

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 22 SUBPART H, PART 24 SUBPART E REQUIREMENT

OF

|                          |                                                                                                                                                               |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Name:</b>     | <b>Tablet</b>                                                                                                                                                 |
| <b>Brand Name:</b>       | <b>HP</b>                                                                                                                                                     |
| <b>Model No.:</b>        | <b>HSN-I07C</b>                                                                                                                                               |
| <b>Model Difference:</b> | <b>N/A</b>                                                                                                                                                    |
| <b>FCC ID:</b>           | <b>B94HNI07CWR2</b>                                                                                                                                           |
| <b>Report No.:</b>       | <b>ER/2016/B0100</b>                                                                                                                                          |
| <b>Issue Date:</b>       | <b>Dec. 27, 2016</b>                                                                                                                                          |
| <b>FCC Rule Part:</b>    | <b>2 , 22H &amp; 24E</b>                                                                                                                                      |
| <b>Prepared for:</b>     | <b>HP Inc.<br/>3390 East Harmony Road Fort Collins, Colo-<br/>rado 80528 United States<br/>SGS Taiwan Ltd.<br/>Electronics &amp; Communication Laboratory</b> |
| <b>Prepared by:</b>      | <b>No.134, Wu Kung Road, New Taipei Industrial<br/>Park, Wuku District, New Taipei City, Taiwan<br/>24803</b>                                                 |

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## VERIFICATION OF COMPLIANCE

**Applicant:** HP Inc.  
3390 East Harmony Road Fort Collins, Colorado 80528 United States

**Product Name:** Tablet

**Brand Name:** HP

**Model No.:** HSN-I07C

**Model Difference:** N/A

**FCC ID:** B94HNI07CWR2

**File Number:** ER/2016/B0100

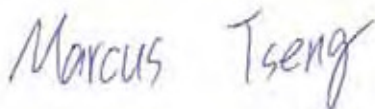
**Date of test:** Nov. 18, 2016 ~ Dec. 16, 2016

**Date of EUT Received:** Nov. 18, 2016

**We hereby certify that:**

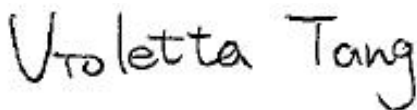
The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-D-2010 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

**Test By:****Date:**

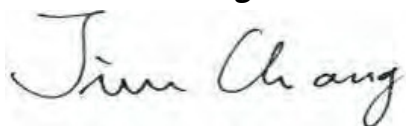
Dec. 27, 2016

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**Marcus Tseng / Sr. Engineer****Prepared By:****Date:**

Dec. 27, 2016

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**Violetta Tang / Clerk****Approved By:****Date:**

Dec. 27, 2016

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**Jim Chang / Asst. Manager**

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## Revision History

| Report Number | Revision | Description                  | Issue Date    |
|---------------|----------|------------------------------|---------------|
| ER/2016/B0100 | Rev.00   | Initial creation of document | Dec. 27, 2016 |
|               |          |                              |               |
|               |          |                              |               |
|               |          |                              |               |

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## 1. GENERAL PRODUCT INFORMATION

### 1.1. Product Description

General:

|                   |                                                                                                    |                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name:     | Tablet                                                                                             |                                                                                                                                                          |
| Brand Name:       | HP                                                                                                 |                                                                                                                                                          |
| Model No.:        | HSN-I07C                                                                                           |                                                                                                                                                          |
| Model Difference: | N/A                                                                                                |                                                                                                                                                          |
| Hardware Version: | N/A                                                                                                |                                                                                                                                                          |
| Software Version: | N/A                                                                                                |                                                                                                                                                          |
| WWAN Module:      | Model No.: H380-GL, Supplier: FIBOCOM Wireless Inc.                                                |                                                                                                                                                          |
| Keyboard:         | 1. Model No.: HSN-D06K, Supplier: HP<br>2. Model No.: HSTNN-I72K, Supplier: HP                     |                                                                                                                                                          |
| Power Supply:     | 7.7Vdc from Rechargeable Li-polymer Battery<br>or 5 / 9 / 10 / 12 / 15 / 20 Vdc from AC/DC Adapter |                                                                                                                                                          |
|                   | Battery:                                                                                           | Model No.: HSTNN-UB7E,<br>Supplier: SAMSUNG SDI Co., Ltd.                                                                                                |
|                   | Adapter:                                                                                           | 1. Model No.: TPN-CA06, Supplier: CHICONY POWER TECHNOLOGY (CHONGQING) CO., LTD.<br>2. Model No.: TPN-AA03, Supplier: Acbel Electronic (Wuhan) Co., Ltd. |

### GPRS / WCDMA:

| Cellular Phone Standards Frequency Range and Power | Operating Frequency              |                       | Rated Power |
|----------------------------------------------------|----------------------------------|-----------------------|-------------|
|                                                    | GPRS 850                         | 824.2 MHz– 848.8 MHz  | 33dBm       |
|                                                    | EDGE 850                         | 824.2 MHz– 848.8 MHz  | 27dBm       |
|                                                    | GPRS 1900                        | 1850.2MHz – 1909.8MHz | 30dBm       |
|                                                    | EDGE 1900                        | 1850.2MHz – 1909.8MHz | 26dBm       |
|                                                    | WCDMA/HSUPA/HSDPA /HSPA+ Band II | 1852.4MHz – 1907.6MHz | 24dBm       |
|                                                    | WCDMA/HSUPA/HSDPA /HSPA+ Band V  | 826.4MHz - 846.6MHz   | 24dBm       |
| IMEI                                               | 860558030009860                  |                       |             |

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## Type of Emission:

| Frequency Band | Type of Emission: |
|----------------|-------------------|
| GPRS 850       | 246KGXW           |
| EDGE 850       | 248KG7W           |
| GPRS 1900      | 246KGXW           |
| EDGE 1900      | 249KG7W           |
| WCDMA Band II  | 4M06F9W           |
| WCDMA Band V   | 4M06F9W           |
| HSDPA Band II  | 4M06F9W           |
| HSDPA Band V   | 4M06F9W           |
| HSUPA Band II  | 4M07F9W           |
| HSUPA Band V   | 4M06F9W           |

## Max ERP/EIRP Power Measurement Result:

|               | dBm   |      | W     |
|---------------|-------|------|-------|
| GPRS 850      | 19.15 | ERP  | 0.082 |
| EDGE 850      | 21.66 | ERP  | 0.147 |
| GPRS 1900     | 24.72 | EIRP | 0.296 |
| EDGE 1900     | 24.22 | EIRP | 0.264 |
| WCDMA Band II | 21.81 | EIRP | 0.152 |
| WCDMA Band V  | 20.73 | ERP  | 0.118 |
| HSDPA Band II | 22.67 | EIRP | 0.185 |
| HSDPA Band V  | 20.35 | ERP  | 0.108 |
| HSUPA Band II | 21.67 | EIRP | 0.147 |
| HSUPA Band V  | 20.75 | ERP  | 0.119 |

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## 1.2. Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22, 24

ANSI / TIA / EIA 603-D-2010

KDB971168 D01 Power Meas license Digital System

KDB941225 of the Output power Procedure of (SAR Measurement Procedures for 3G Devices, WCDMA / HSPA) was used for EUT and Base station setting.

TS 151 010-1 is used to set, and measure the output power.

Note:

All test items have been performed and record as per the above standards.

## 1.3. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 509634

Canada Registration Number: 4620A-5.

## 1.4. Special Accessories

No special accessories were used during testing.

## 1.5. Equipment Modifications

There were no modifications incorporated into the EUT.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2. EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

### 2.3. Test Procedure

#### 2.3.1 Conducted Measurement at Antenna Port

According to measurement procured TIA/EIA 603C, the EUT is placed on a turn table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

#### 2.3.2 Radiated Emissions (ERP/EIRP)

According to measurement procured TIA/EIA 603C, The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna according to the requirements in Section 8 and 13.

### 2.4. Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

#### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation example with cable loss 0.4 dB for low band and 0.8 dB for high band with 10 dB attenuator and 3.2 splitter

Low Band: Offset = RF cable loss (dB)+ attenuation factor(dB) =0.4+10+3.2=13.6(dB)

High Band: Offset = RF cable loss (dB)+ attenuation factor(dB) =0.8+10+3.2=14(dB)

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## 2.5. Final Amplifier Voltage and Current Information:

| Test Mode     | DC voltage (V) | DC current (mA) |
|---------------|----------------|-----------------|
| GPRS 850      | 7.7 Vdc        | 525             |
| GPRS 1900     | 7.7 Vdc        | 536             |
| EDGE 850      | 7.7 Vdc        | 485             |
| EDGE 1900     | 7.7 Vdc        | 515             |
| WCDMA Band II | 7.7 Vdc        | 720             |
| WCDMA Band V  | 7.7 Vdc        | 660             |
| HSUPA Band II | 7.7 Vdc        | 735             |
| HSUPA Band V  | 7.7 Vdc        | 655             |
| HSDPA Band II | 7.7 Vdc        | 752             |
| HSDPA Band V  | 7.7 Vdc        | 631             |

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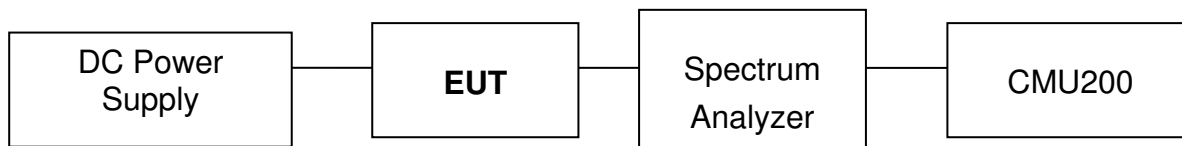
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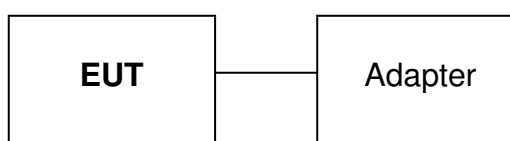
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## 2.6. Configuration of Tested System

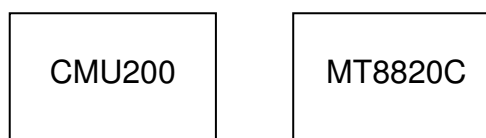
**Fig. 2-1 Configuration of Tested System (Fixed Channel-Conducted)**



**Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)**



**Remote Side**



**Table 2-1 Equipment Used in Tested System**

| Item | Equipment                            | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power Cord  |
|------|--------------------------------------|-----------|--------------------|------------|------------|-------------|
| 1.   | Universal Radio Communication Tester | R&S       | CMU200             | 102189     | shielded   | Un-shielded |
| 2.   | Universal Radio Communication Tester | Anritsu   | MT8820C            | 6200995019 | shielded   | Un-shielded |

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### 3. SUMMARY OF TEST RESULTS

| FCC Rules                                 | Description Of Test                                      | Result    |
|-------------------------------------------|----------------------------------------------------------|-----------|
| §2.1046(a)                                | RF Power Output                                          | Compliant |
| §2.1046(a)<br>§22.913(a)(2)<br>§24.232(c) | ERP/ EIRP measurement                                    | Compliant |
| §2.1049(h)                                | 99% & 26dB Occupied Bandwidth                            | Compliant |
| §2.1051<br>§22.917(a)<br>§24.238(a)       | Out of Band Emissions at Antenna Terminals and Band Edge | Compliant |
| §2.1053<br>§22.917(a)<br>§24.238(a)       | Field Strength of Spurious Radiation                     | Compliant |
| §24.232(d)                                | Peak to Average Ratio                                    | Compliant |
| §2.1055(a)(1)<br>§22.355<br>§24.235       | Frequency Stability                                      | Compliant |

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## 4. DESCRIPTION OF TEST MODES

### 4.1. The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X(E1)Y(E2)Z(H) axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

| BAND               | ERP/EIRP | RADIATED EMISSION |
|--------------------|----------|-------------------|
| GSM/GPRS/EDGE 850  | E2-plan  | E2-plan           |
| GSM/GPRS/EDGE 1900 | E2-plan  | E2-plan           |
| WCDMA/HSPA Band II | E2-plan  | E2-plan           |
| WCDMA/HSPA Band V  | E2-plan  | E2-plan           |

#### GSM/GPRS/EDGE MODE

| TEST ITEM             | AVAILABLE CHANNEL        | TESTED CHANNEL                 | MODE                                    |
|-----------------------|--------------------------|--------------------------------|-----------------------------------------|
| ERP                   | 128 to 251               | 128, 190, 251                  | GSM/GPRS/EDGE 850                       |
| EIRP                  | 512 to 810               | 512, 661, 810                  | GSM/GPRS/EDGE 1900                      |
| FREQUENCY STABILITY   | 128 to 251<br>512 to 810 | 190<br>661                     | GPRS 850<br>GPRS 1900                   |
| OCCUPIED BANDWIDTH    | 128 to 251<br>512 to 810 | 190<br>661                     | GSM/GPRS/EDGE 850<br>GSM/GPRS/EDGE 1900 |
| PEAK TO AVERAGE RATIO | 128 to 251<br>512 to 810 | 128, 190, 251<br>512, 661, 810 | GSM/GPRS/EDGE 850<br>GSM/GPRS/EDGE 1900 |
| BAND EDGE             | 128 to 251<br>512 to 810 | 128, 251<br>512, 810           | GSM/GPRS/EDGE 850<br>GSM/GPRS/EDGE 1900 |
| CONDUCTED EMISSION    | 128 to 251<br>512 to 810 | 128, 190, 251<br>512, 661, 810 | GSM/GPRS/EDGE 850<br>GSM/GPRS/EDGE 1900 |
| RADIATED EMISSION     | 128 to 251<br>512 to 810 | 128, 190, 251<br>512, 661, 810 | EDGE 850<br>GPRS 1900                   |

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## WCDMA/HSPA MODE

| TEST ITEM             | AVAILABLE CHANNEL            | TESTED CHANNEL                       | MODE                                    |
|-----------------------|------------------------------|--------------------------------------|-----------------------------------------|
| ERP                   | 4132 to 4233                 | 4132, 4183, 4233                     | WCDMA/HSPA Band V                       |
| EIRP                  | 9262 to 9538                 | 9262, 9400, 9583                     | WCDMA/HSPA Band II                      |
| FREQUENCY STABILITY   | 4132 to 4233<br>9262 to 9538 | 4183<br>9400                         | WCDMA Band II<br>WCDMA Band V           |
| OCCUPIED BANDWIDTH    | 4132 to 4233<br>9262 to 9538 | 4132, 4183, 4233<br>9262, 9400, 9583 | WCDMA/HSPA Band II<br>WCDMA/HSPA Band V |
| PEAK TO AVERAGE RATIO | 4132 to 4233<br>9262 to 9538 | 4132, 4183, 4233<br>9262, 9400, 9583 | WCDMA/HSPA Band II<br>WCDMA/HSPA Band V |
| BAND EDGE             | 4132 to 4233<br>9262 to 9538 | 4132, 4233<br>9262, 9583             | WCDMA Band II<br>WCDMA Band V           |
| CONDUCTED EMISSION    | 4132 to 4233<br>9262 to 9538 | 4132, 4183, 4233<br>9262, 9400, 9583 | WCDMA Band II<br>WCDMA Band V           |
| RADIATED EMISSION     | 4132 to 4233<br>9262 to 9538 | 4132, 4183, 4233<br>9262, 9400, 9583 | HSDPA Band II<br>HSUPA Band V           |

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## 5. MEASUREMENT UNCERTAINTY

| Test Items                          | Uncertainty                                                                |
|-------------------------------------|----------------------------------------------------------------------------|
| RF Power Output                     | +/- 1.10 dB                                                                |
| ERP/ EIRP measurement               | Vertical Polarization = +/- 4.74dB<br>Horizontal Polarization = +/- 4.62dB |
| 99% Occupied Bandwidth              | +/- 5.19 Hz                                                                |
| Out of Band Emissions at Antenna    | +/- 0.70 dB                                                                |
| Terminals and Band Edge             |                                                                            |
| Peak to Average Ratio               | +/- 0.70 dB                                                                |
| Frequency Stability vs. Temperature | +/- 5.19 Hz                                                                |
| Frequency Stability vs. Voltage     | +/- 5.19 Hz                                                                |
| Temperature                         | +/- 0.65 °C                                                                |
| Humidity                            | +/- 4.6 %                                                                  |
| DC / AC Power Source                | DC= +/- 0.13%, AC= +/- 0.2%                                                |

### Radiated Spurious Emission:

|                                                              |                            |
|--------------------------------------------------------------|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Vertical</b> ) | 9kHz – 30MHz: +/- 2.87 dB  |
|                                                              | 30MHz - 180MHz: +/- 3.37dB |
|                                                              | 180MHz -417MHz: +/- 3.19dB |
|                                                              | 0.417GHz-1GHz: +/- 3.19dB  |
|                                                              | 1GHz - 18GHz: +/- 4.04dB   |
|                                                              | 18GHz - 40GHz: +/- 4.04dB  |

|                                                                |                            |
|----------------------------------------------------------------|----------------------------|
| Measurement uncertainty<br>(Polarization : <b>Horizontal</b> ) | 9kHz – 30MHz: +/- 2.87 dB  |
|                                                                | 30MHz - 167MHz: +/- 4.22dB |
|                                                                | 167MHz -500MHz: +/- 3.44dB |
|                                                                | 0.5GHz-1GHz: +/- 3.39dB    |
|                                                                | 1GHz - 18GHz: +/- 4.08dB   |
|                                                                | 18GHz - 40GHz: +/- 4.08dB  |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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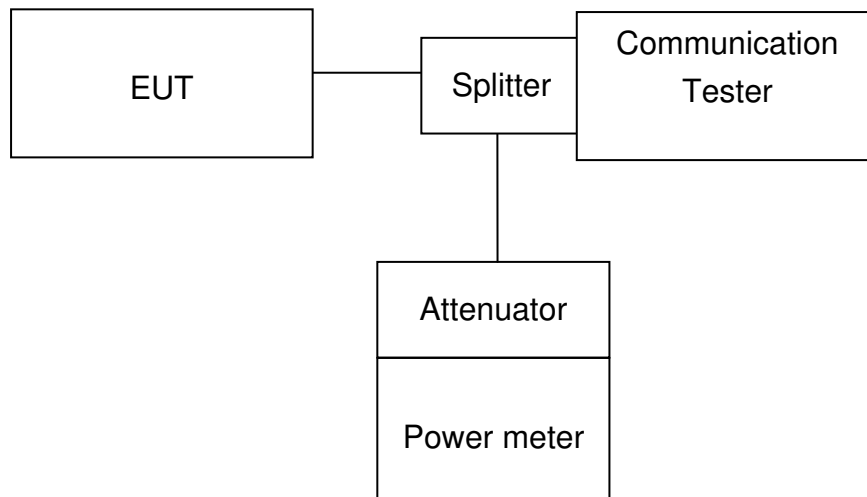
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## 6. RF CONDUCTED OUTPUT POWER MEASUREMENT

### 6.1. Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

### 6.2. Test Set-up



**Note:** Measurement setup for testing on Antenna connector

### 6.3. Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading. TS 151 010-1 is reference to conduct the test measurement of output power.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCDMA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results

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#### 6.4. Measurement Equipment Used

| SGS Conducted Room           |               |              |               |            |            |
|------------------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR           | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Power Meter                  | Anritsu       | ML2495A      | 1005007       | 12/15/2015 | 12/14/2016 |
| Power Sensor                 | Anritsu       | MA2411B      | 917032        | 12/15/2015 | 12/14/2016 |
| EXA Spectrum Analyzer        | Agilent       | N9030A       | MY53120760    | 02/26/2016 | 02/25/2017 |
| DC Block                     | Mini-Circuits | BLK-18-S+    | 1             | 01/02/2016 | 01/01/2017 |
| Coaxial Cable                | HUBER+SUHNER  | SUCOFLEX 102 | 23670/2       | 01/02/2016 | 01/01/2017 |
| Attenuator                   | Mini-Circuit  | BW-S10W2+    | 2             | 01/02/2016 | 01/01/2017 |
| Splitter                     | Agilent       | 11636B       | N/A           | 01/02/2016 | 01/01/2017 |
| DC Power Supply              | Agilent       | E3640A       | MY52410006    | 11/21/2016 | 11/20/2017 |
| Temperature Chamber          | TERCHY        | MHG-120LF    | 911009        | 05/17/2016 | 05/16/2017 |
| Radio Communication Analyzer | R&S           | CMU200       | 102189        | 02/11/2016 | 02/10/2017 |
| Radio Communication Analyzer | Anritsu       | MT8820C      | 6200995019    | 09/24/2016 | 09/23/2017 |

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## 6.5. Measurement Result

### RF Conducted Output Power GPRS/EDGE (GMSK; 8-PSK) Result:

| EUT Mode  | Frequency<br>(MHz) | CH  | Average Burst Power<br>(1DN 1UP)<br>(dBm) | Average Burst Power<br>(1DN 2UP)<br>(dBm) | Average Burst Power<br>(1DN 3UP)<br>(dBm) | Average Burst Power<br>(1DN 4UP)<br>(dBm) |
|-----------|--------------------|-----|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| GPRS 850  | 824.2              | 128 | <b>31.53</b>                              | 29.46                                     | 28.1                                      | 26.52                                     |
|           | 836.6              | 190 | 31.51                                     | 29.32                                     | 27.98                                     | 26.4                                      |
|           | 848.8              | 251 | 31.52                                     | 29.42                                     | 28.08                                     | 26.49                                     |
| GPRS 1900 | 1850.2             | 512 | 29.44                                     | 27.21                                     | 25.93                                     | 24.37                                     |
|           | 1880.0             | 661 | 29.36                                     | 27.18                                     | 25.91                                     | 24.32                                     |
|           | 1909.8             | 810 | <b>29.5</b>                               | 27.32                                     | 26.05                                     | 24.47                                     |
| EDGE 850  | 824.2              | 128 | <b>26.15</b>                              | 23.82                                     | 22.63                                     | 21.02                                     |
|           | 836.6              | 190 | 26.1                                      | 23.81                                     | 22.5                                      | 20.96                                     |
|           | 848.8              | 251 | 26.14                                     | 23.84                                     | 22.63                                     | 21.05                                     |
| EDGE 1900 | 1850.2             | 512 | 25.37                                     | 23.19                                     | 22.34                                     | 20.81                                     |
|           | 1880.0             | 661 | 25.36                                     | 23.14                                     | 22.32                                     | 20.78                                     |
|           | 1909.8             | 810 | <b>25.51</b>                              | 23.32                                     | 22.48                                     | 20.93                                     |

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## WCDMA MODE:

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 V8.4.0 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7). RMC 12.2kps is used for this testing.

