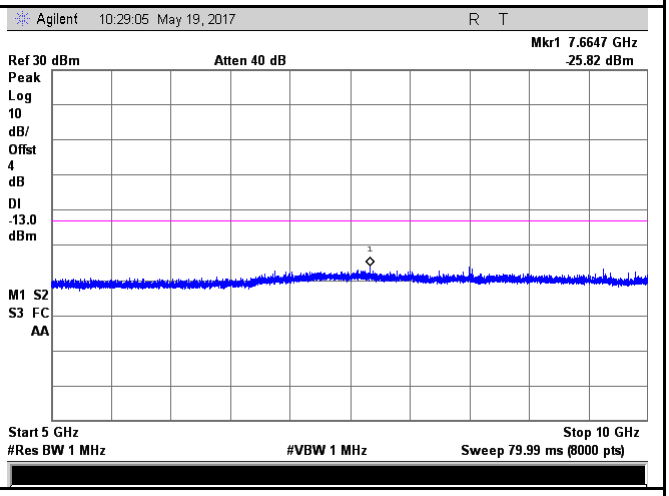

Band V - Low Channel-1



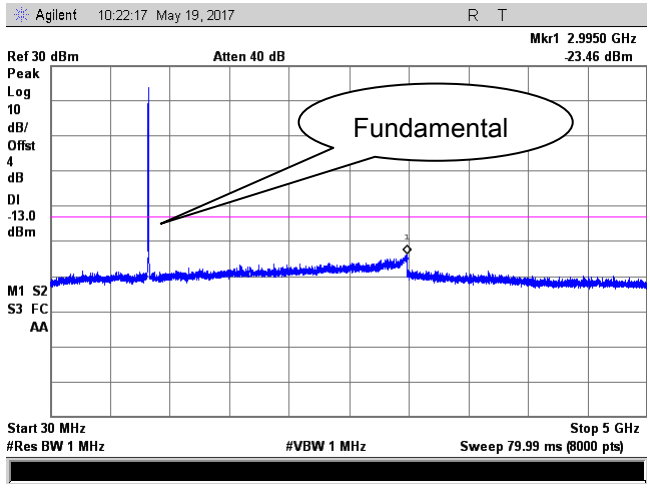

Band V - Low Channel-2



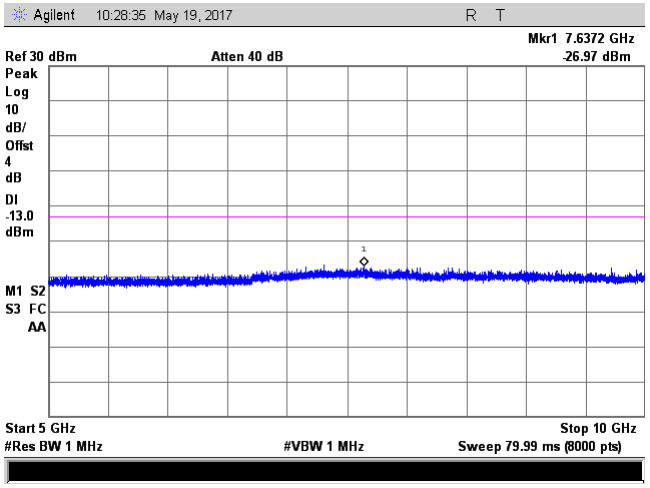

Band V - Middle Channel-1




Band V - Middle Channel-2

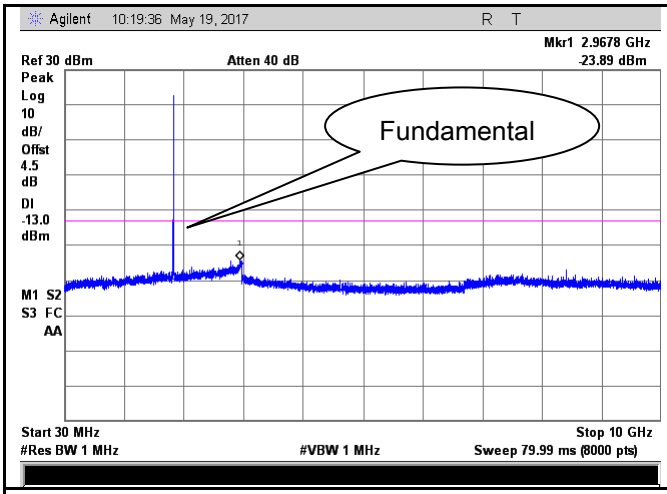



Band V - High Channel-1

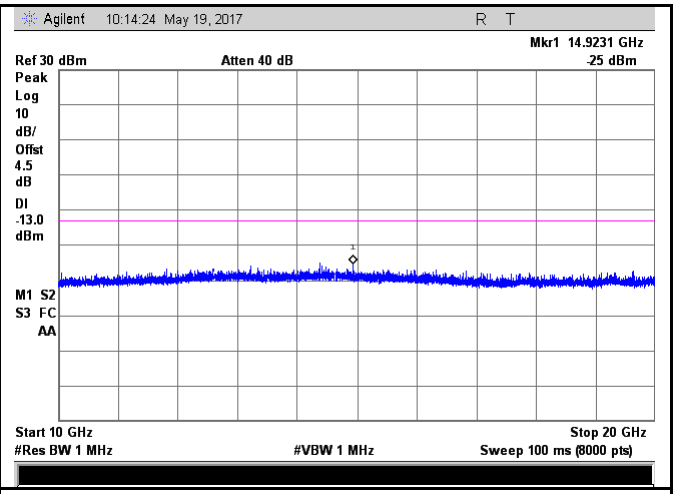



Band V - High Channel-2

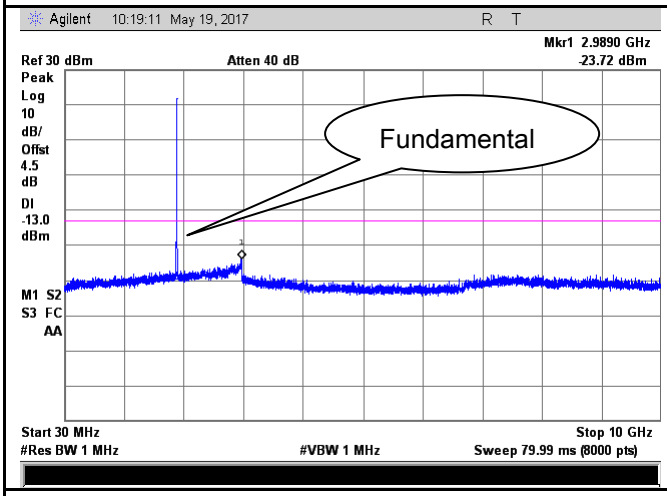
## UMTS-FDD Band II (Part 24E)