## Results:

| EUT Mode           |      | WCDMA<br>Band II       | HSDPA<br>Band II       | HSUPA<br>Band II       |
|--------------------|------|------------------------|------------------------|------------------------|
| Frequency<br>(MHz) | CH   | Avg.<br>Power<br>(dBm) | Avg.<br>Power<br>(dBm) | Avg.<br>Power<br>(dBm) |
| 1852.4             | 9262 | 24.49                  | 23.3                   | 23.29                  |
| 1880.0             | 9400 | 24.25                  | 23.08                  | 23.12                  |
| 1907.6             | 9538 | 24.18                  | 23.16                  | 23.1                   |

| EUT Mode           |      | WCDMA<br>Band V        | HSDPA<br>Band V        | HSUPA<br>Band V        |
|--------------------|------|------------------------|------------------------|------------------------|
| Frequency<br>(MHz) | CH   | Avg.<br>Power<br>(dBm) | Avg.<br>Power<br>(dBm) | Avg.<br>Power<br>(dBm) |
| 826.4              | 4132 | 23.44                  | 22.37                  | 22.4                   |
| 836.6              | 4183 | 23.64                  | 22.45                  | 22.58                  |
| 846.6              | 4233 | 23.36                  | 22.3                   | 22.32                  |

Note: The results above reflect max power with all up bits.

Cable loss offset Low Band: 0.4dB, Cable loss offset High Band: 0.8dB

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## HSDPA Release 6 MODE:

The following 4 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V8.4.0 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C10.1.4 & C11.1.3 in the 3GPP TS34.121-1 V8.4.0. RMC 12.2kps is used for this testing.

## HSDPA SUB-TEST Setting

Table C.10.1.4:  $\beta$  values for transmitter characteristics tests with HS-DPCCH(FOR HSDPA)

| Sub-test | $\beta_c$         | $\beta_d$         | $\beta_d$<br>(SF) | $\beta_c/\beta_d$ | $\beta_{HS}$<br>(Note 1,<br>Note 2) | CM (dB)<br>(Note 3) | MPR<br>(dB)<br>(Note 3) | RMC<br>(Kbps) |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------------------------|---------------------|-------------------------|---------------|
| 1        | 2/15              | 15/15             | 64                | 2/15              | 4/15                                | 0.0                 | 0.0                     | 12.2          |
| 2        | 12/15<br>(Note 4) | 15/15<br>(Note 4) | 64                | 12/15<br>(Note 4) | 24/15                               | 1.0                 | 0.0                     | 12.2          |
| 3        | 15/15             | 8/15              | 64                | 15/8              | 30/15                               | 1.5                 | 0.5                     | 12.2          |
| 4        | 15/15             | 4/15              | 64                | 15/4              | 30/15                               | 1.5                 | 0.5                     | 12.2          |

**Note:** The recommended HSDPA MPRs are implemented as per following sub-tests.

## Results:

| Mode               | Sub-test | Avg. Power (dBm)<br>Channel |       |       | Power Class 3 Lim-<br>itation (dBm) | Comments |
|--------------------|----------|-----------------------------|-------|-------|-------------------------------------|----------|
|                    |          | 9262                        | 9400  | 9538  |                                     |          |
| HSDPA<br>(Band II) | 1        | 24.66                       | 24.14 | 24.04 | 20.3dBm – 25.7dBm                   | Pass     |
|                    | 2        | 24.37                       | 24.11 | 24.03 | 20.3dBm – 25.7dBm                   | Pass     |
|                    | 3        | 24.18                       | 23.69 | 23.51 | 19.8dBm – 25.7dBm                   | Pass     |
|                    | 4        | 24.25                       | 23.7  | 23.63 | 19.8dBm – 25.7dBm                   | Pass     |

| Mode              | Sub-test | Avg. Power (dBm)<br>Channel |       |       | Power Class 3 Lim-<br>itation (dBm) | Comments |
|-------------------|----------|-----------------------------|-------|-------|-------------------------------------|----------|
|                   |          | 4132                        | 4183  | 4233  |                                     |          |
| HSDPA<br>(Band V) | 1        | 23.61                       | 23.53 | 23.22 | 20.3dBm – 25.7dBm                   | Pass     |
|                   | 2        | 23.32                       | 23.5  | 23.21 | 20.3dBm – 25.7dBm                   | Pass     |
|                   | 3        | 23.13                       | 23.08 | 22.69 | 19.8dBm – 25.7dBm                   | Pass     |
|                   | 4        | 23.2                        | 23.09 | 22.81 | 19.8dBm – 25.7dBm                   | Pass     |

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## HSPA (HSDPA & HSUPA) Release 6 MODE

The following 5 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V8.4.0 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C11.1.3 in the 3GPP TS34.121-1 V8.4.0. RMC 12.2kps is used for this testing

### HSPA SUB-TEST Setting

Table C.11.1.3:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH(FOR HSUPA)

| Sub-test | $\beta_c$      | $\beta_d$      | $\beta_d$ (SF) | $\beta_c/\beta_d$ | $\beta_{HS}$ | $\beta_{ec}$ | $\beta_{ed}$                                 | $\beta_{ed}$ (SF) | $\beta_{ed}$ (Code s) | CM (dB) | MPR (dB) | AG Index | E-TFCI | RMC (Kbps) |
|----------|----------------|----------------|----------------|-------------------|--------------|--------------|----------------------------------------------|-------------------|-----------------------|---------|----------|----------|--------|------------|
| 1        | 11/15 (Note 3) | 15/15 (Note 3) | 64             | 11/15 (Note 3)    | 22/15        | 209/225      | 1309/225                                     | 4                 | 1                     | 1.0     | 0.0      | 20       | 75     | 12.2       |
| 2        | 6/15           | 15/15          | 64             | 6/15              | 12/15        | 12/15        | 94/75                                        | 4                 | 1                     | 3.0     | 2.0      | 12       | 67     | 12.2       |
| 3        | 15/15          | 9/15           | 64             | 15/9              | 30/15        | 30/15        | $\beta_{ed1}: 47/15$<br>$\beta_{ed2}: 47/15$ | 4<br>4            | 2                     | 2.0     | 1.0      | 15       | 92     | 12.2       |
| 4        | 2/15           | 15/15          | 64             | 2/15              | 4/15         | 2/15         | 56/75                                        | 4                 | 1                     | 3.0     | 2.0      | 17       | 71     | 12.2       |
| 5        | 15/15 (Note 4) | 15/15 (Note 4) | 64             | 15/15 (Note 4)    | 30/15        | 24/15        | 134/15                                       | 4                 | 1                     | 1.0     | 0.0      | 21       | 81     | 12.2       |

**Note:** The recommended HSUPA MPRs are implemented as per following sub-tests.

### Results:

| Mode            | Sub-test | Avg. Power (dBm)<br>Channel |              |       | Power Class 3 Limitation (dBm) | Comments    |
|-----------------|----------|-----------------------------|--------------|-------|--------------------------------|-------------|
|                 |          | 9262                        | 9400         | 9538  |                                |             |
| HSUPA (Band II) | 1        | 24.41                       | <b>24.23</b> | 24.12 | 18.8dBm – 25.7dBm              | <b>Pass</b> |
|                 | 2        | 22.46                       | 22.3         | 22.16 | 16.8dBm – 25.7dBm              | <b>Pass</b> |
|                 | 3        | 23.47                       | 23.25        | 23.2  | 17.8dBm – 25.7dBm              | <b>Pass</b> |
|                 | 4        | 22.59                       | 22.35        | 22.2  | 16.8dBm – 25.7dBm              | <b>Pass</b> |
|                 | 5        | 24.3                        | 24.09        | 24.03 | 18.8dBm – 25.7dBm              | <b>Pass</b> |

| Mode           | Sub-test | Avg. Power (dBm)<br>Channel |              |       | Power Class 3 Limitation (dBm) | Comments    |
|----------------|----------|-----------------------------|--------------|-------|--------------------------------|-------------|
|                |          | 4132                        | 4183         | 4233  |                                |             |
| HSUPA (Band V) | 1        | 23.36                       | <b>23.62</b> | 23.3  | 18.8dBm – 25.7dBm              | <b>Pass</b> |
|                | 2        | 21.41                       | 21.69        | 21.34 | 16.8dBm – 25.7dBm              | <b>Pass</b> |
|                | 3        | 22.42                       | 22.64        | 22.38 | 17.8dBm – 25.7dBm              | <b>Pass</b> |
|                | 4        | 21.54                       | 21.74        | 21.38 | 16.8dBm – 25.7dBm              | <b>Pass</b> |
|                | 5        | 23.25                       | 23.48        | 23.21 | 18.8dBm – 25.7dBm              | <b>Pass</b> |

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**WCDMA/HSDPA/HSUPA Band II / V**

The EUT output power was controlled by simulator. Set Communication Tester CMU200 function key "UE Power Control" and enter max rated power 24dBm. The EUT is going to be set to max output power to 24dBm. Then record the read (see page 21 for measurement data). The min. power was measures by a function key "minimum power" then record the read. It is -52.3dBm. The power variation can be 0.1dB step by setting.

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## 7. EFFECTIVE RADIATED POWER AND EQUIVALENT ISOTROPIC RADIATED POWER MEASUREMENT

### 7.1. Standard Applicable

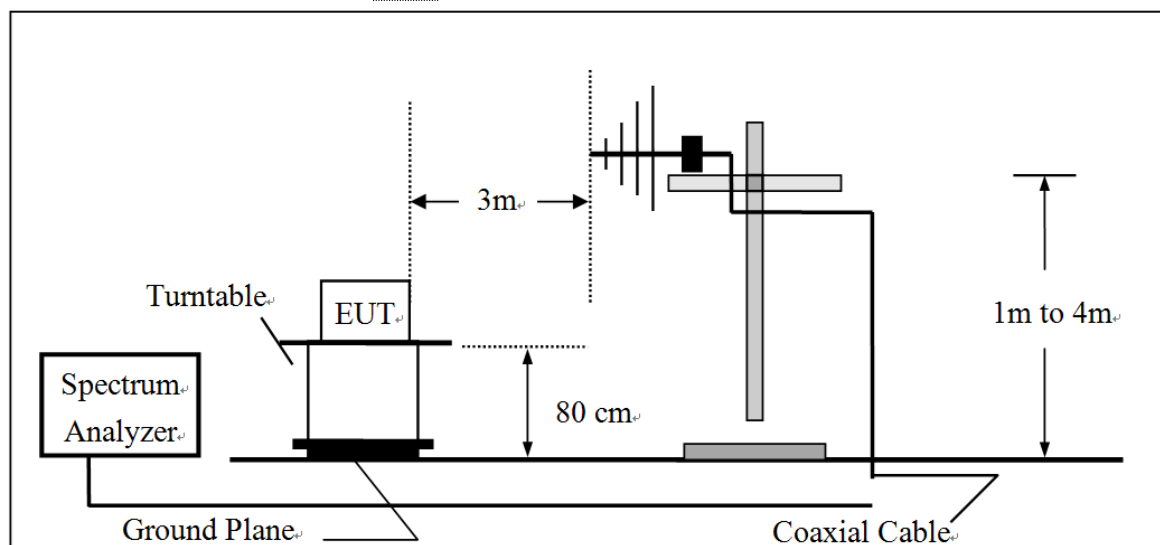
According to FCC §2.1046

FCC 22.913(a) Mobile station is limited to 7W ERP.

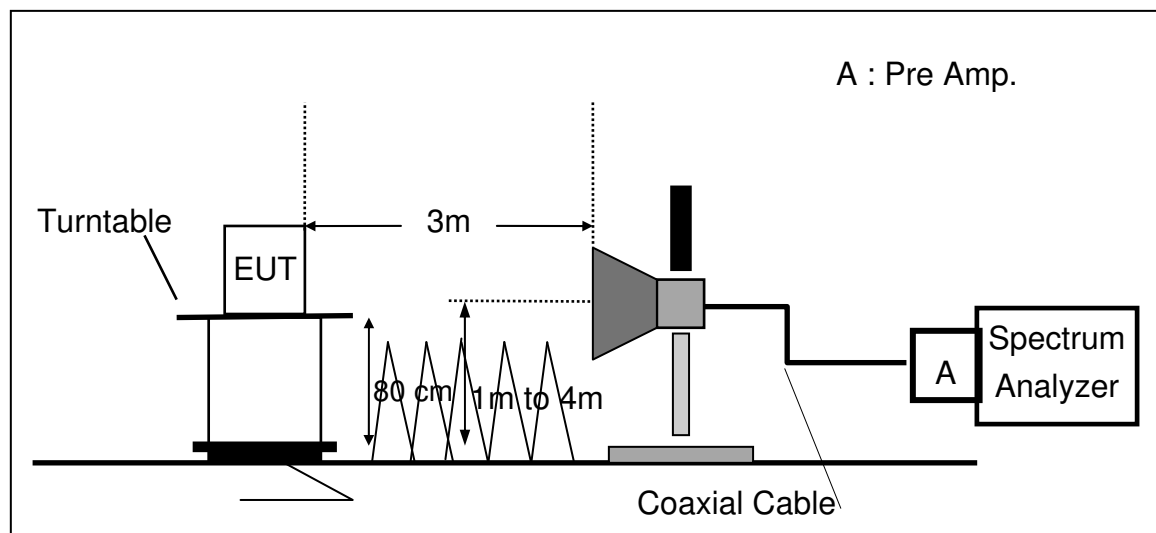
FCC 24.232(b) Mobile and portable stations are limited to 2 W EIRP.

### 7.2. Test SET-UP

#### (A) Radiated Power Test Set-Up, Frequency Below 1000MHz



#### (B) Radiated Power Test Set-Up Frequency Over 1 GHz



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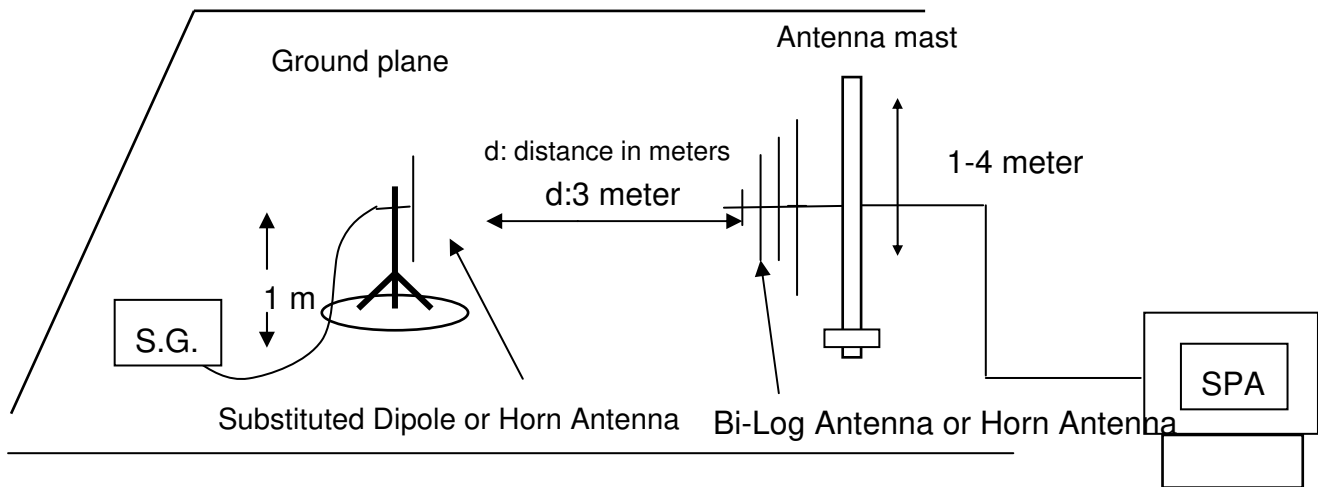
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### (C) Substituted Method Test Set-UP



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### 7.3. Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 971168 D01
2. The EUT was placed on a non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.
3. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated
4. The testing follows the Measurement Procedure of FCC KDB 971168 D01
5. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
6.  $ERP = S.G. \text{ output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable Loss (dB)}$
7.  $ERP = S.G. \text{ output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable Loss (dB)}$
8. Spectrum setting:
  - (1) Detector = Peak, marker the highest value of the detector by maximum hold, set RBW wide enough to capture the entire signal of emission, and  $VBW \geq 3 \times RBW$ .
  - (2) KDB 971168 D01 is adopted, and the procedure as lists under item 4, Measurement of the Average Power over the Fundamental Signal Bandwidth, is followed to set correspondingly for the acquisition of proper measurement data.

Set frequency = nominal signal center frequency;  
 Set span = 2 X occupied BW;  
 Set RBW  $\approx 1 \sim 5\%$  of the span, not to exceed 1 MHz  
 Set VBW = 3 x RBW;  
 Select average power (RMS) detector  
 Set sweep time and number of measurement points to achieve a minimum of 1 millisecond/pt integration time (ex. Point = 601points, then sweep time =  $601 \times 10^{-3} = 6s$ ).

Activate trace averaging routine over a minimum of 10 sweeps;

Activate marker/span pair and set span = signal or channel bandwidth;

Activate the band/interval power marker function;

Record the band power level;

Record adjusted value as the average signal power level. Then activate the occupied bandwidth measurement function.

The proper adjustment due to limitation of spectrum capability is given compensated to spectrum with conversion factor of  $10 \times \log (TBW/RBW)$ , where TBW is the transmission of UE exceeding the maximum BW UE can extends, and RBW is the resolution BW in UE.

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#### 7.4. Measurement Equipment Used

| SGS FAC-I                    |               |                 |               |                  |                 |
|------------------------------|---------------|-----------------|---------------|------------------|-----------------|
| Name of Equipment            | Manufacturer  | Model           | Serial Number | Calibration Date | Calibration Due |
| Spectrum Analyzer            | R&S           | FSV-30          | 101398        | 10/05/2016       | 10/04/2017      |
| Bi-log Antenna               | SCHWAZBECK    | VULB9160        | 9160-3158     | 10/28/2016       | 10/27/2017      |
| Bi-log Antenna               | SCHWAZBECK    | VULB9168        | 300           | 12/16/2015       | 12/15/2016      |
| Horn antenna                 | ETS.LINDGREN  | 3117            | 143279        | 11/14/2016       | 11/13/2017      |
| Horn antenna                 | ETS.LINDGREN  | 3117            | 123991        | 12/12/2016       | 12/11/2017      |
| Horn Antenna                 | Schwarzbeck   | BBHA9170        | 184           | 12/12/2016       | 12/11/2017      |
| Horn Antenna                 | Schwarzbeck   | BBHA9170        | 185           | 07/18/2016       | 07/17/2017      |
| Filter 2400-2483.5 MHz       | EWT           | EWT-14-0166     | M1            | 01/02/2016       | 01/01/2017      |
| Pre-Amplifier                | HP            | 8447F           | 3113A06892    | 01/02/2016       | 01/01/2017      |
| Pre-Amplifier                | HP            | 8449B           | 3008A01973    | 01/02/2016       | 01/01/2017      |
| Network Analyze              | Anritsu       | MS4644A         | 1216312       | 05/26/2016       | 05/25/2017      |
| Signal Generator             | Agilent       | E4438C          | MY45093613    | 07/07/2016       | 07/06/2017      |
| Low Loss Cable               | Huber Suhner  | SUCOFLEX 104EPA | 1166TX        | 01/02/2016       | 01/01/2017      |
| Low Loss Cable               | Huber Suhner  | SUCOFLEX 104EPA | 1166RX        | 01/02/2016       | 01/01/2017      |
| Attenuator                   | Mini-Circuit  | BW-S10W2+       | 3             | 01/02/2016       | 01/01/2017      |
| Turn Table                   | HD            | DT420           | N/A           | N.C.R            | N.C.R           |
| Antenna Tower                | HD            | MA240-N         | 240/657       | N.C.R            | N.C.R           |
| Controller                   | HD            | HD100           | N/A           | N.C.R            | N.C.R           |
| Site Cal                     | SGS           | 1166 chamber    | N/A           | 01/02/2016       | 01/01/2017      |
| Filter 800-1000              | Micro-Tronics | EWT             | M1            | 01/02/2016       | 01/01/2017      |
| Filter 1800-2000             | Micro-Tronics | EWT             | M1            | 01/02/2016       | 01/01/2017      |
| 1GHz High Pass Filter        | Micro-Tronics | HPM50108        | 32            | 01/02/2016       | 01/01/2017      |
| 2GHz High Pass Filter        | Micro-Tronics | HPM50110        | 36            | 01/02/2016       | 01/01/2017      |
| Radio Communication Analyzer | Anritsu       | MT8820C         | 6201465317    | 12/10/2016       | 12/09/2017      |

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## 7.5. Measurement Result: (Peak) –using option of peak measurement

| EUT            |                       |    | Measurement  |             |              |            |     |       |
|----------------|-----------------------|----|--------------|-------------|--------------|------------|-----|-------|
| Operation Band | Fundamental Frequency | CH | Antenna Pol. | S.G. Output | Antenna Gain | Cable Loss | ERP | Limit |

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| EUT            |                       |    | Measurement  |             |              |            |      |       |
|----------------|-----------------------|----|--------------|-------------|--------------|------------|------|-------|
| Operation Band | Fundamental Frequency | CH | Antenna Pol. | S.G. Output | Antenna Gain | Cable Loss | EIRP | Limit |

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| EUT            |                       |    | Measurement  |             |              |            |      |       |
|----------------|-----------------------|----|--------------|-------------|--------------|------------|------|-------|
| Operation Band | Fundamental Frequency | CH | Antenna Pol. | S.G. Output | Antenna Gain | Cable Loss | EIRP | Limit |

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| EUT            |                       |    | Measurement  |             |              |            |     |       |
|----------------|-----------------------|----|--------------|-------------|--------------|------------|-----|-------|
| Operation Band | Fundamental Frequency | CH | Antenna Pol. | S.G. Output | Antenna Gain | Cable Loss | ERP | Limit |

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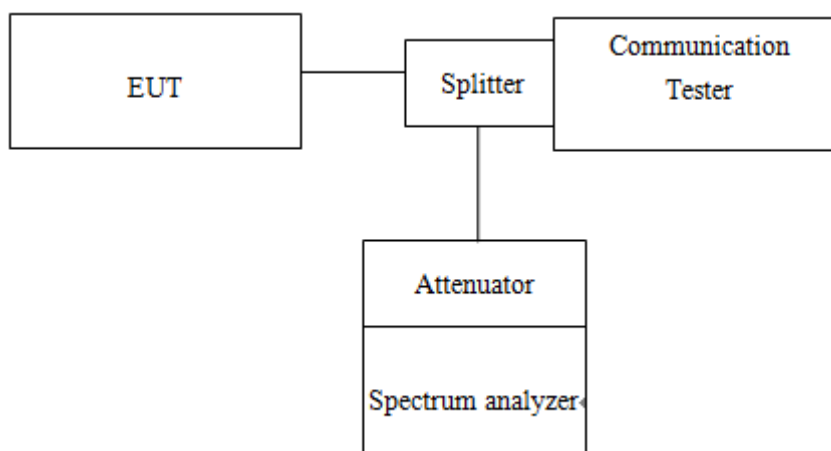
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## 8. OCCUPIED BANDWIDTH MEASUREMENT

### 8.1. Standard Applicable

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power.

### 8.2. Test Set-up



### 8.3. Measurement Procedure

#### **99% & 26dB Bandwidth with detector peak**

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 RBW, with span > 2 \* Signal BW, set % Power = 99%.

#### **99% Bandwidth with detector sample**

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% ~ 5% of emission BW, VBW= 3 times RBW, -20dBc display line was placed on the screen (or 20dB bandwidth). Set RBW to 99% bandwidth, RBW= 1% ~ 5%, VBW= 3 RBW, with span > 2 \* Signal BW, set % Power = 99%.

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#### 8.4. Measurement Equipment Used

| SGS Conducted Room           |               |              |               |            |            |
|------------------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR           | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Power Meter                  | Anritsu       | ML2495A      | 1005007       | 12/15/2015 | 12/14/2016 |
| Power Sensor                 | Anritsu       | MA2411B      | 917032        | 12/15/2015 | 12/14/2016 |
| EXA Spectrum Analyzer        | Agilent       | N9030A       | MY53120760    | 02/26/2016 | 02/25/2017 |
| DC Block                     | Mini-Circuits | BLK-18-S+    | 1             | 01/02/2016 | 01/01/2017 |
| Coaxial Cable                | HUBER+SUHNER  | SUCOFLEX 102 | 23670/2       | 01/02/2016 | 01/01/2017 |
| Attenuator                   | Mini-Circuit  | BW-S10W2+    | 2             | 01/02/2016 | 01/01/2017 |
| Splitter                     | Agilent       | 11636B       | N/A           | 01/02/2016 | 01/01/2017 |
| DC Power Supply              | Agilent       | E3640A       | MY52410006    | 11/21/2016 | 11/20/2017 |
| Temperature Chamber          | TERCHY        | MHG-120LF    | 911009        | 05/17/2016 | 05/16/2017 |
| Radio Communication Analyzer | R&S           | CMU200       | 102189        | 02/11/2016 | 02/10/2017 |
| Radio Communication Analyzer | Anritsu       | MT8820C      | 6200995019    | 09/24/2016 | 09/23/2017 |

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## 8.5. Measurement Result

| Freq.<br>(MHz) | CH  | 99%<br>BW<br>(MHz) | 99%<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) |
|----------------|-----|--------------------|--------------------|----------------------|----------------------|
|                |     | GPRS<br>850        | EDGE<br>850        | GPRS<br>850          | EDGE<br>850          |
| 824.2          | 128 | 0.24161            | 0.24551            | 0.3181               | <b>0.3216</b>        |
| 836.6          | 190 | 0.24178            | 0.24551            | <b>0.3217</b>        | 0.3048               |
| 848.8          | 251 | <b>0.24573</b>     | <b>0.24784</b>     | 0.3157               | 0.3122               |

| Freq.<br>(MHz) | CH  | 99%<br>BW<br>(MHz) | 99%<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) |
|----------------|-----|--------------------|--------------------|----------------------|----------------------|
|                |     | GPRS<br>1900       | EDGE<br>1900       | GPRS<br>1900         | EDGE<br>1900         |
| 1850.2         | 512 | 0.24183            | 0.2452             | 0.3212               | 0.3143               |
| 1880.0         | 661 | 0.24475            | <b>0.24879</b>     | 0.3185               | 0.3165               |
| 1909.8         | 810 | <b>0.24572</b>     | 0.24467            | <b>0.3233</b>        | <b>0.3169</b>        |

| Freq.<br>(MHz) | CH   | 99%<br>BW<br>(MHz) | 99%<br>BW<br>(MHz) | 99%<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) |
|----------------|------|--------------------|--------------------|--------------------|----------------------|----------------------|----------------------|
|                |      | WCDMA<br>II        | HSDPA<br>II        | HSUPA<br>II        | WCDMA<br>II          | HSDPA<br>II          | HSUPA<br>II          |
| 1850.20        | 9262 | 4.0580             | 4.0460             | 4.0655             | 4.615                | 4.590                | <b>4.621</b>         |
| 1880.00        | 9400 | 4.0561             | 4.0532             | 4.0650             | 4.609                | 4.621                | 4.573                |
| 1909.80        | 9538 | <b>4.0591</b>      | <b>4.0561</b>      | <b>4.0694</b>      | <b>4.622</b>         | <b>4.646</b>         | 4.583                |

| Freq.<br>(MHz) | CH   | 99%<br>BW<br>(MHz) | 99%<br>BW<br>(MHz) | 99%<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) | 26 dB<br>BW<br>(MHz) |
|----------------|------|--------------------|--------------------|--------------------|----------------------|----------------------|----------------------|
|                |      | WCDMA<br>V         | HSDPA<br>V         | HSUPA<br>V         | WCDMA<br>V           | HSDPA<br>V           | HSUPA<br>V           |
| 826.40         | 4132 | 4.0567             | 4.0513             | 4.0566             | 4.611                | <b>4.622</b>         | <b>4.616</b>         |
| 836.60         | 4183 | <b>4.0574</b>      | <b>4.0584</b>      | <b>4.0584</b>      | <b>4.616</b>         | 4.610                | 4.615                |
| 846.60         | 4233 | 4.0530             | 4.0493             | 4.0472             | 4.591                | 4.606                | 4.576                |

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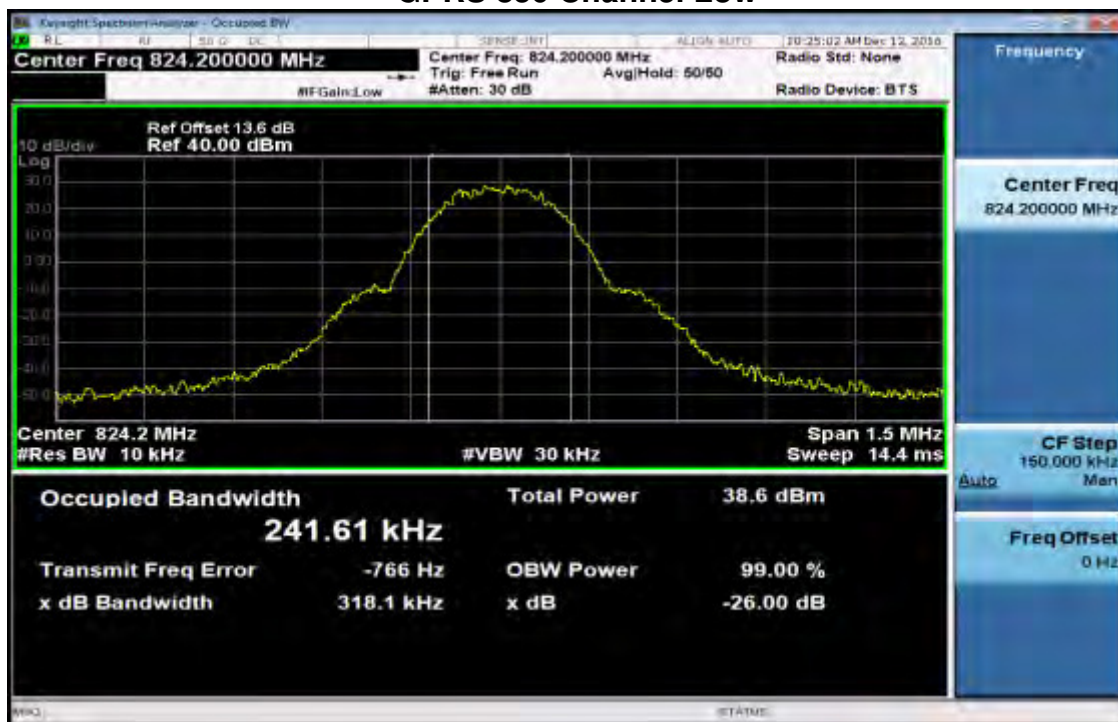
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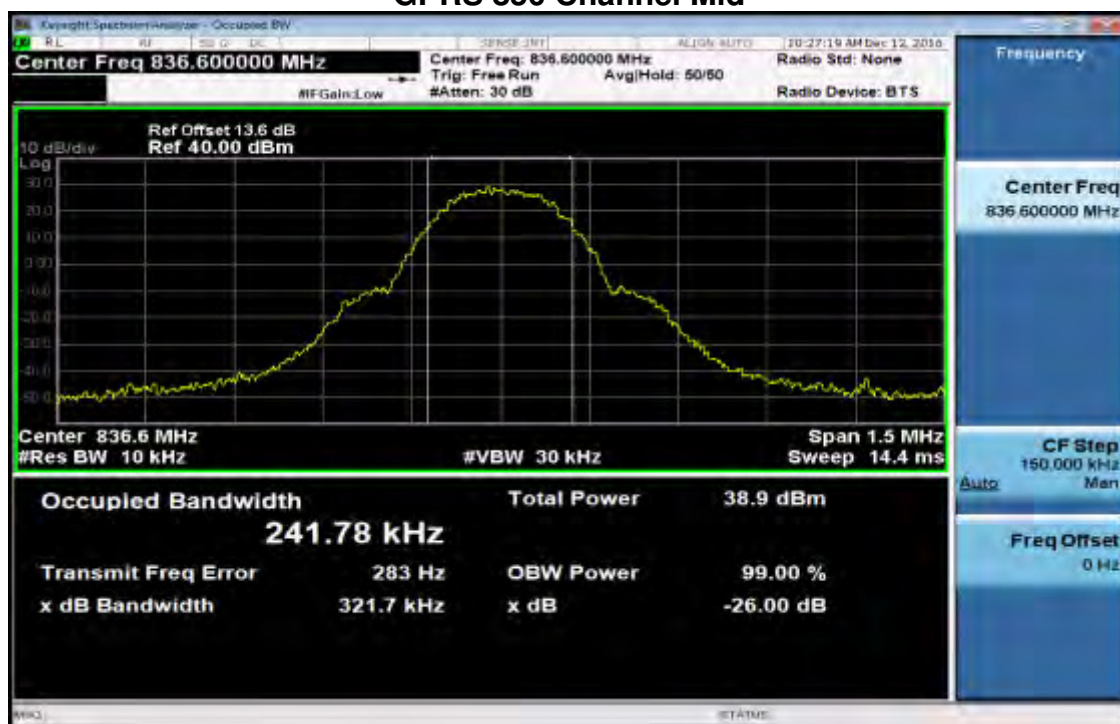
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## 99% & 26dB Bandwidth Test Data (Detector Peak) GPRS 850 Channel Low



## GPRS 850 Channel Mid



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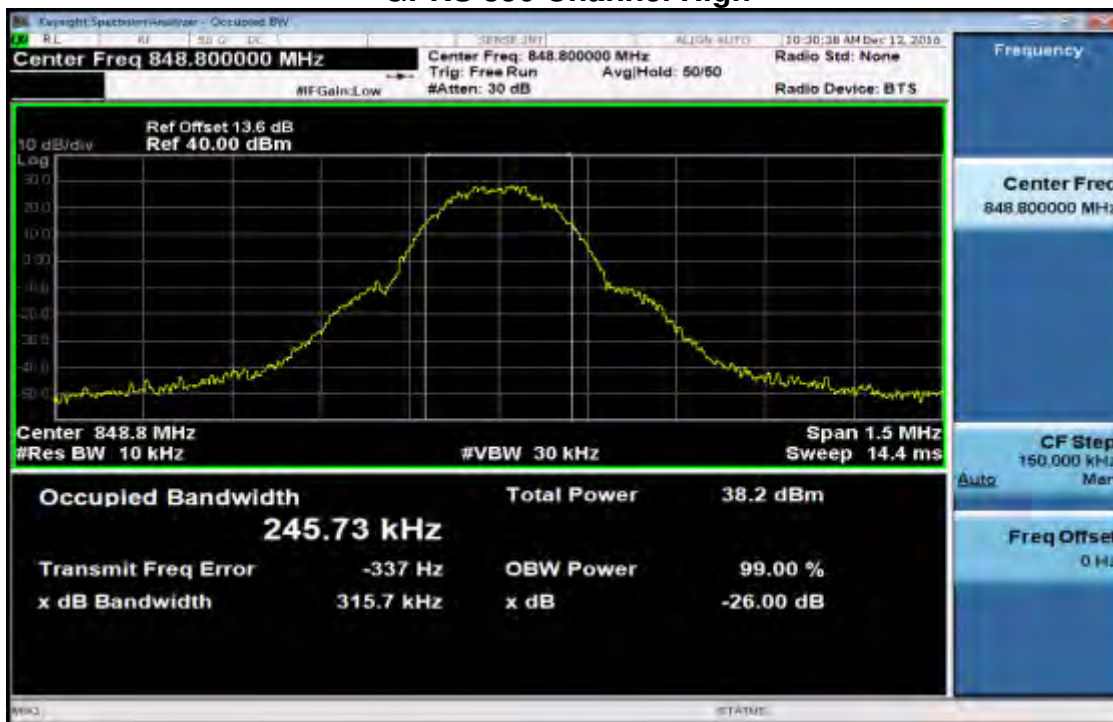
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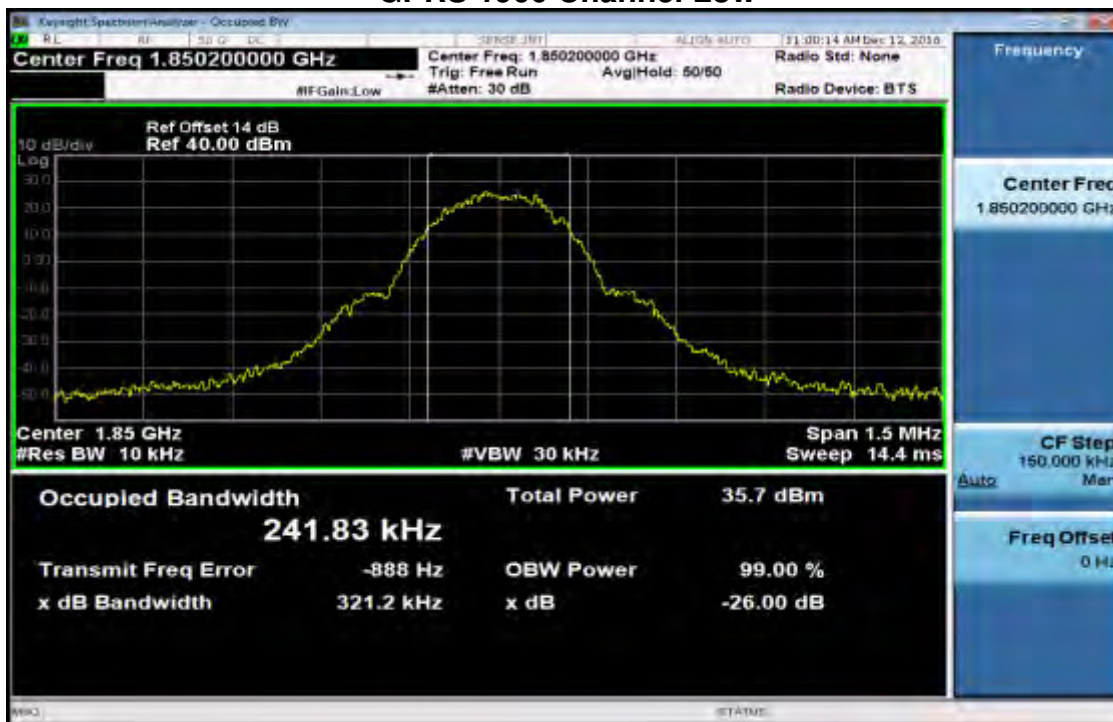
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### GPRS 850 Channel High