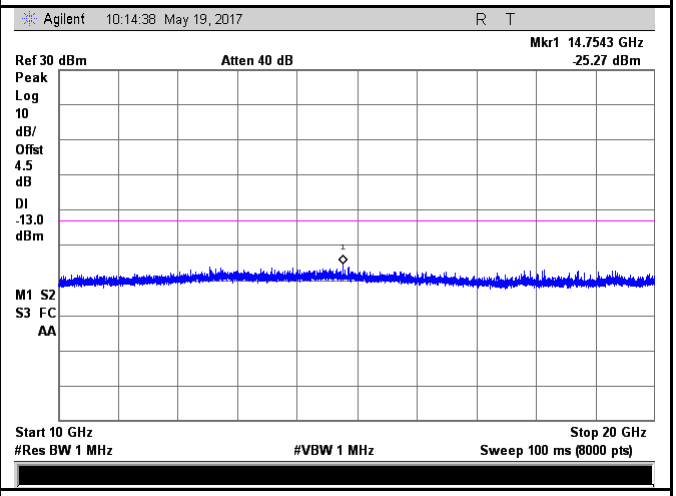

Band II - Low Channel-1



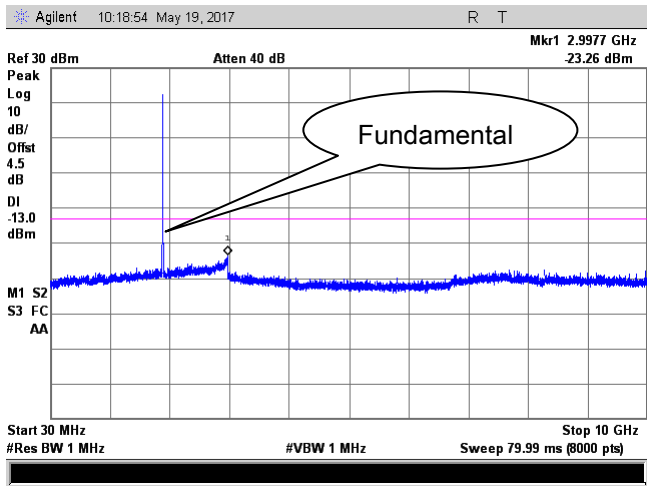

Band II - Low Channel-2



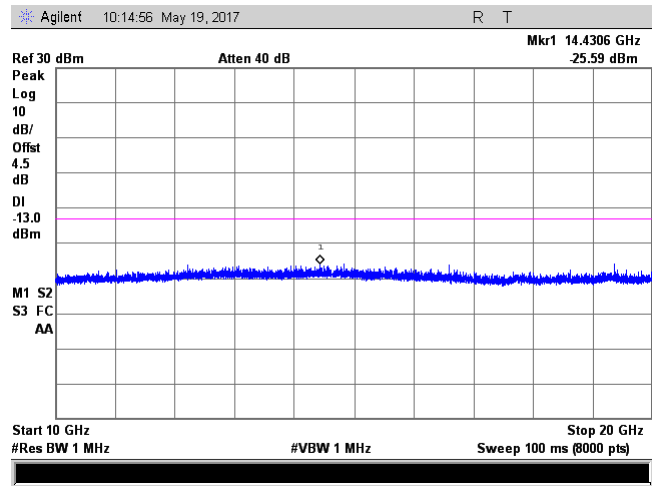

Band II - Middle Channel-1




Band II - Middle Channel-2




Band II - High Channel-1

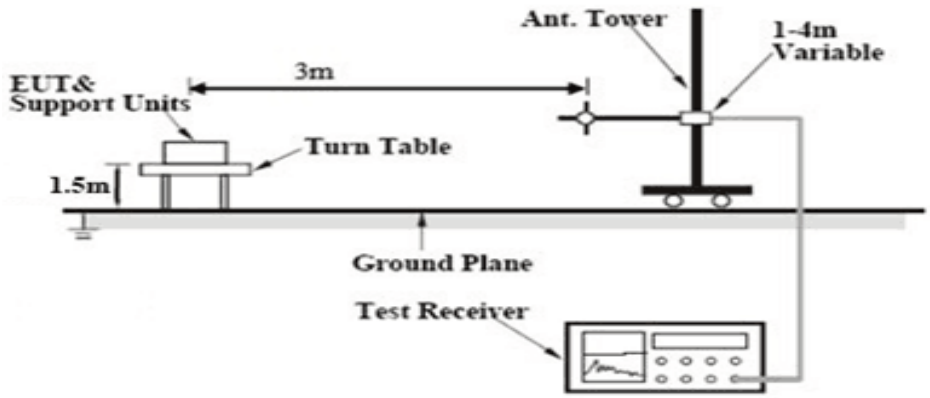



Band II - High Channel-2

## 6.6 Spurious Radiated Emissions

| | |
|---|---|
| Temperature | 23 °C |
| Relative Humidity | 55% |
| Atmospheric Pressure | 1022mbar |
| Test date : | May 22, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §2.1053, §22.917 & §24.238 | 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 | -43.82 | V | 7.95 | 0.78 | -36.65 | -13 | -23.65 |
| 1648.4 | -44.21 | H | 7.95 | 0.78 | -37.04 | -13 | -24.04 |
| 325.3 | -52.88 | V | 6.4 | 0.26 | -46.74 | -13 | -33.74 |
| 605.7 | -53.05 | H | 6.8 | 0.37 | -46.62 | -13 | -33.62 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 1673.2 | -43.71 | V | 7.95 | 0.78 | -36.54 | -13 | -23.54 |
| 1673.2 | -44.19 | H | 7.95 | 0.78 | -37.02 | -13 | -24.02 |
| 325.5 | -52.76 | V | 6.4 | 0.26 | -46.62 | -13 | -33.62 |
| 605.4 | -52.85 | H | 6.8 | 0.37 | -46.42 | -13 | -33.42 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 1697.6 | -43.75 | V | 7.95 | 0.78 | -36.58 | -13 | -23.58 |
| 1697.6 | -44.2 | H | 7.95 | 0.78 | -37.03 | -13 | -24.03 |
| 325.8 | -52.82 | V | 6.4 | 0.26 | -46.68 | -13 | -33.68 |
| 605.1 | -52.97 | H | 6.8 | 0.37 | -46.54 | -13 | -33.54 |

**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 | -48.83 | V | 10.25 | 2.73 | -41.31 | -13 | -28.31 |
| 3700.4 | -49.45 | H | 10.25 | 2.73 | -41.93 | -13 | -28.93 |
| 326.9 | -53.47 | V | 6.4 | 0.26 | -47.33 | -13 | -34.33 |
| 606.2 | -53.98 | H | 6.8 | 0.37 | -47.55 | -13 | -34.55 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3760 | -48.72 | V | 10.25 | 2.73 | -41.2 | -13 | -28.2 |
| 3760 | -49.44 | H | 10.25 | 2.73 | -41.92 | -13 | -28.92 |
| 326.3 | -53.36 | V | 6.4 | 0.26 | -47.22 | -13 | -34.22 |
| 606.5 | -53.82 | H | 6.8 | 0.37 | -47.39 | -13 | -34.39 |