### GPRS 1900 Channel Low



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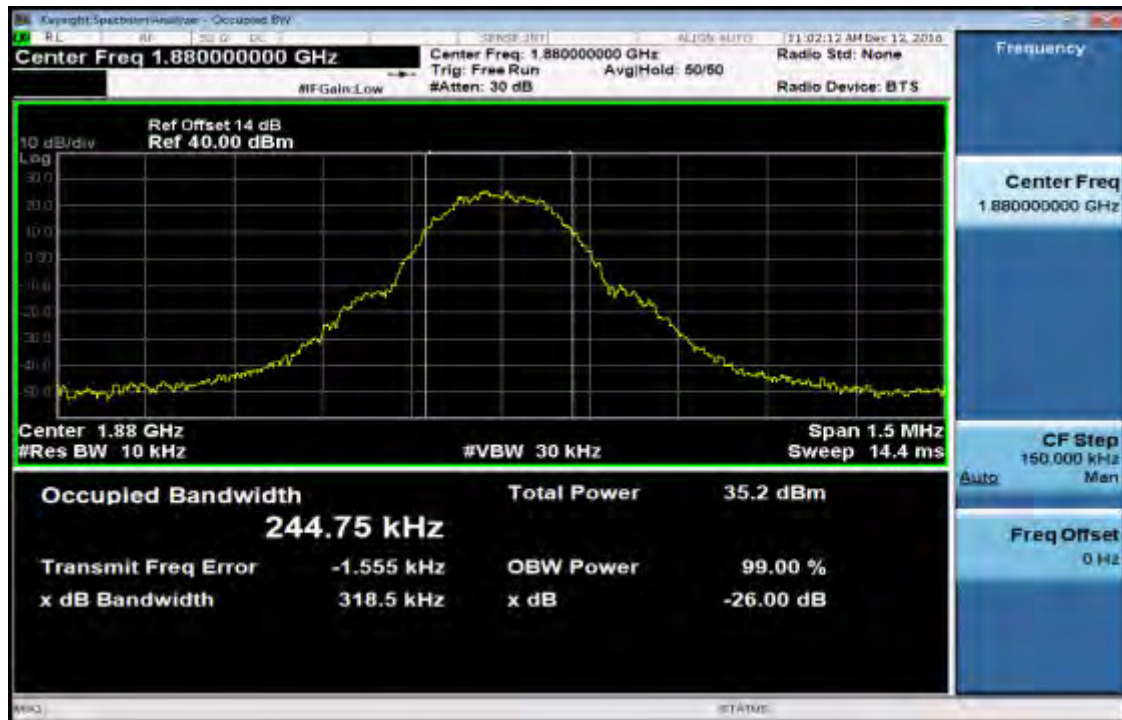
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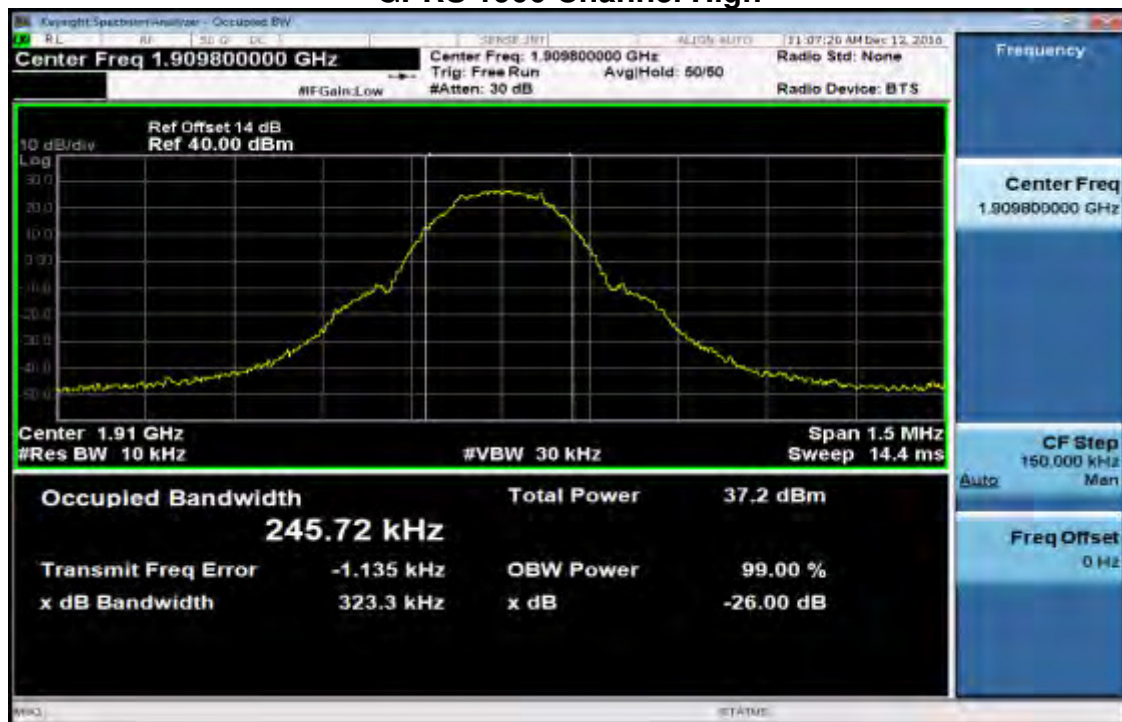
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### GPRS 1900 Channel Mid



### GPRS 1900 Channel High



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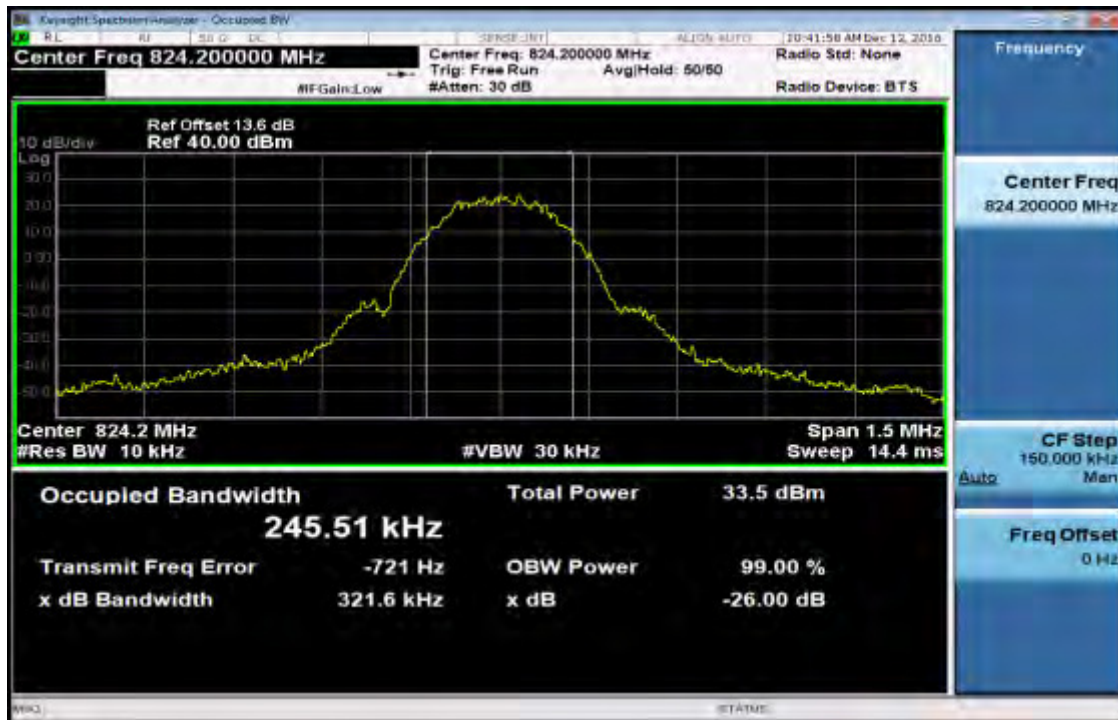
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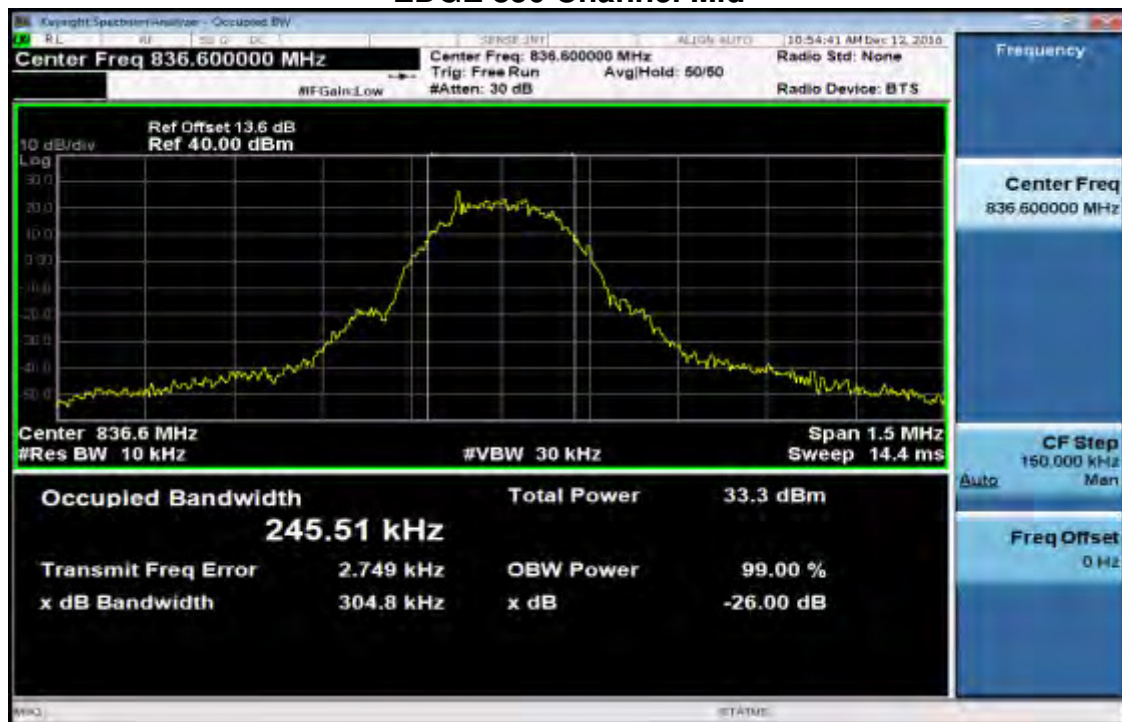
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## EDGE 850 Channel Low



## EDGE 850 Channel Mid



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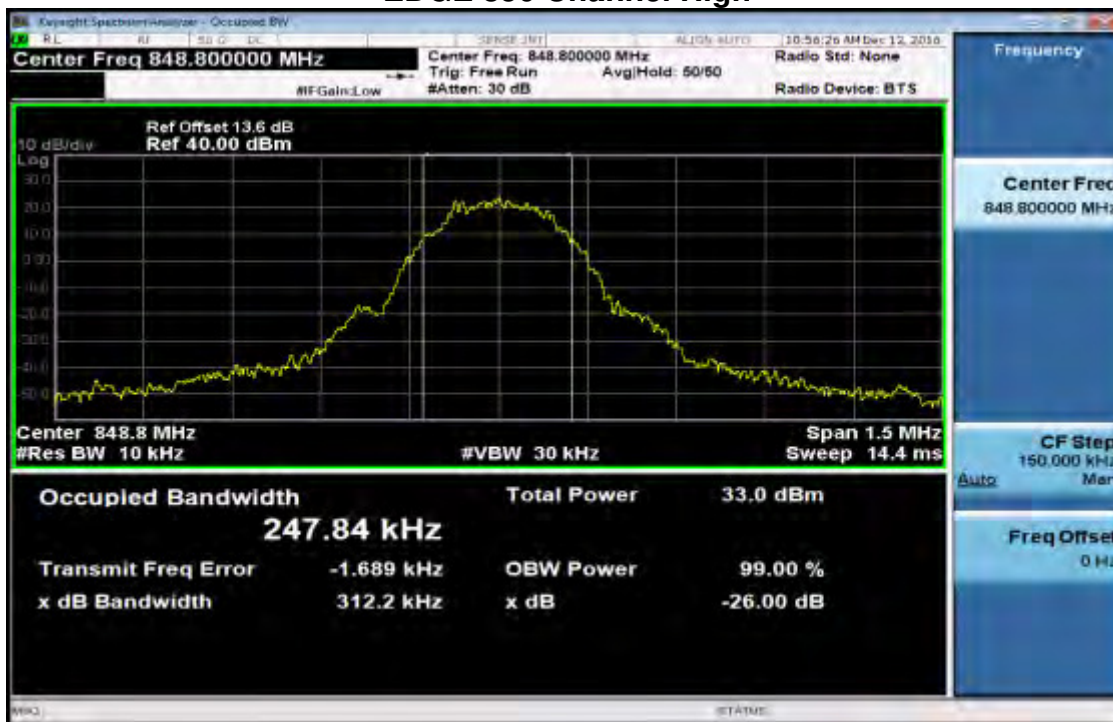
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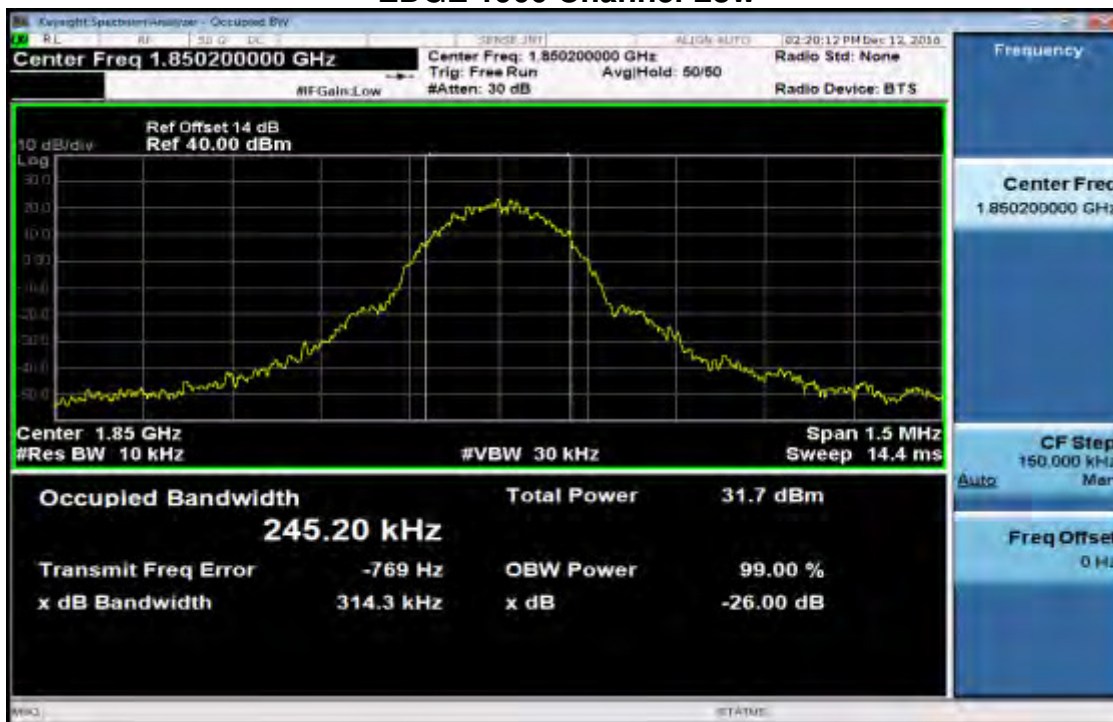
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## EDGE 850 Channel High



## EDGE 1900 Channel Low



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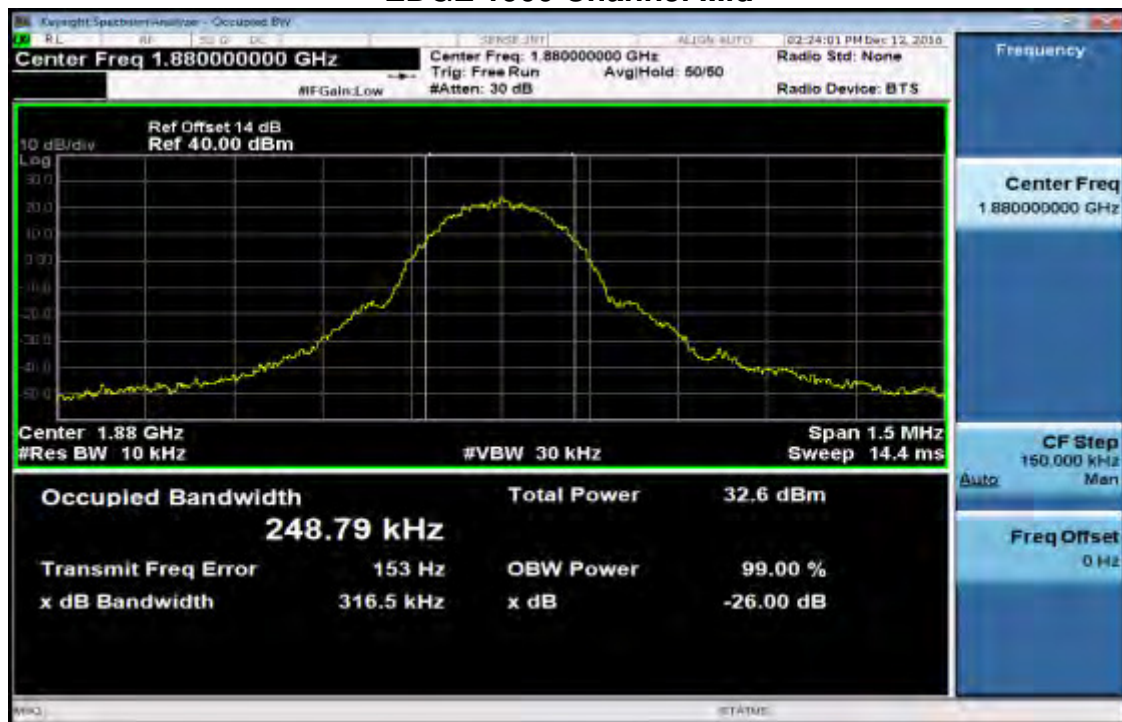
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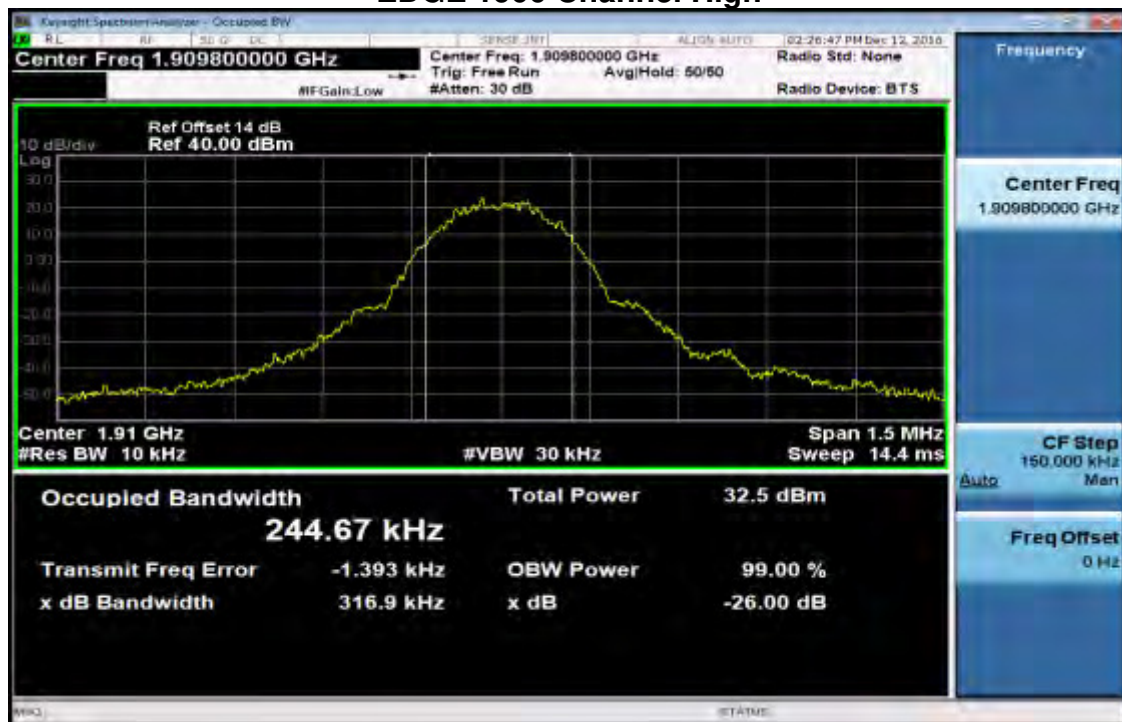
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## EDGE 1900 Channel Mid



## EDGE 1900 Channel High



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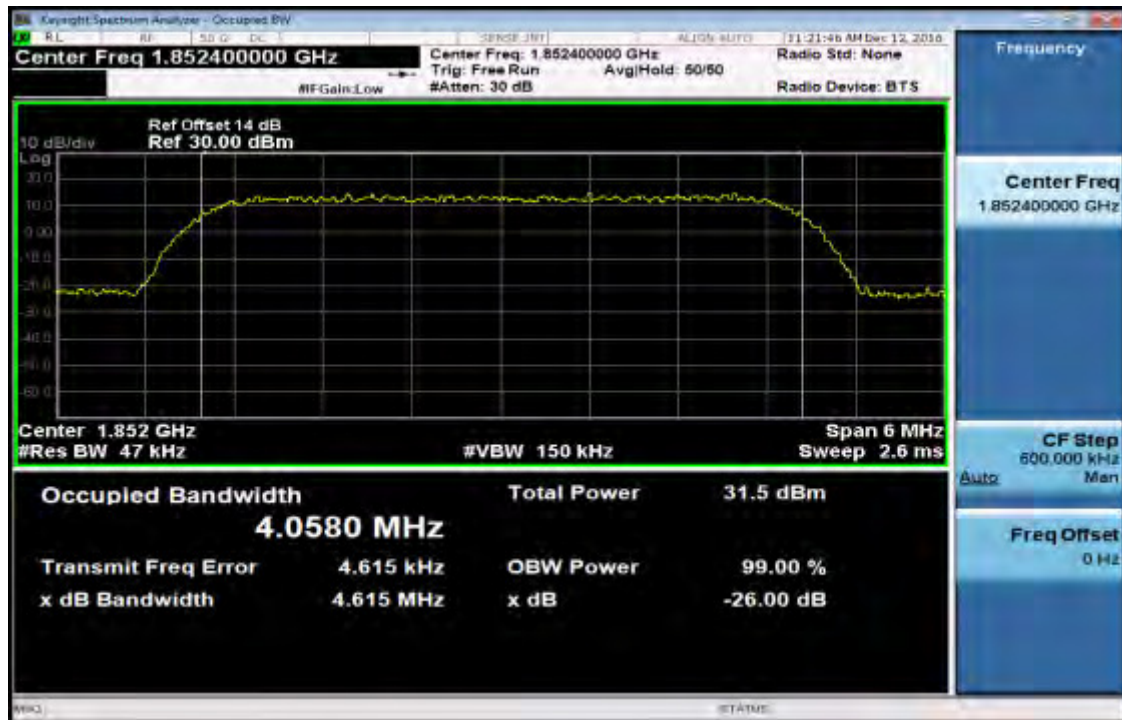
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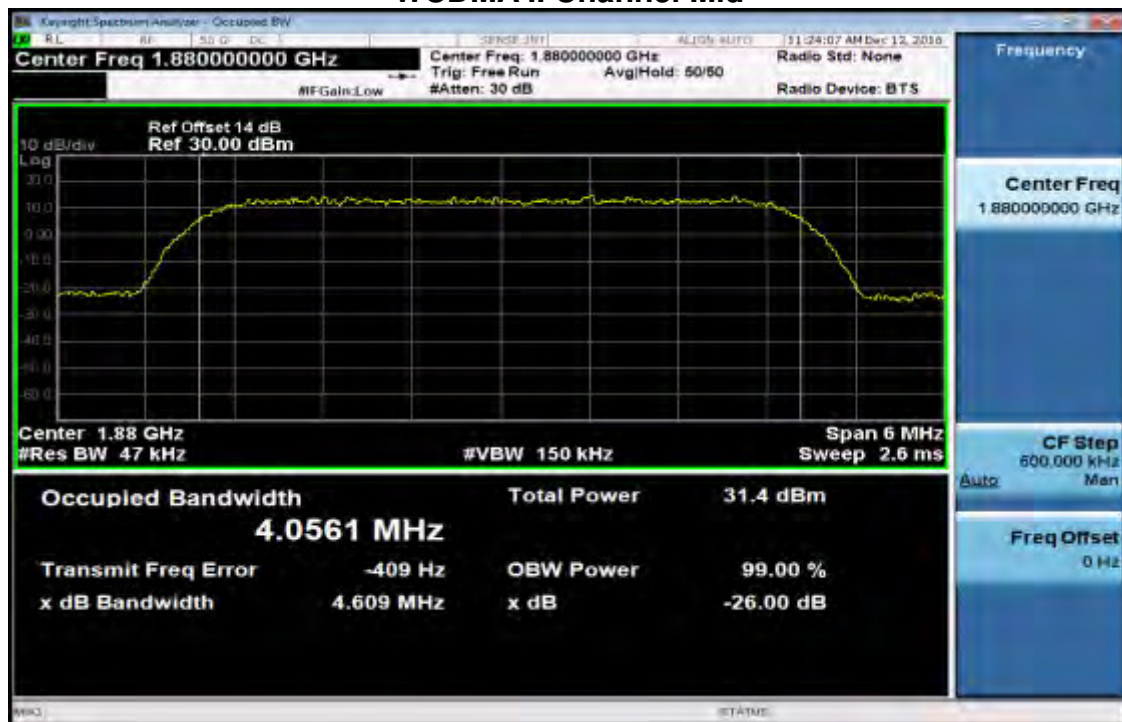
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## WCDMA II Channel Low



## WCDMA II Channel Mid



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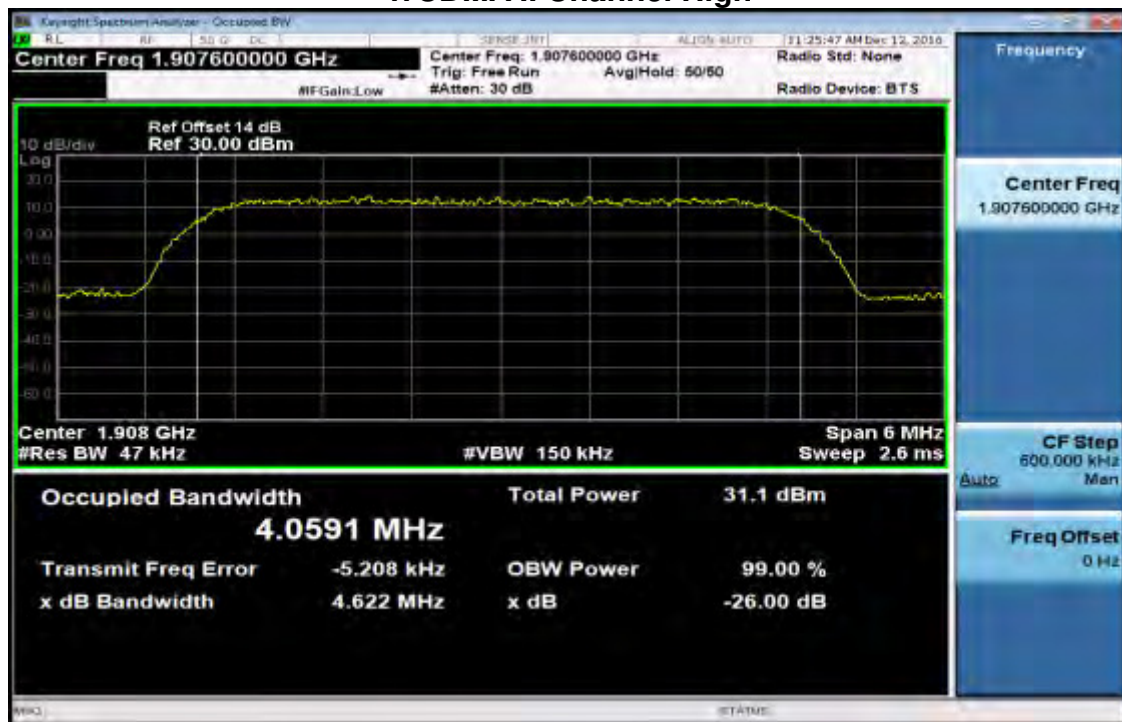
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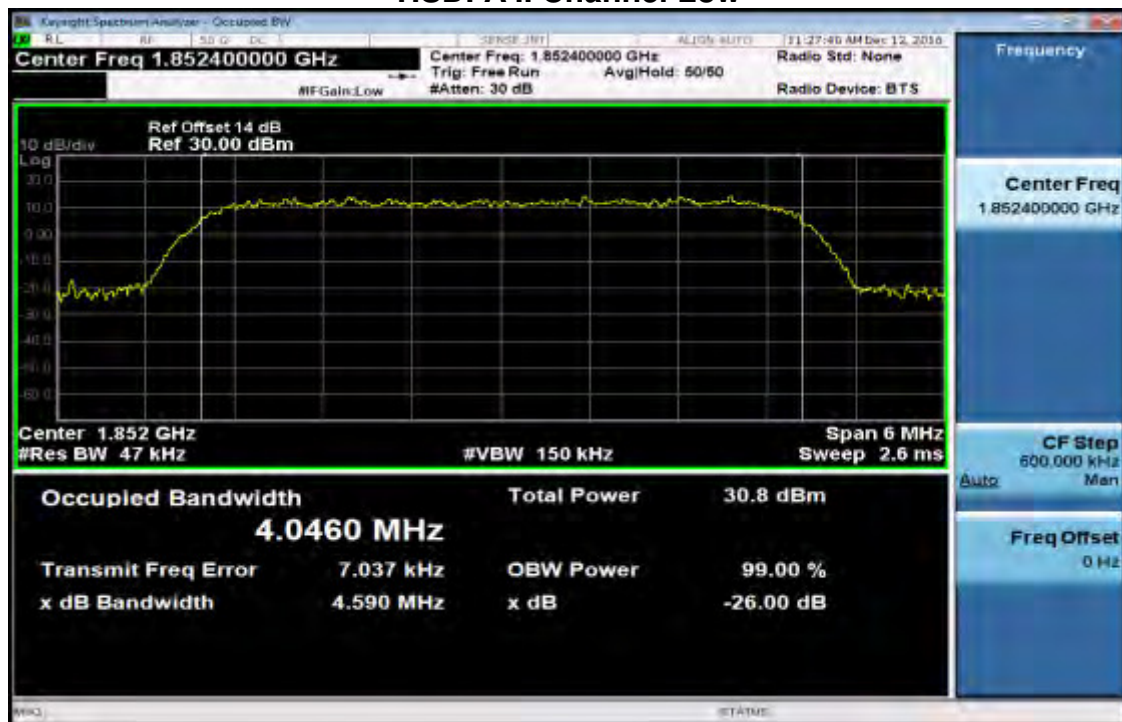
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## WCDMA II Channel High



## HSDPA II Channel Low



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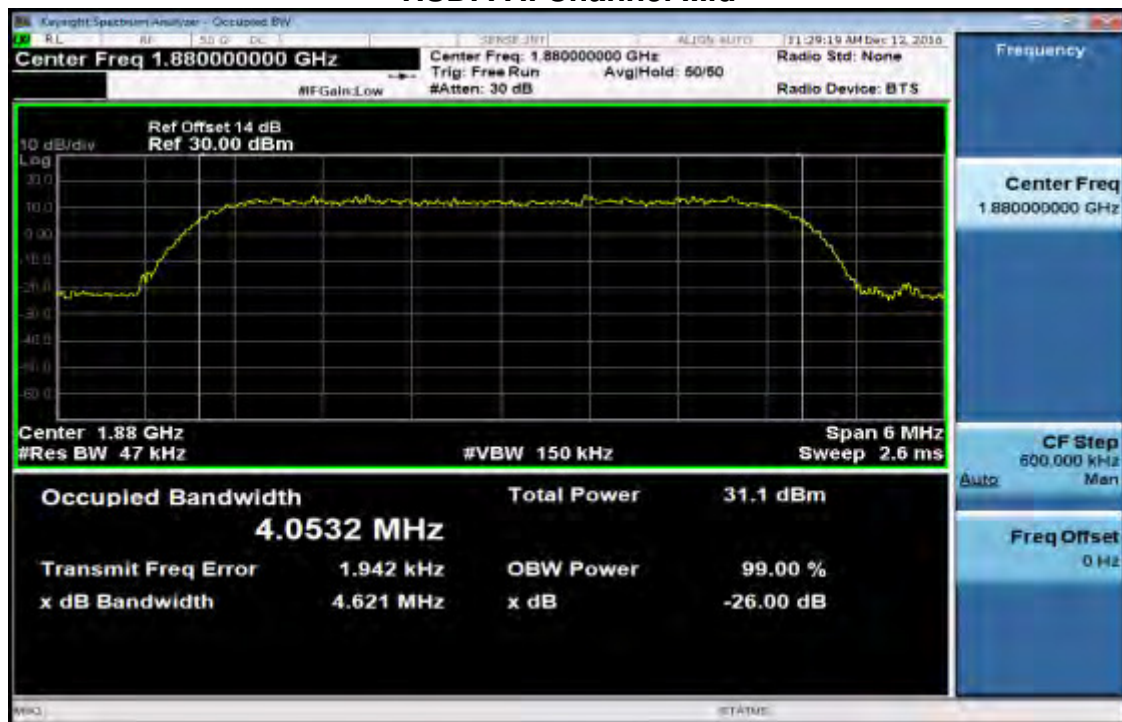
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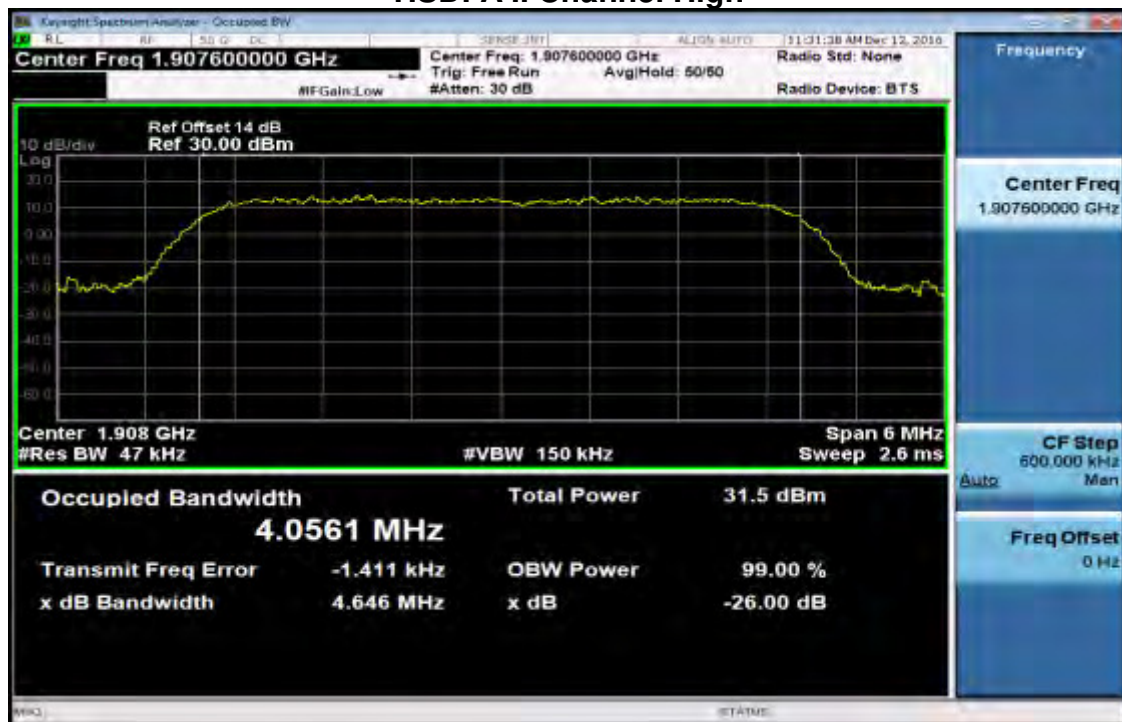
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## HSDPA II Channel Mid



## HSDPA II Channel High



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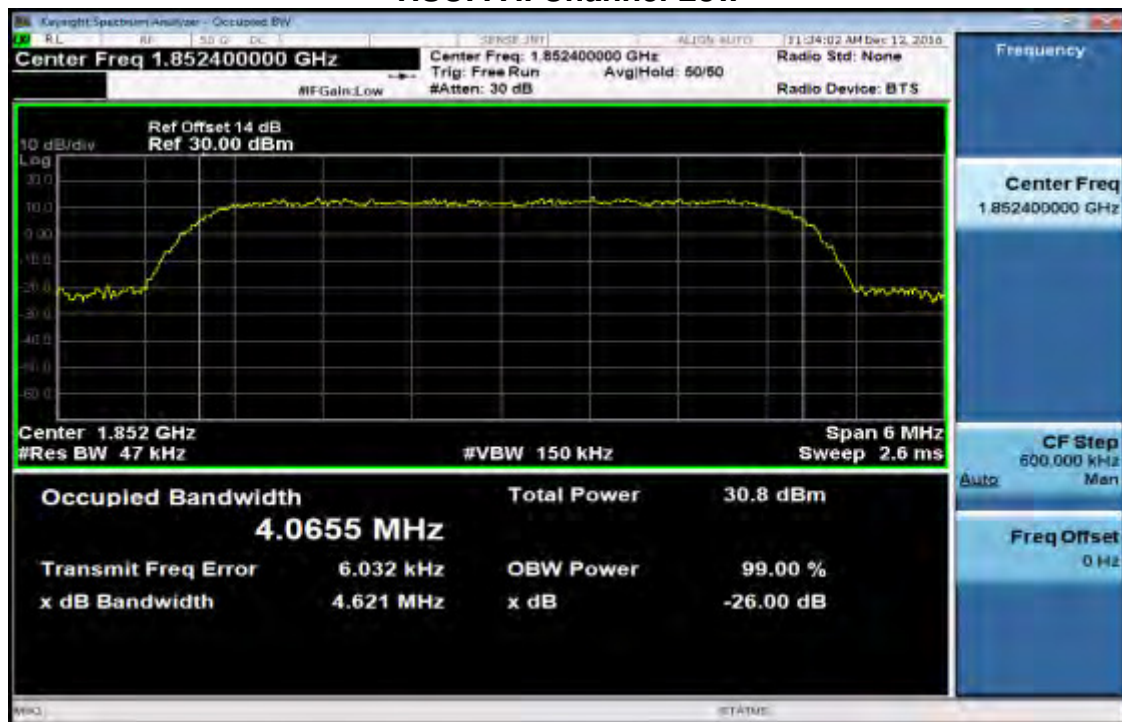
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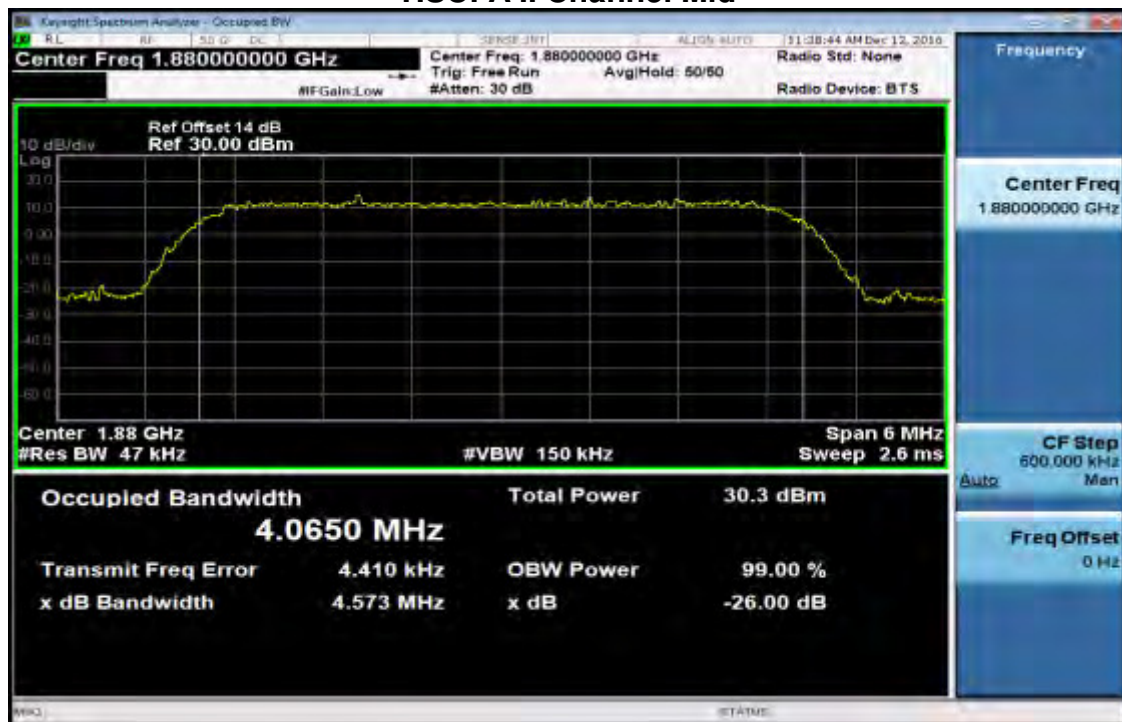
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## HSUPA II Channel Low