### High channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3819.6 | -48.73 | V | 10.36 | 2.73 | -41.1 | -13 | -28.1 |
| 3819.6 | -49.51 | H | 10.36 | 2.73 | -41.88 | -13 | -28.88 |
| 326.7 | -53.46 | V | 6.4 | 0.26 | -47.32 | -13 | -34.32 |
| 606.8 | -52.65 | H | 6.8 | 0.37 | -46.22 | -13 | -33.22 |

**Note:**

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

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

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 1652.8 | -47.01 | V | 7.95 | 0.78 | -39.84 | -13 | -26.84 |
| 1652.8 | -46.32 | H | 7.95 | 0.78 | -39.15 | -13 | -26.15 |
| 329.7 | -53.27 | V | 6.4 | 0.26 | -47.13 | -13 | -34.13 |
| 608.2 | -53.96 | H | 6.8 | 0.37 | -47.53 | -13 | -34.53 |

### Middle channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 1670 | -47.12 | V | 7.95 | 0.78 | -39.95 | -13 | -26.95 |
| 1670 | -46.45 | H | 7.95 | 0.78 | -39.28 | -13 | -26.28 |
| 329.6 | -53.31 | V | 6.4 | 0.26 | -47.17 | -13 | -34.17 |
| 608.4 | -53.98 | H | 6.8 | 0.37 | -47.55 | -13 | -34.55 |

### 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 | -47.09 | V | 7.95 | 0.78 | -39.92 | -13 | -26.92 |
| 1693.2 | -46.21 | H | 7.95 | 0.78 | -39.04 | -13 | -26.04 |
| 329.1 | -53.29 | V | 6.4 | 0.26 | -47.15 | -13 | -34.15 |
| 608.8 | -53.88 | H | 6.8 | 0.37 | -47.45 | -13 | -34.45 |

**Note:**

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

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

### Low channel

| Frequency (MHz) | Substituted level (dBm) | Polarity (H/V) | Antenna Gain Correction (dB) | Cable Loss (dB) | Corrected Reading (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| 3704.8 | -49.88 | V | 10.25 | 2.73 | -42.36 | -13 | -29.36 |
| 3704.8 | -50.23 | H | 10.25 | 2.73 | -42.71 | -13 | -29.71 |
| 310.1 | -53.65 | V | 6.4 | 0.26 | -47.51 | -13 | -34.51 |
| 604.3 | -53.57 | H | 6.8 | 0.37 | -47.14 | -13 | -34.14 |

### 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 | -49.76 | V | 10.25 | 2.73 | -42.24 | -13 | -29.24 |
| 3760 | -49.95 | H | 10.25 | 2.73 | -42.43 | -13 | -29.43 |
| 310.5 | -53.82 | V | 6.4 | 0.26 | -47.68 | -13 | -34.68 |
| 604.8 | -53.78 | H | 6.8 | 0.37 | -47.35 | -13 | -34.35 |

### 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 | -49.83 | V | 10.36 | 2.73 | -42.2 | -13 | -29.2 |
| 3815.2 | -49.65 | H | 10.36 | 2.73 | -42.02 | -13 | -29.02 |
| 310.7 | -53.76 | V | 6.4 | 0.26 | -47.62 | -13 | -34.62 |
| 604.2 | -53.95 | H | 6.8 | 0.37 | -47.52 | -13 | -34.52 |

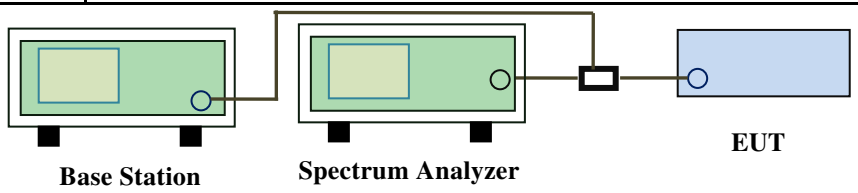
**Note:**

*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*

## 6.7 Band Edge

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

**Requirement(s):**

| Spec | Item | Requirement | Applicable |
|---|---|---|---|
| §22.917(a)<br>§24.238(a) | 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) |
| --- | --- | --- |
| 823.9800 | -17.11 | -13 |
| 849.0175 | -18.40 | -13 |

## PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.9975 | -16.24 | -13 |
| 1910.0150 | -17.10 | -13 |

GPRS:

## Cellular Band (Part 22H) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.9925 | -18.49 | -13 |
| 849.0200 | -18.13 | -13 |

## PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.9925 | -18.72 | -13 |
| 1910.0225 | -17.09 | -13 |

EGPRS (MCS5):

Cellular Band (Part 22H) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.9825 | -17.74 | -13 |
| 849.0075 | -17.60 | -13 |

PCS Band (Part24E) result

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.9800 | -17.53 | -13 |
| 1910.0200 | -16.85 | -13 |

RMC:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.925 | -25.94 | -13 |
| 849.050 | -22.73 | -13 |

UMTS-FDD Band II (Part 24E)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.875 | -23.17 | -13 |
| 1911.100 | -16.01 | -13 |

HSDPA:

UMTS-FDD Band V (Part 22H)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.925 | -24.68 | -13 |
| 849.100 | -23.84 | -13 |

UMTS-FDD Band II (Part 24E)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.950 | -32.93 | -13 |
| 1910.100 | -23.45 | -13 |

HSUPA:

UMTS-FDD Band V (Part 22H)

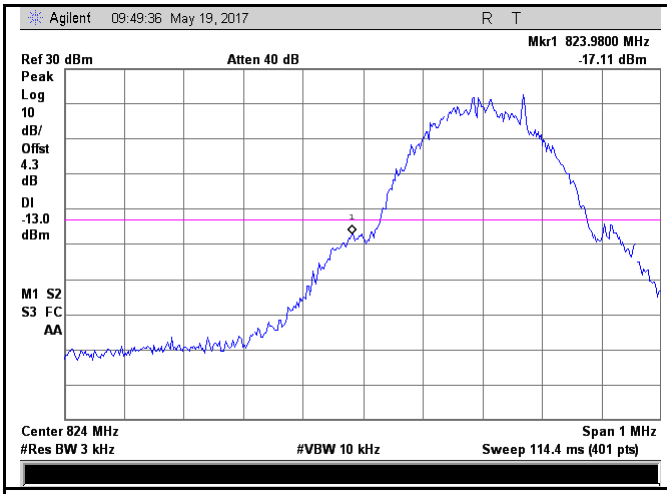
| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 823.950 | -26.02 | -13 |
| 849.075 | -23.71 | -13 |

UMTS-FDD Band II (Part 24E)

| Frequency (MHz) | Emission (dBm) | Limit (dBm) |
| --- | --- | --- |
| 1849.900 | -33.21 | -13 |
| 1910.075 | -23.77 | -13 |

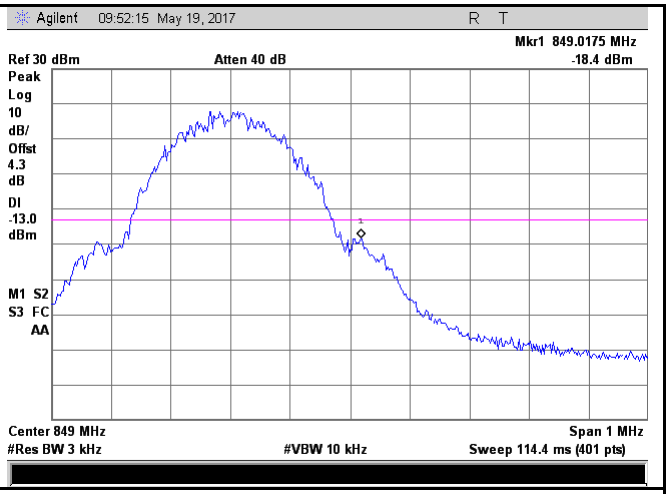
## GSM Voice:

## Test Plots



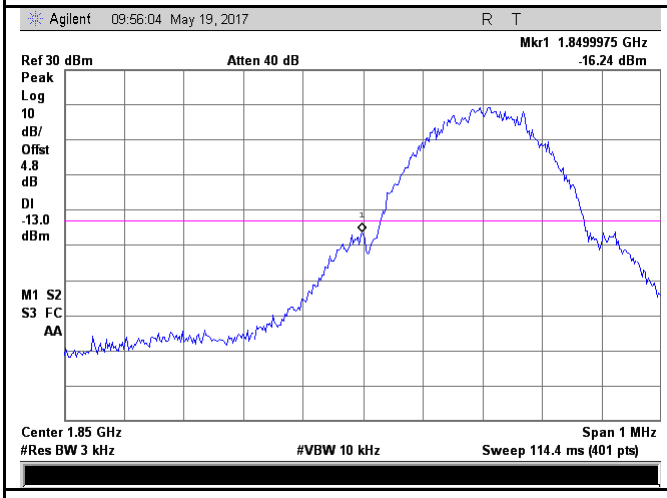

Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.21/3)=4.0+0.3=4.3dB



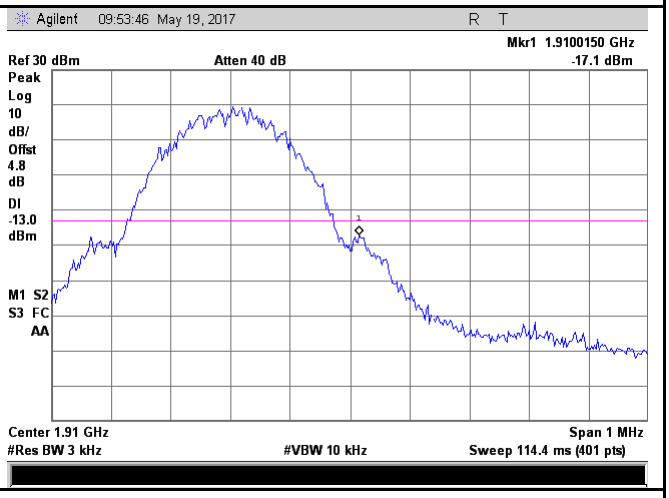

Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.23)=4.0+0.3=4.3dB




PCS Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.18/3)=4.5+0.3=4.8dB

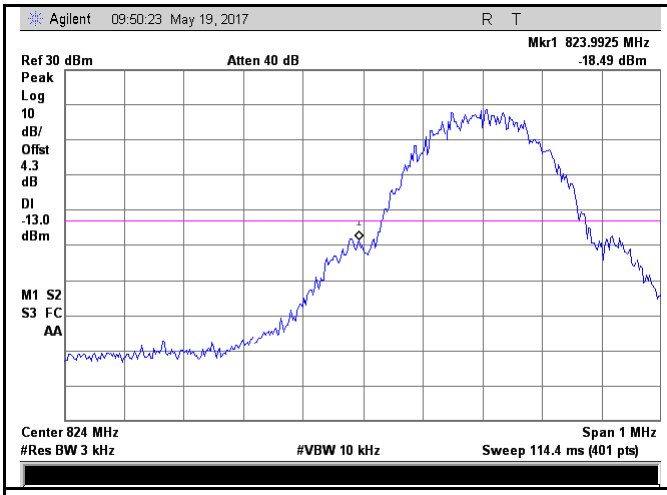



PCS Band - High Channel

Note: Offset=Cable loss (4.0) + 10log (3.19/3)=4.5+0.3=4.8dB

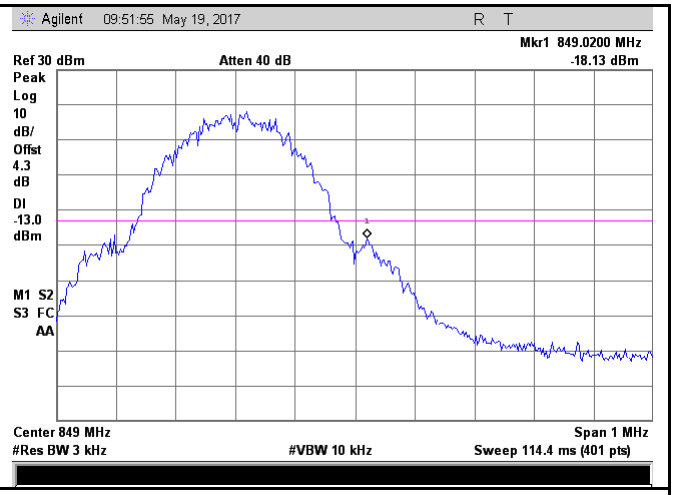
## GPRS:

### Test Plots



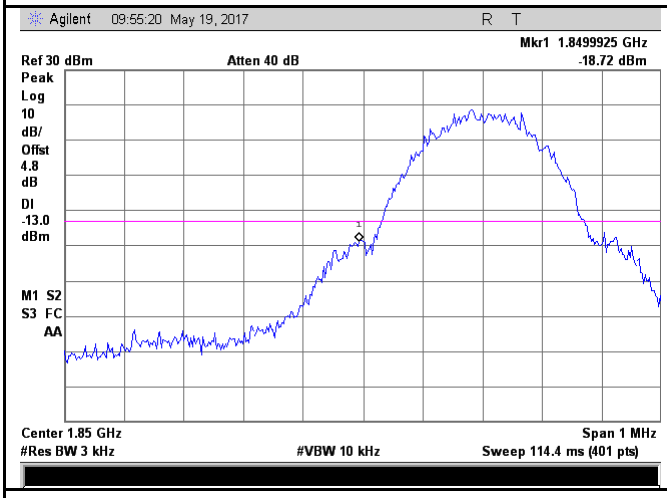

Cellular Band - Low Channel

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



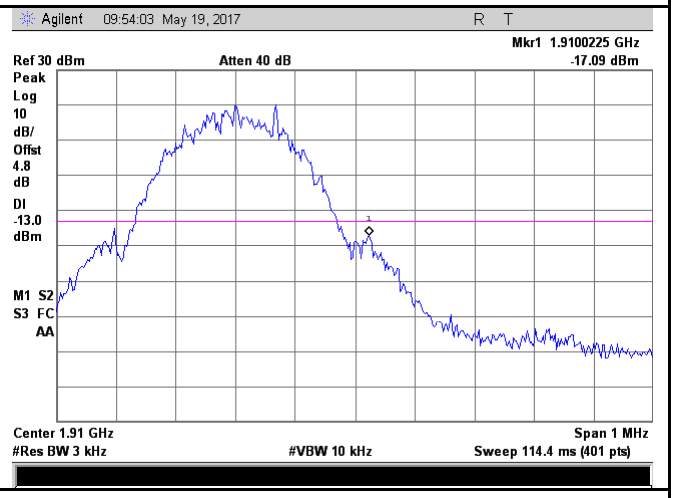

Cellular Band - High Channel

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




PCS Band - Low Channel

Note: Offset=Cable loss (4.5) + 10log (3.22/3)=4.5+0.3=4.8dB

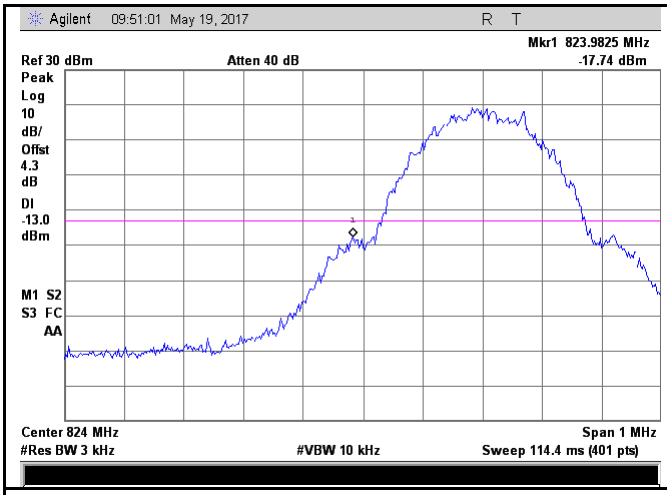



PCS Band - High Channel

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

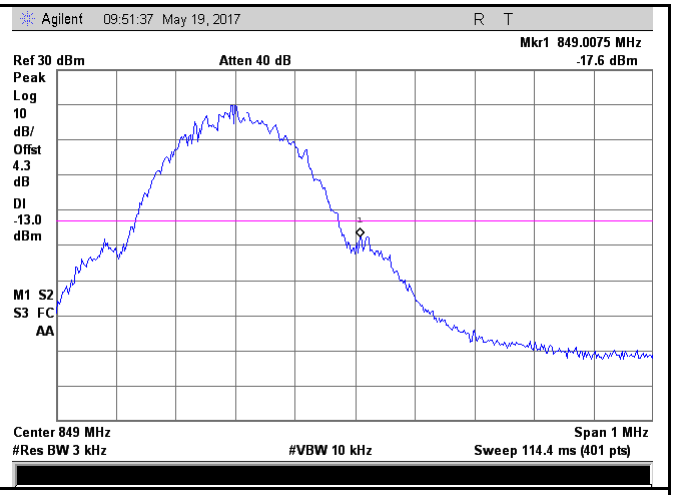
## EGPRS (MCS1):

### Test Plots



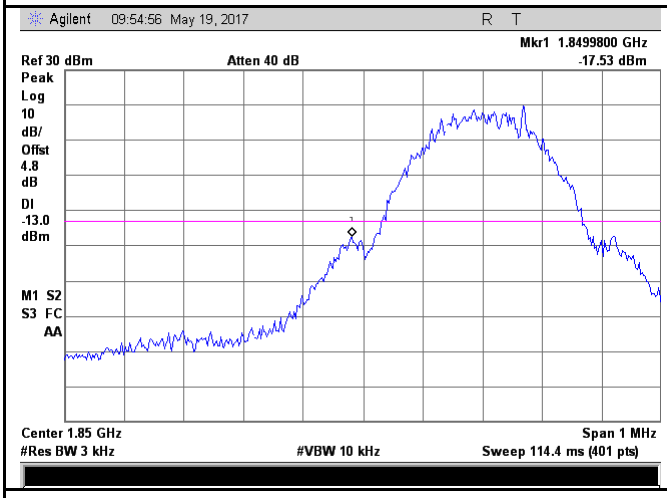

Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log (3.23/3)=4.0+0.3=4.3dB



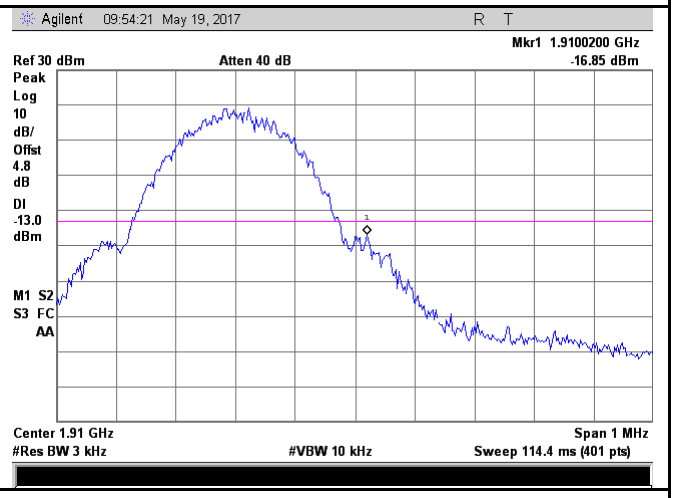

Cellular Band - High Channel

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




PCS Band - Low Channel

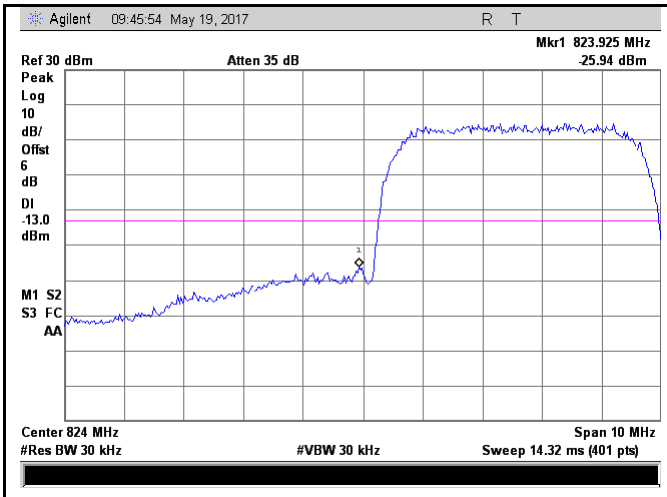
Note: Offset=Cable loss (4.5) + 10log (3.21/3)=4.5+0.3=4.8dB