## HSUPA II Channel Mid



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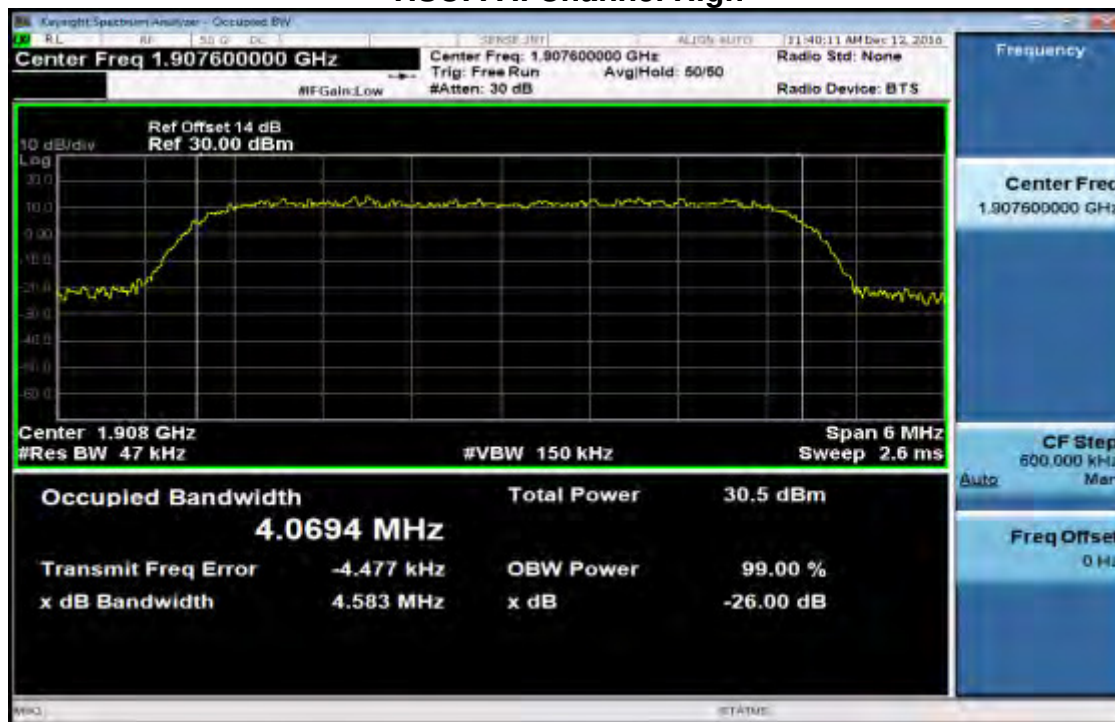
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## HSUPA II Channel High



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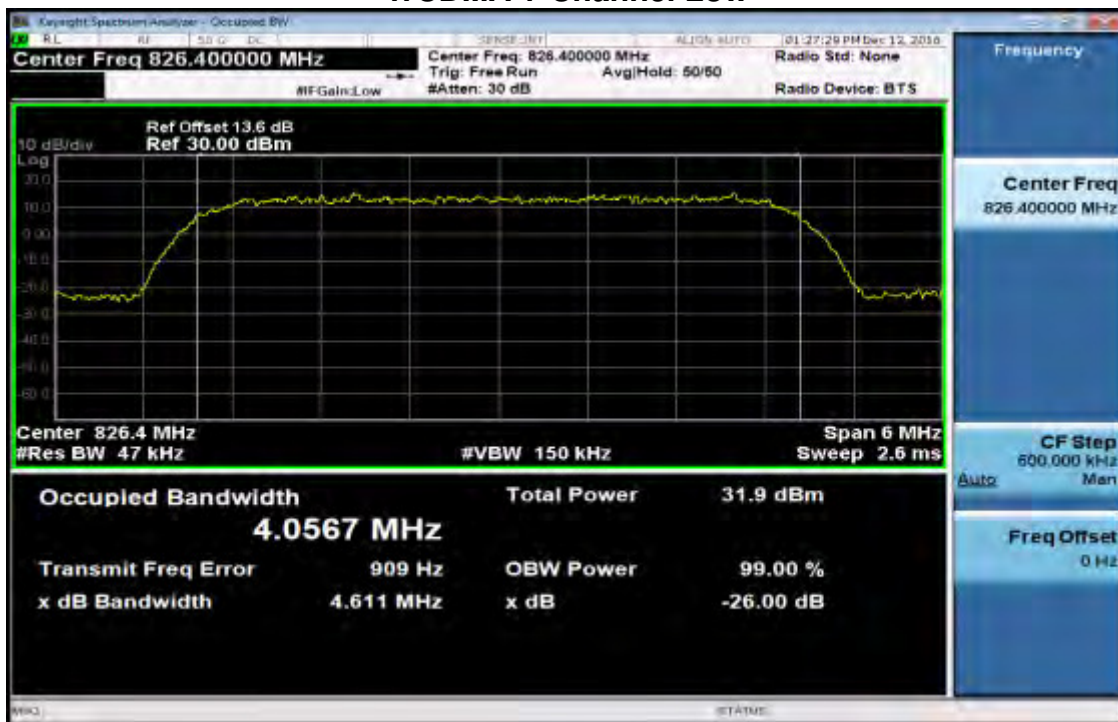
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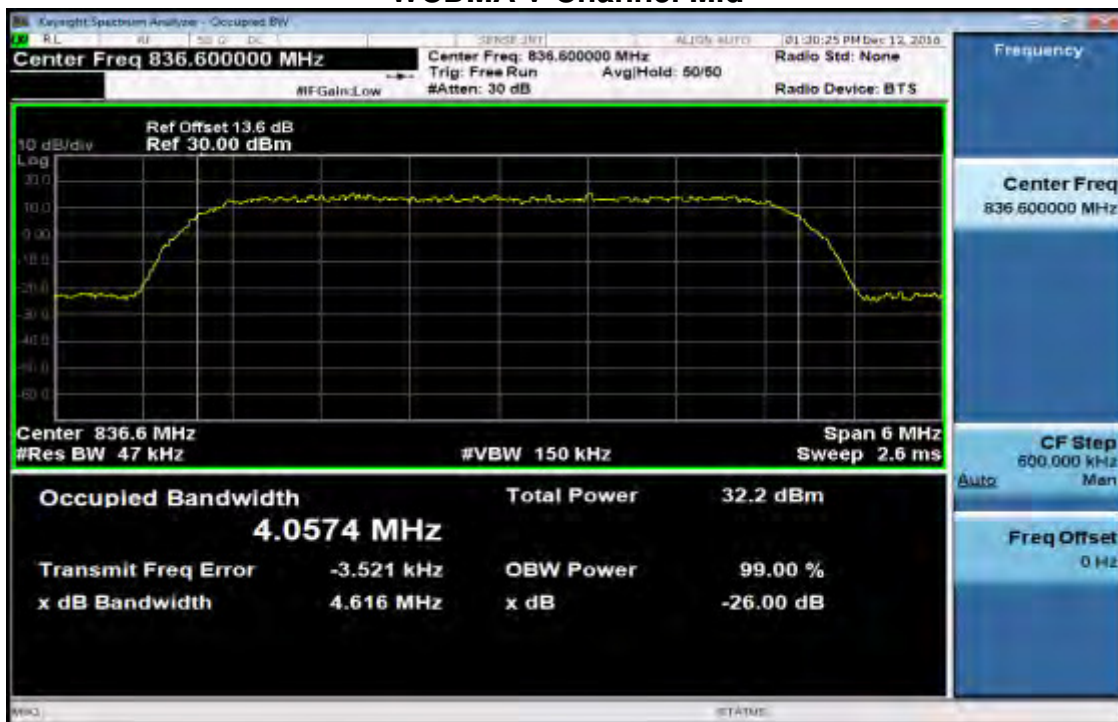
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### WCDMA V Channel Low



### WCDMA V Channel Mid



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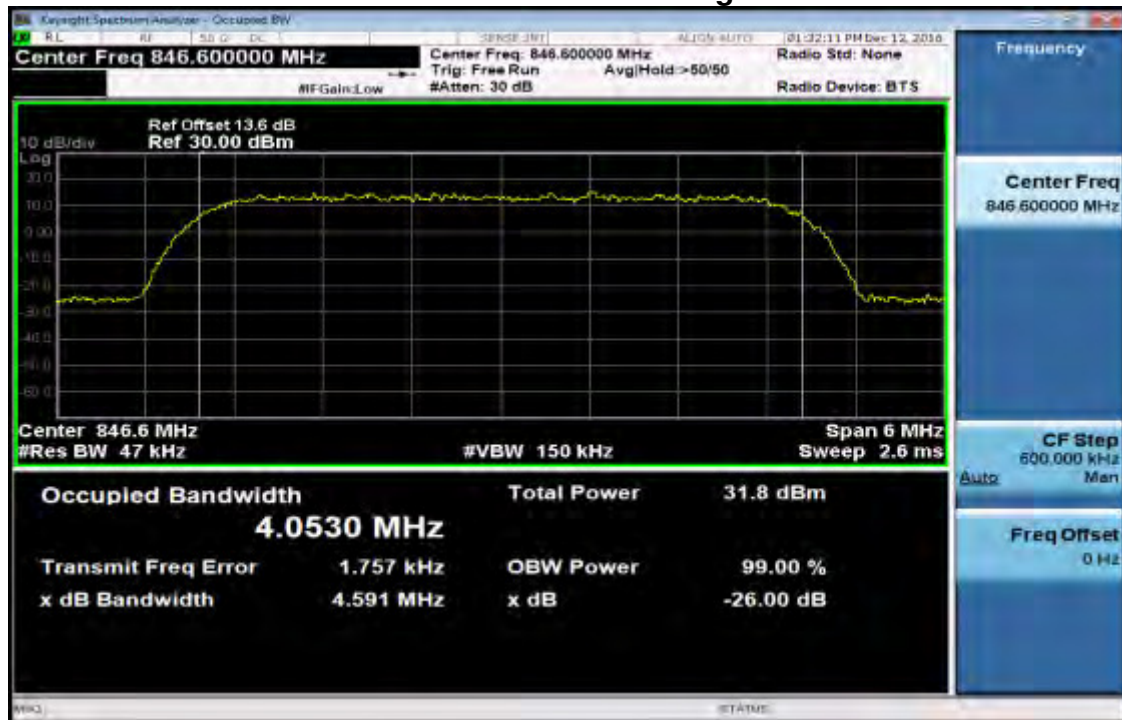
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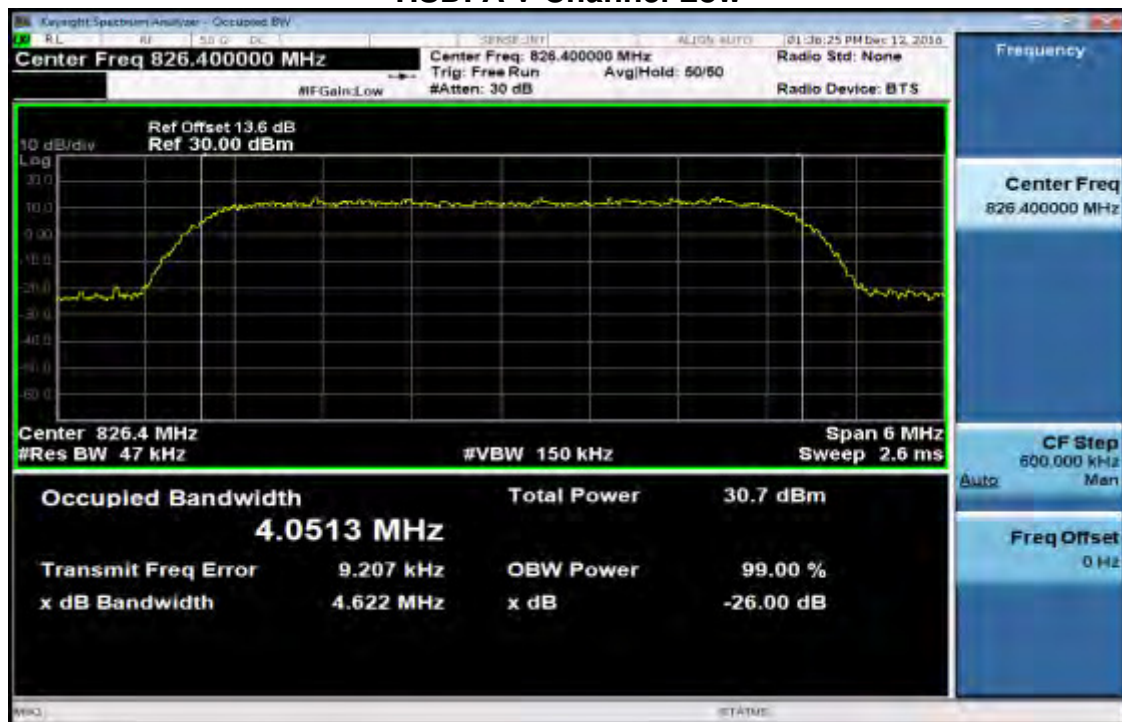
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## WCDMA V Channel High



## HSDPA V Channel Low



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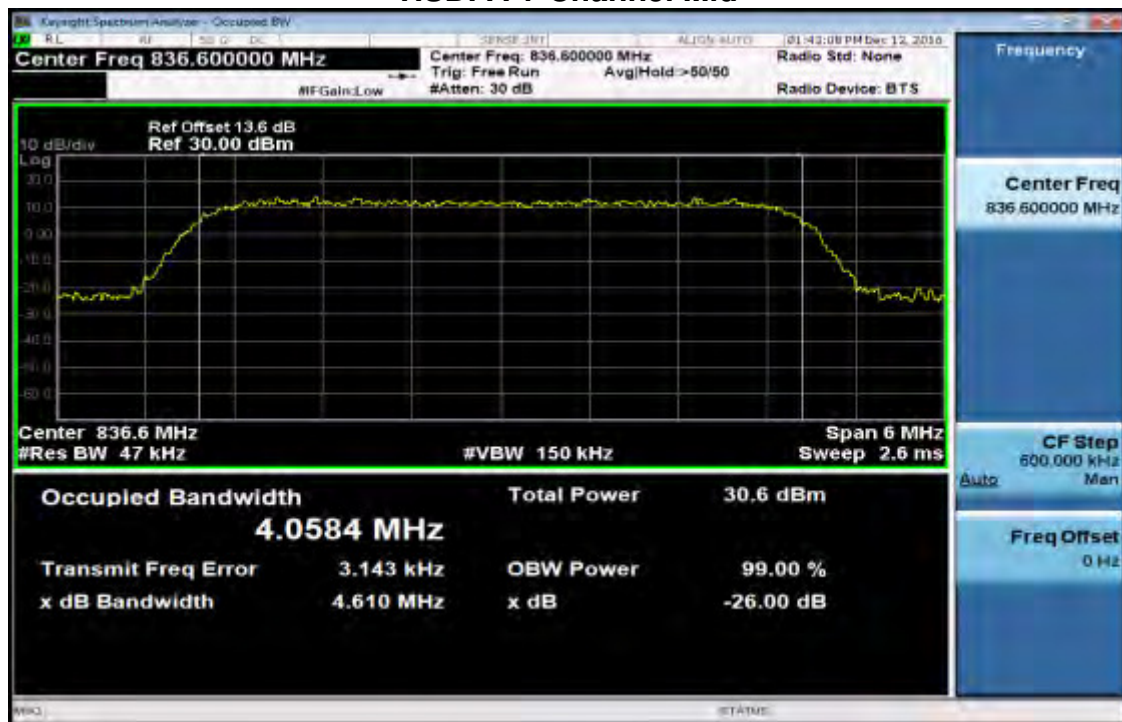
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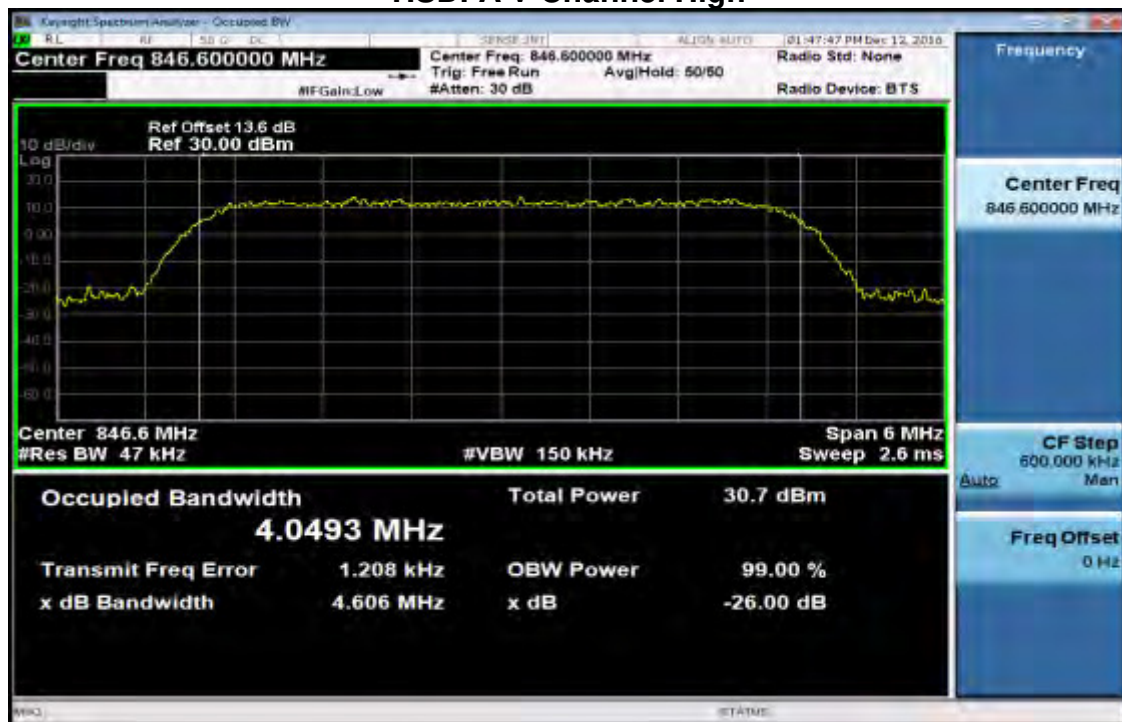
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### HSDPA V Channel Mid