PCS Band - High Channel

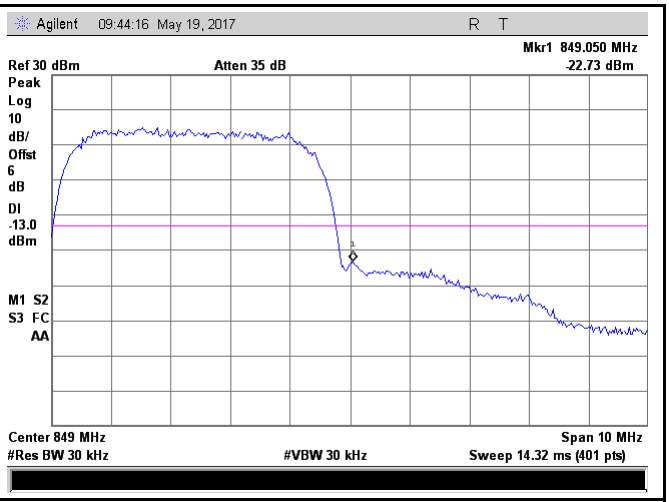
Note: Offset=Cable loss (4.5) + 10log (3.17/3)=4.5+0.3=4.8dB

**RMC:**



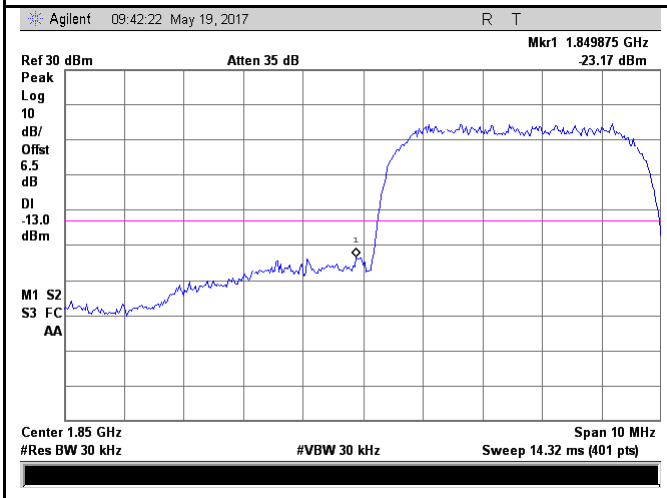

UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (47.21/30)=4.0+2.0=6.0 dB



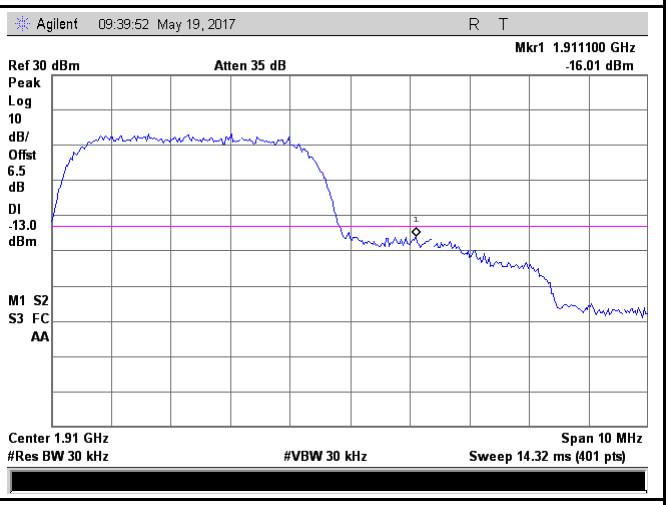

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (47.08/30)=4.0+2.0=6.0 dB




UMTS-FDD Band II - Low Channel

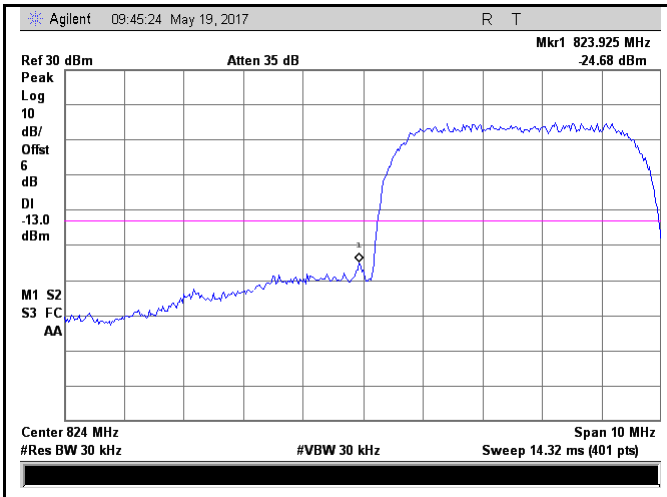
Note: Offset=Cable loss (4.5) + 10log (47.20/30)=4.5+2.0=6.5 dB




UMTS-FDD Band II - High Channel

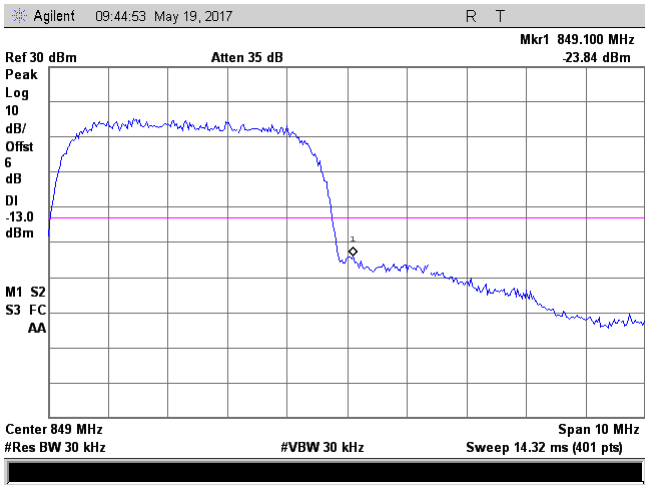
Note: Offset=Cable loss (4.5) + 10log (47.35/30)=4.5+2.0=6.5 dB