### HSDPA V Channel High



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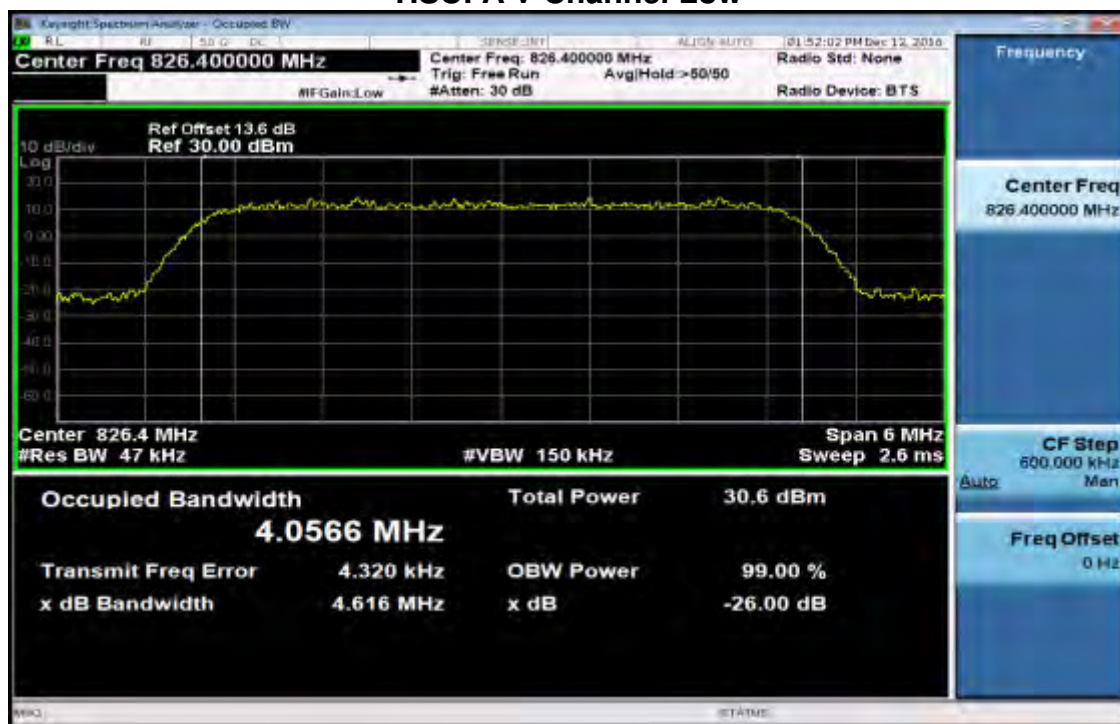
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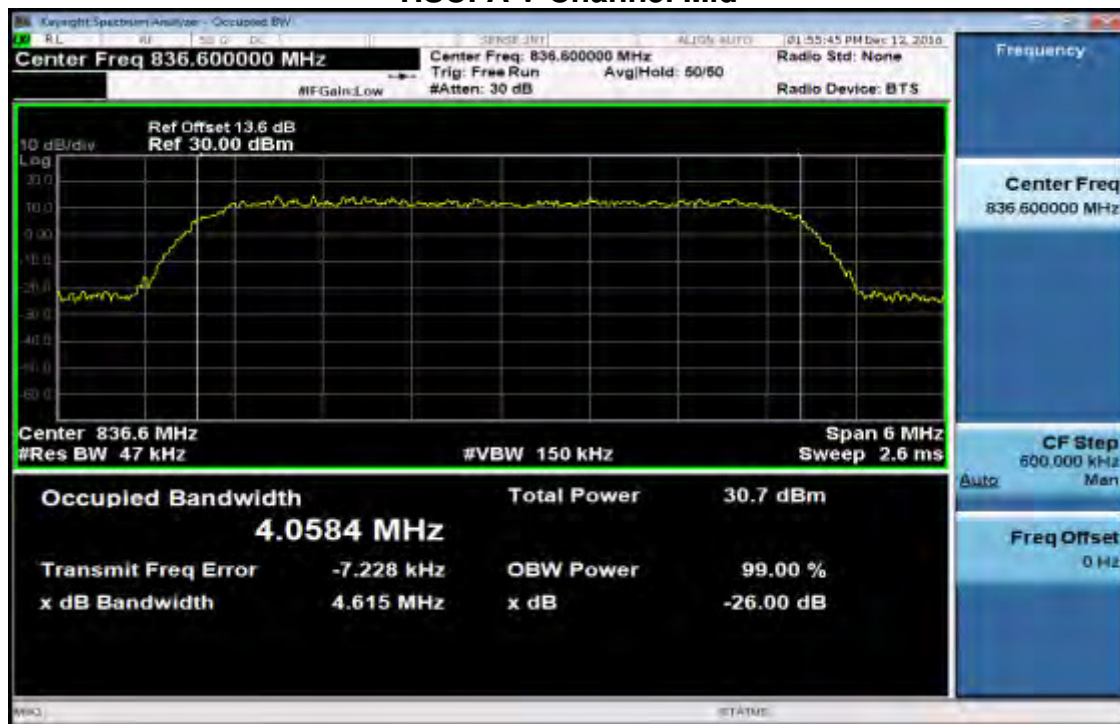
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## HSUPA V Channel Low



## HSUPA V Channel Mid



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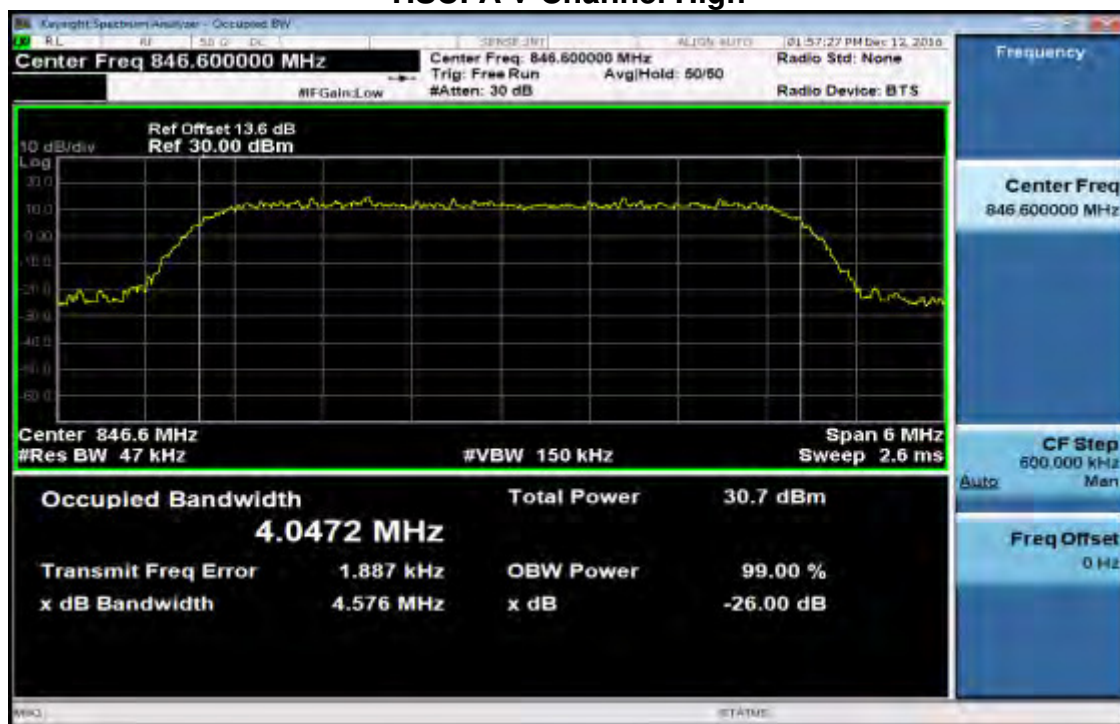
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## HSUPA V Channel High



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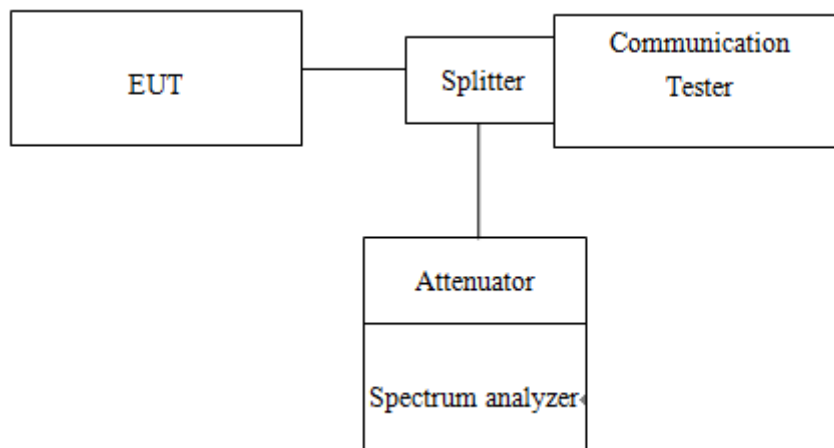
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## 9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

### 9.1. Standard Applicable

FCC §22.917(a), §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than  $43 + 10 \log$  (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

### 9.2. Test SET-UP



### 9.3. Measurement Procedure

#### Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

#### Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting  $RBW \geq 1\% EBW$ .
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

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#### 9.4. Measurement Equipment Used

| SGS Conducted Room           |               |              |               |            |            |
|------------------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE               | MFR           | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| Power Meter                  | Anritsu       | ML2495A      | 1005007       | 12/15/2015 | 12/14/2016 |
| Power Sensor                 | Anritsu       | MA2411B      | 917032        | 12/15/2015 | 12/14/2016 |
| EXA Spectrum Analyzer        | Agilent       | N9030A       | MY53120760    | 02/26/2016 | 02/25/2017 |
| DC Block                     | Mini-Circuits | BLK-18-S+    | 1             | 01/02/2016 | 01/01/2017 |
| Coaxial Cable                | HUBER+SUHNER  | SUCOFLEX 102 | 23670/2       | 01/02/2016 | 01/01/2017 |
| Attenuator                   | Mini-Circuit  | BW-S10W2+    | 2             | 01/02/2016 | 01/01/2017 |
| Splitter                     | Agilent       | 11636B       | N/A           | 01/02/2016 | 01/01/2017 |
| DC Power Supply              | Agilent       | E3640A       | MY52410006    | 11/21/2016 | 11/20/2017 |
| Temperature Chamber          | TERCHY        | MHG-120LF    | 911009        | 05/17/2016 | 05/16/2017 |
| Radio Communication Analyzer | R&S           | CMU200       | 102189        | 02/11/2016 | 02/10/2017 |
| Radio Communication Analyzer | Anritsu       | MT8820C      | 6200995019    | 09/24/2016 | 09/23/2017 |

#### 9.5. Measurement Result:

Refer to next pages.

**NOTE: The occurrence of the spike on the conducted emission is the signal of the fundamental emission.**

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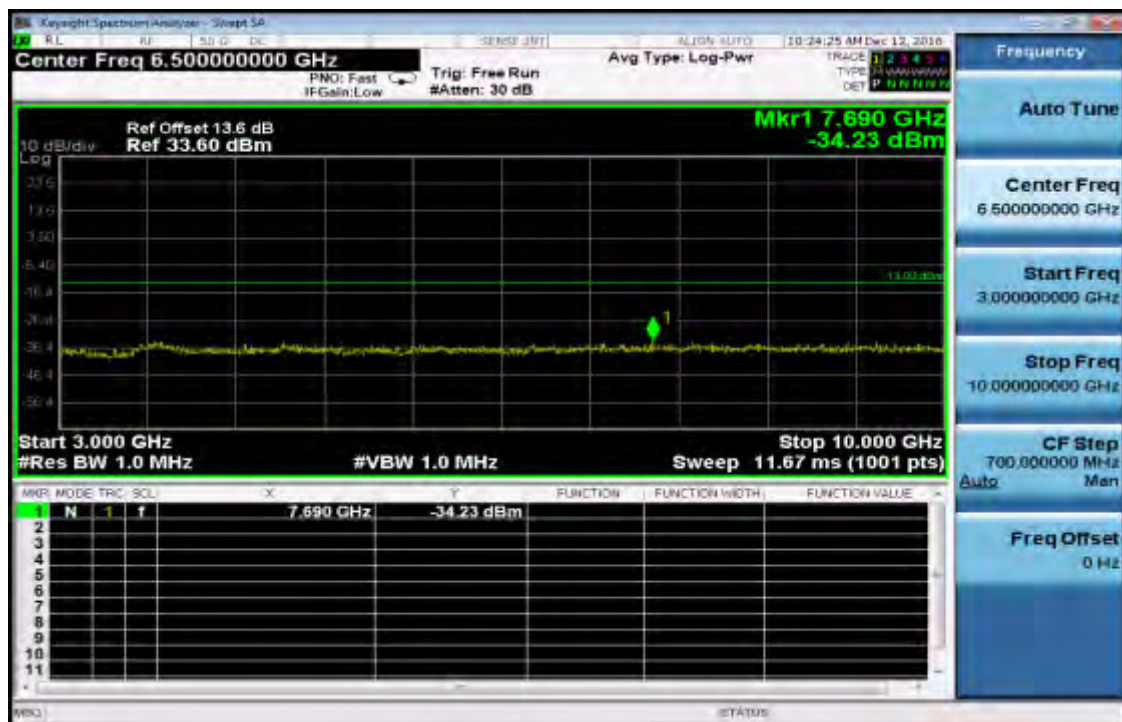
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## Out of Band emission at antenna terminals – GPRS 850 Channel Lowest



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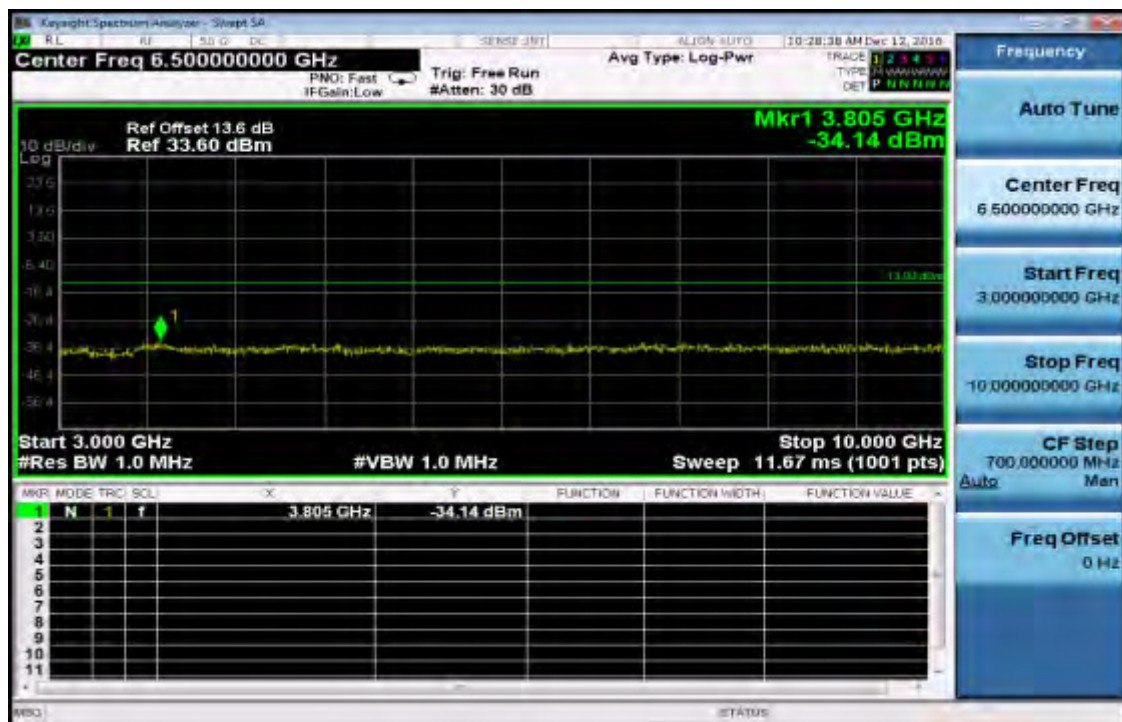
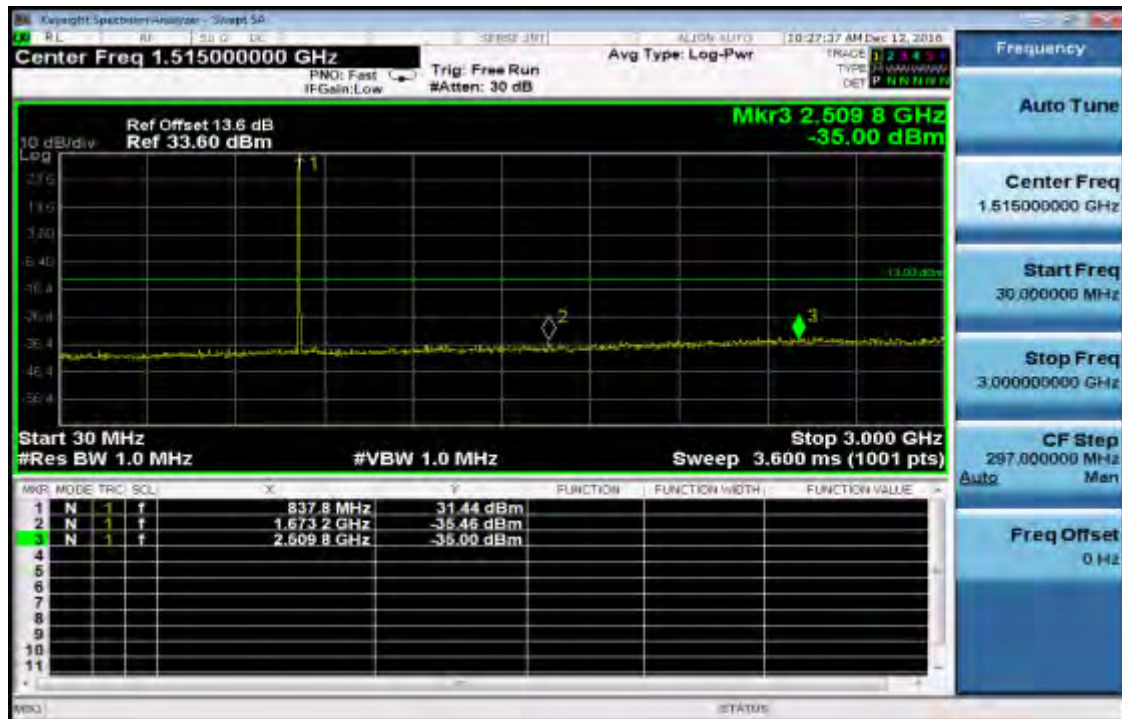
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## Out of Band emission at antenna terminals – GPRS 850 Channel Mid



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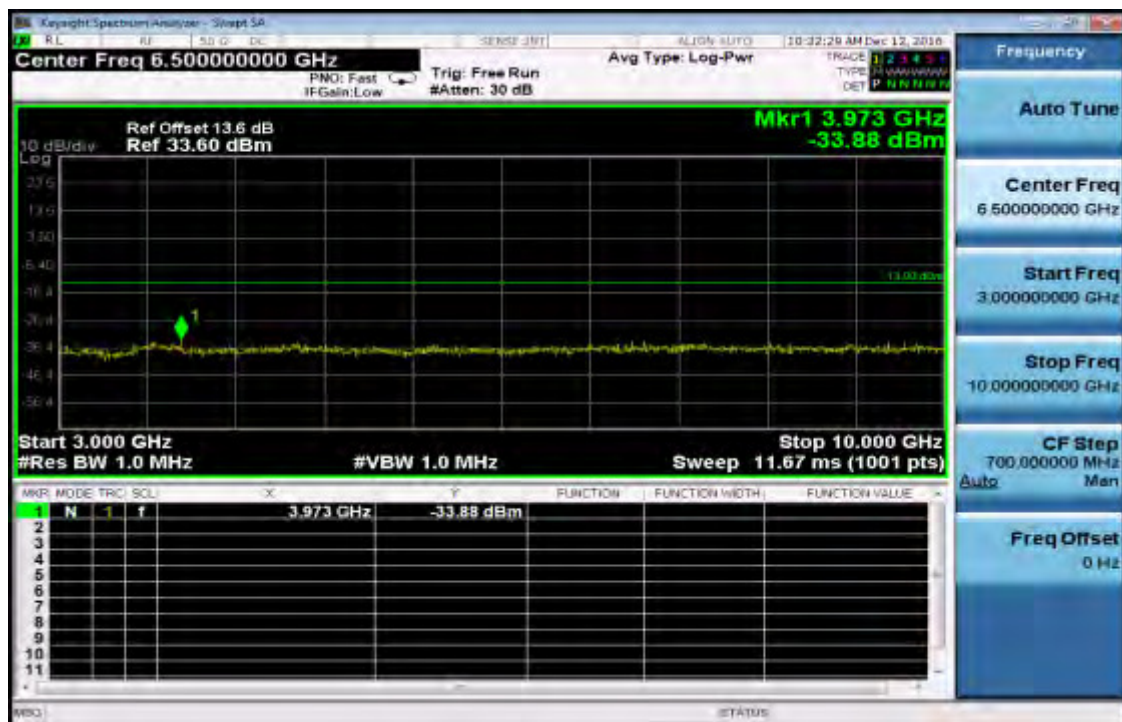
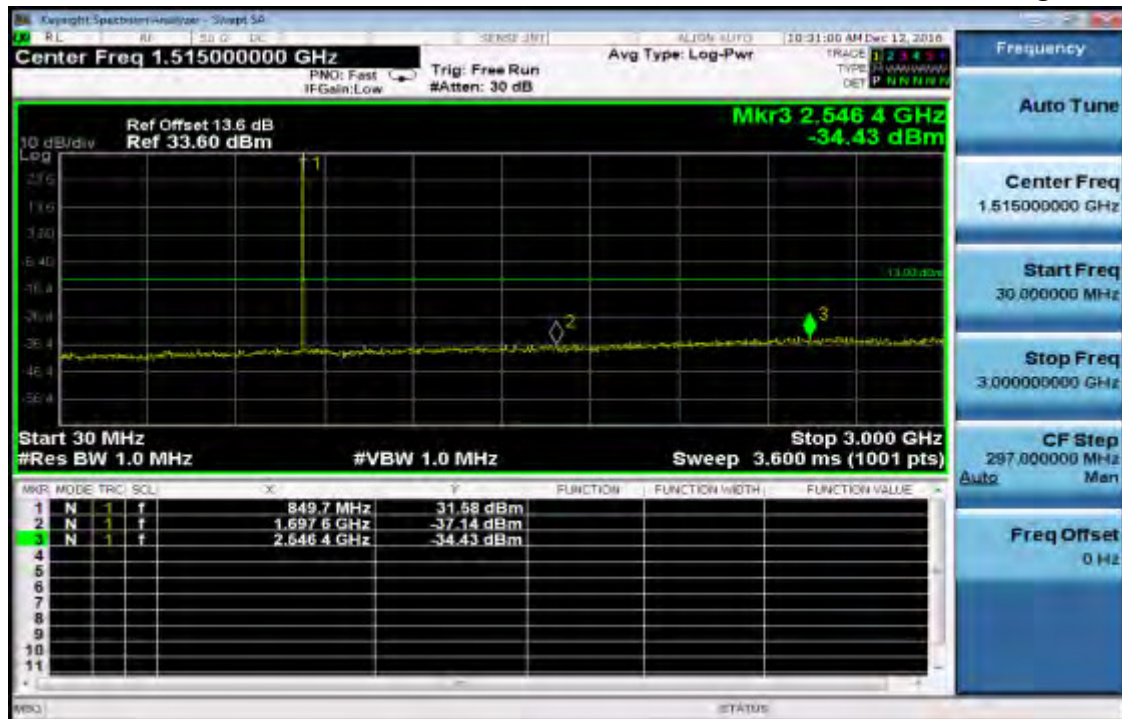
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## Out of Band emission at antenna terminals – GPRS 850 Channel Highest