**HSDPA:**



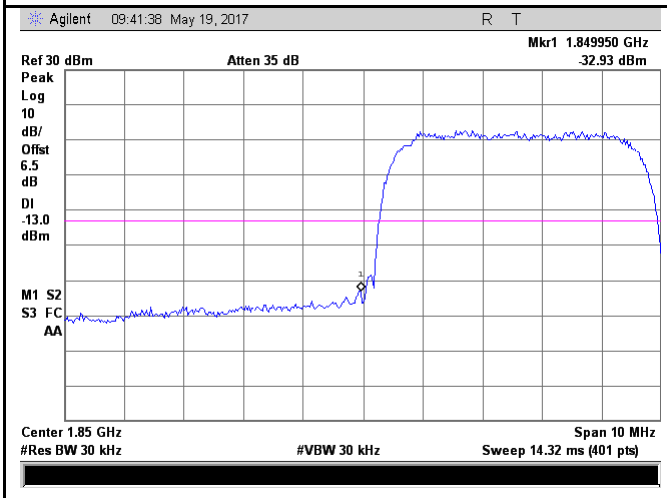

UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (47.11/30)=4.0+2.0=6.0dB



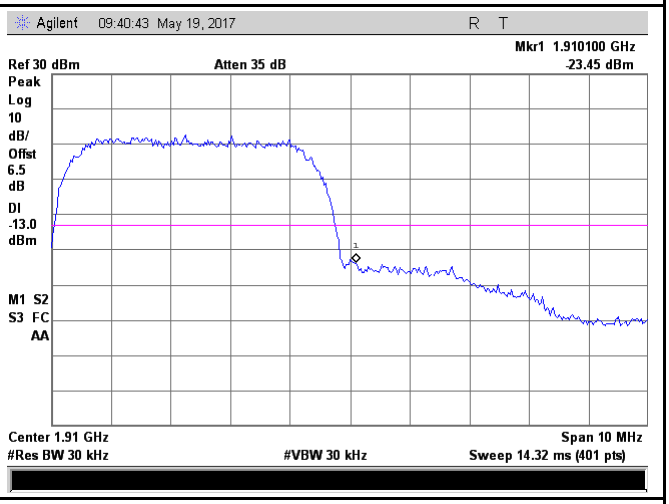

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (47.21/30)=4.0+2.0=6.0 dB




UMTS-FDD Band II - Low Channel

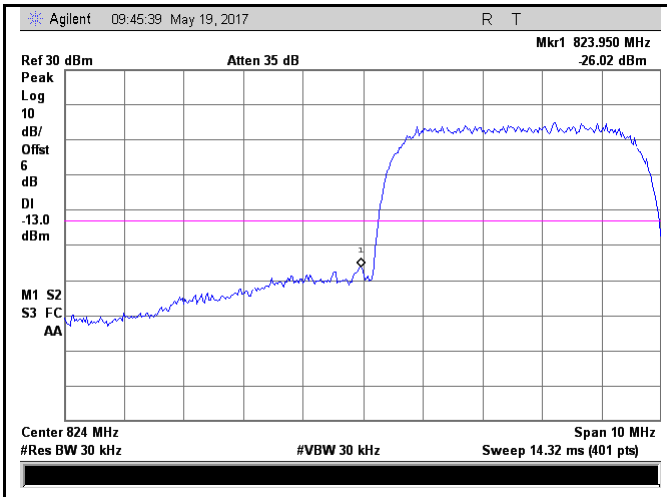
Note: Offset=Cable loss (4.5) + 10log (47.49/30)=4.0+2.5=6.5 dB




UMTS-FDD Band II - High Channel

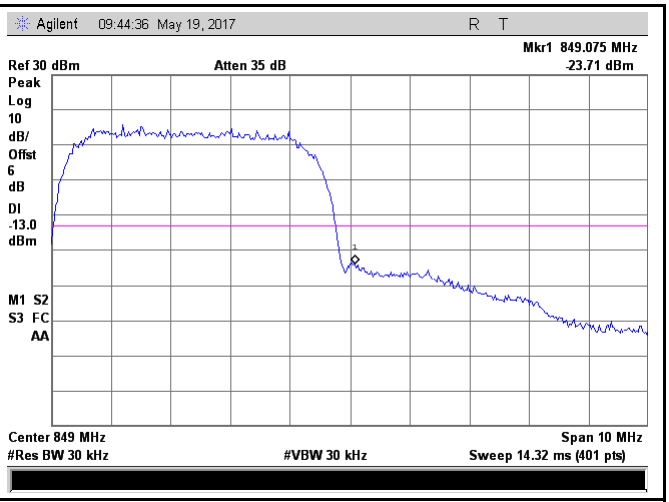
Note: Offset=Cable loss (4.5) + 10log (47.33/30)=4.0+2.5=6.5 dB

**HSUPA:**



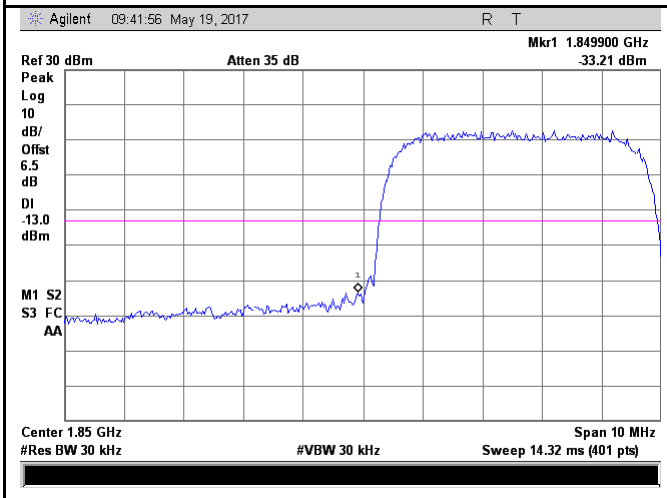

UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log (47.29/30)=4.0+2.0=6.0dB



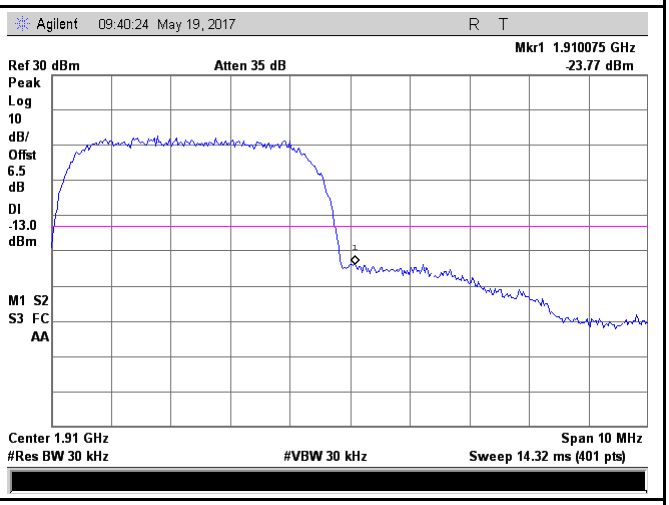

UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (47.31/30)=4.0+2.0=6.0 dB




UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log (47.24/30)=4.5+2.0=6.5dB



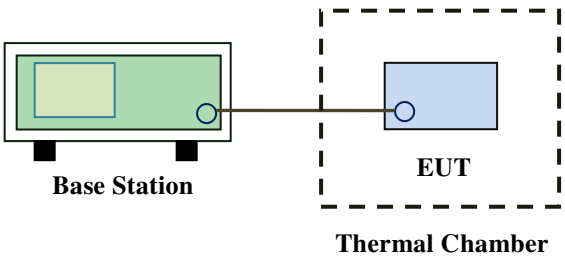

UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log (47.16/30)=4.5+2.0=6.5 dB

## 6.8 Frequency Stability

| | |
|---|---|
| Temperature | 23 °C |
| Relative Humidity | 55% |
| Atmospheric Pressure | 1022mbar |
| Test date : | May 22, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

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

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

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

GSM Voice:

## Cellular Band (Part 22H) result

| Middle Channel, $f_o$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 20 | 0.0239 | 2.5 |
| 0 | | 15 | 0.0179 | 2.5 |
| 10 | | 14 | 0.0167 | 2.5 |
| 20 | | 15 | 0.0179 | 2.5 |
| 30 | | 13 | 0.0155 | 2.5 |
| 40 | | 15 | 0.0179 | 2.5 |
| 50 | | 20 | 0.0239 | 2.5 |
| 55 | | 19 | 0.0227 | 2.5 |
| 25 | 4.2 | 20 | 0.0239 | 2.5 |
| | 3.5 | 16 | 0.0191 | 2.5 |

## PCS Band (Part 24E) result

| Middle Channel, $f_o$ = 1880 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 12 | 0.0064 | 2.5 |
| 0 | | 11 | 0.0059 | 2.5 |
| 10 | | 12 | 0.0064 | 2.5 |
| 20 | | 11 | 0.0059 | 2.5 |
| 30 | | 15 | 0.0080 | 2.5 |
| 40 | | 16 | 0.0085 | 2.5 |
| 50 | | 15 | 0.0080 | 2.5 |
| 55 | | 20 | 0.0106 | 2.5 |
| 25 | 4.2 | 15 | 0.0080 | 2.5 |
| | 3.5 | 20 | 0.0106 | 2.5 |

RMC:

UMTS-FDD Band V (Part 22H)

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

UMTS-FDD Band II (Part 24E)

| Middle Channel, $f_o$ = 1880 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 15 | 0.0080 | 2.5 |
| 0 | | 13 | 0.0069 | 2.5 |
| 10 | | 14 | 0.0074 | 2.5 |
| 20 | | 12 | 0.0064 | 2.5 |
| 30 | | 11 | 0.0059 | 2.5 |
| 40 | | 14 | 0.0074 | 2.5 |
| 50 | | 10 | 0.0053 | 2.5 |
| 55 | | 12 | 0.0064 | 2.5 |
| 25 | 4.2 | 15 | 0.0080 | 2.5 |
| | 3.5 | 15 | 0.0080 | 2.5 |

# Annex A. TEST INSTRUMENT

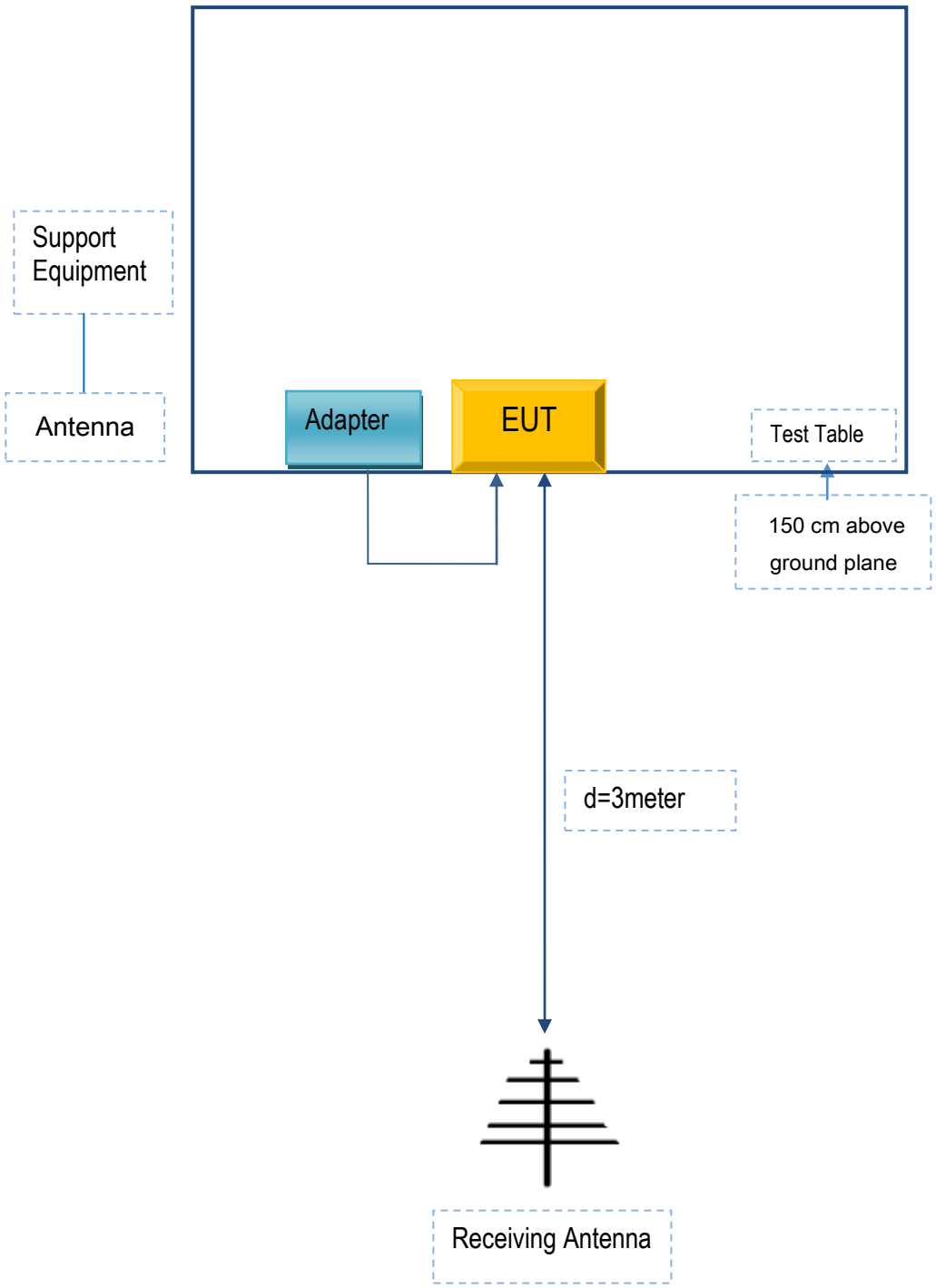
| Instrument | Model | Serial # | Cal Date | Cal Due | In use |
|---|---|---|---|---|---|
| **RF Conducted Test** | | | | | |
| Agilent ESA-E SERIES SPECTRUM ANALYZER | E4407B | MY45108319 | 09/15/2016 | 09/14/2017 | ☑ |
| Power Splitter | 1# | 1# | 08/31/2016 | 08/30/2017 | ☑ |
| Universal Radio Communication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

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

# Annex 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 |
| --- | --- | --- | --- |
| SMT TELECOMM HK LIMITED | Adapter | PCX422 | AS402 |

**Supporting Cable:**

| Cable type | Shield Type | Ferrite Core | Length | Serial No |
| --- | --- | --- | --- | --- |
| USB Cable | Un-shielding | No | 0.8m | AS402 |

# 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