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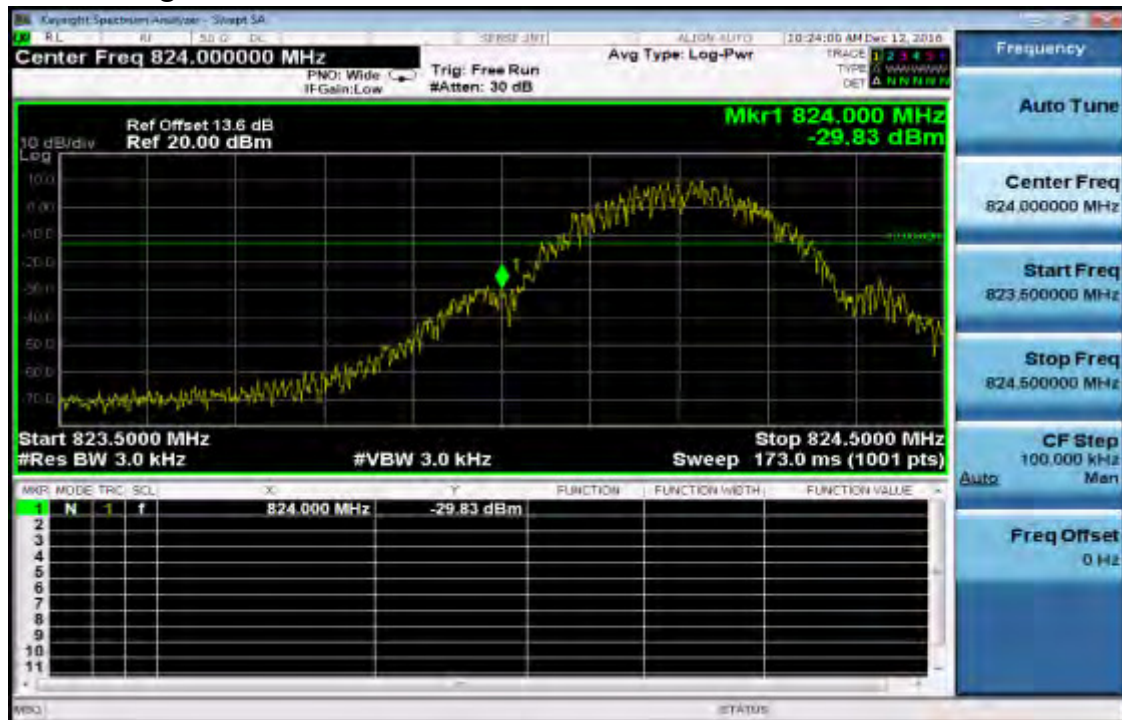
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## Band edge emission at antenna terminals – GPRS 850 Channel Lowest



## Band edge emission at antenna terminals – GPRS 850 Channel Highest



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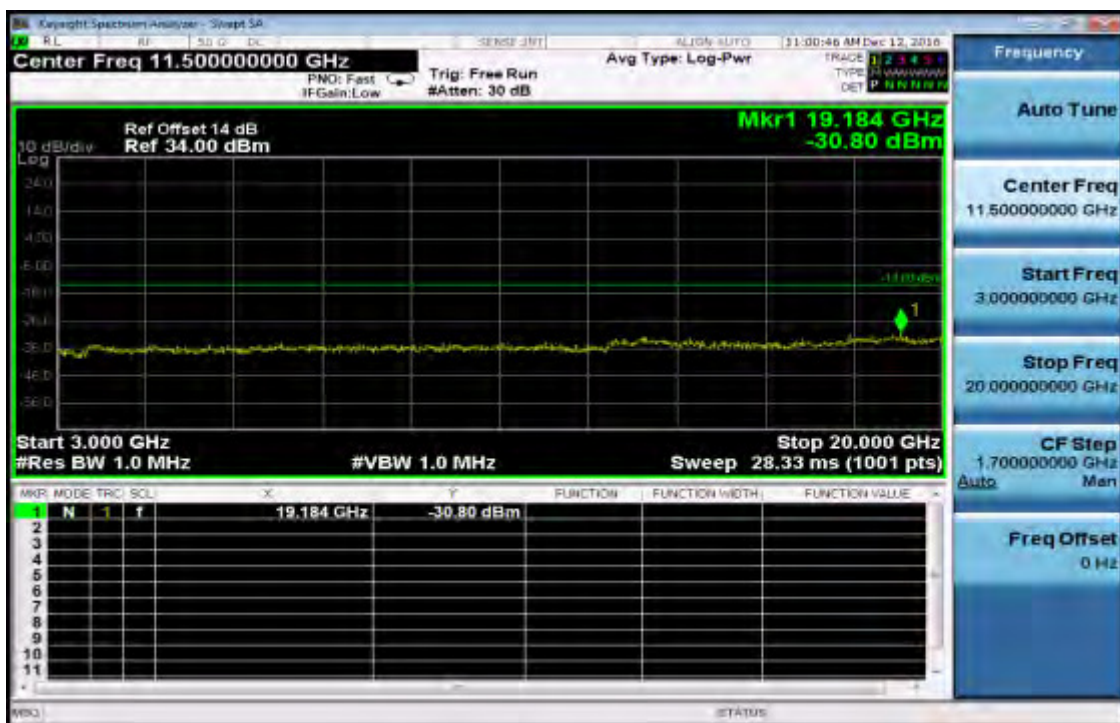
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## Out of Band emission at antenna terminals – GPRS 1900 Channel Lowest



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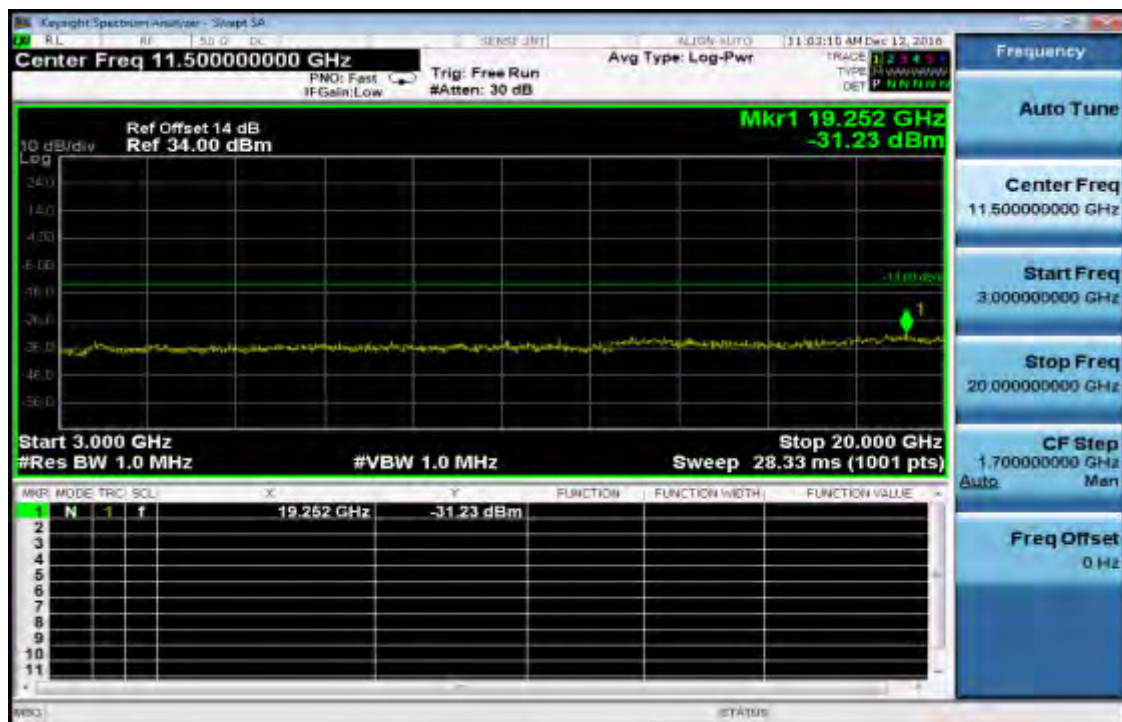
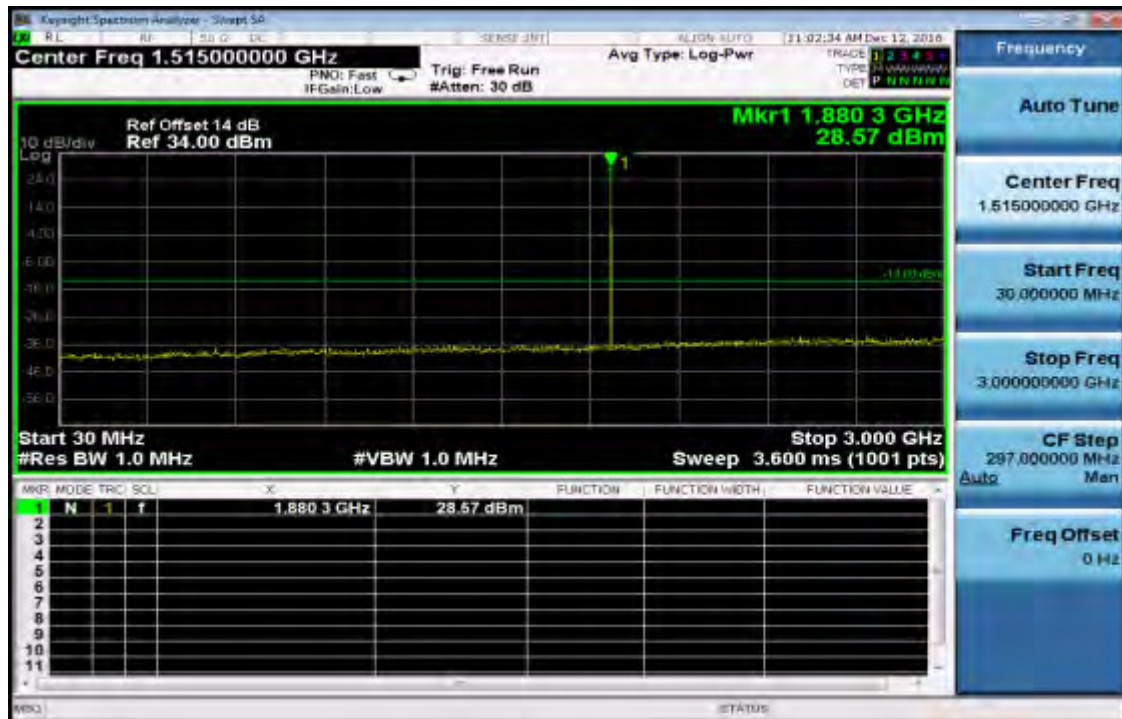
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## Out of Band emission at antenna terminals – GPRS 1900 Channel Mid



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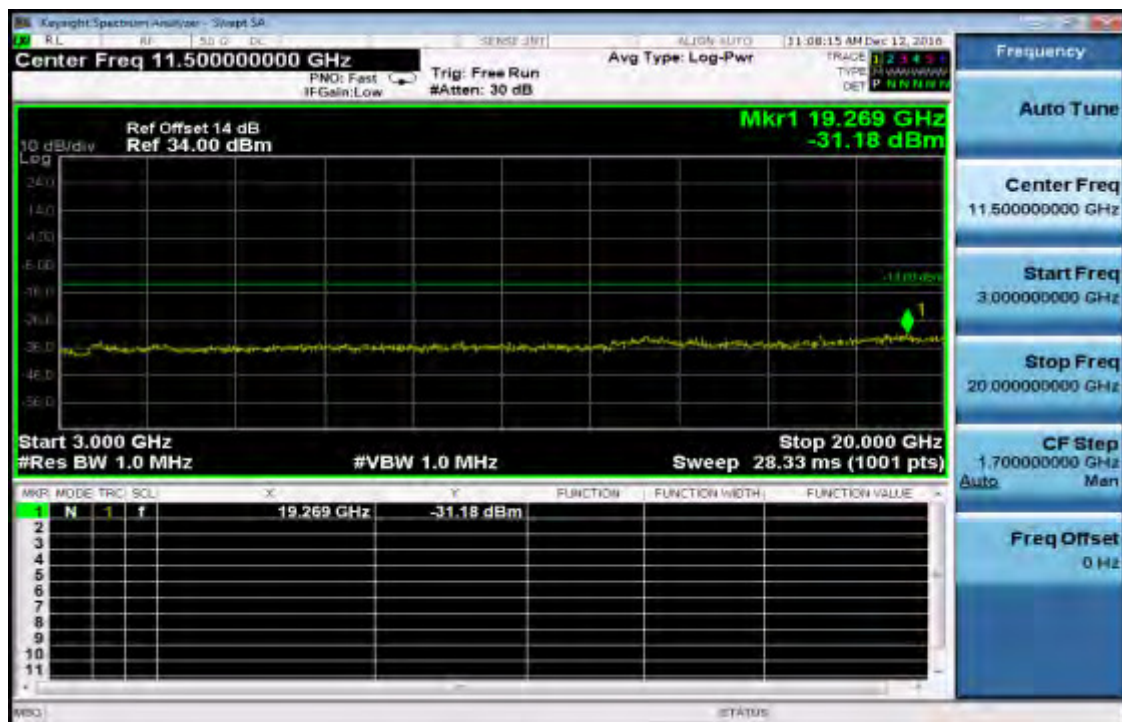
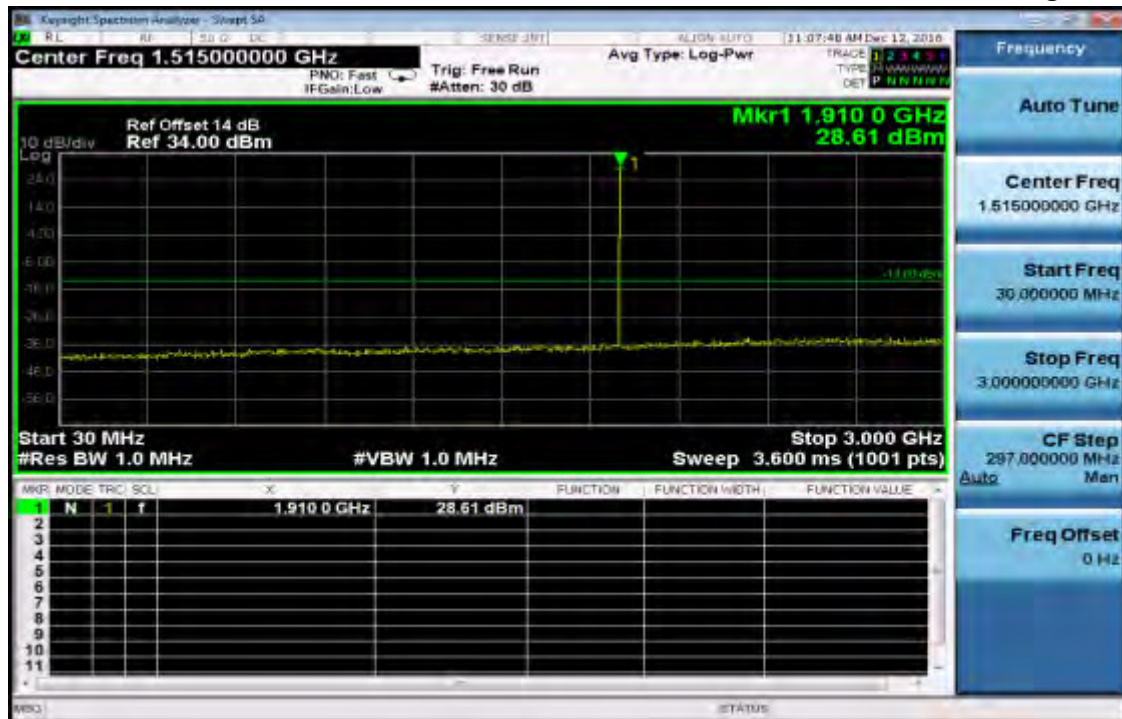
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## Out of Band emission at antenna terminals – GPRS 1900 Channel Highest



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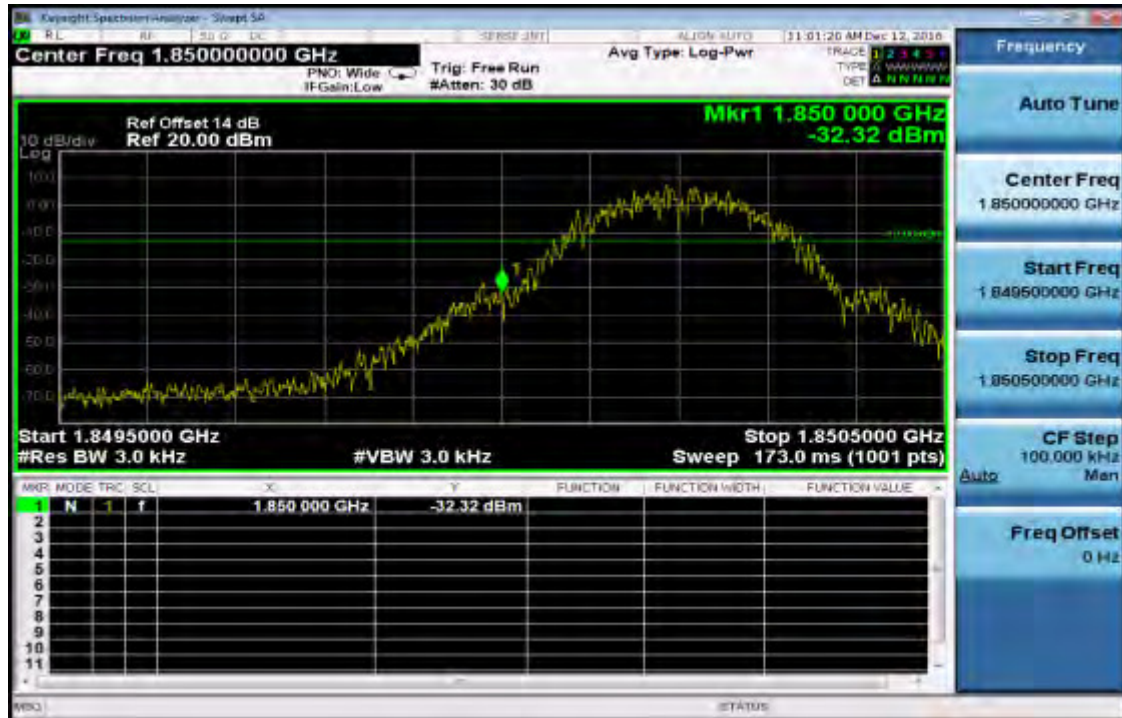
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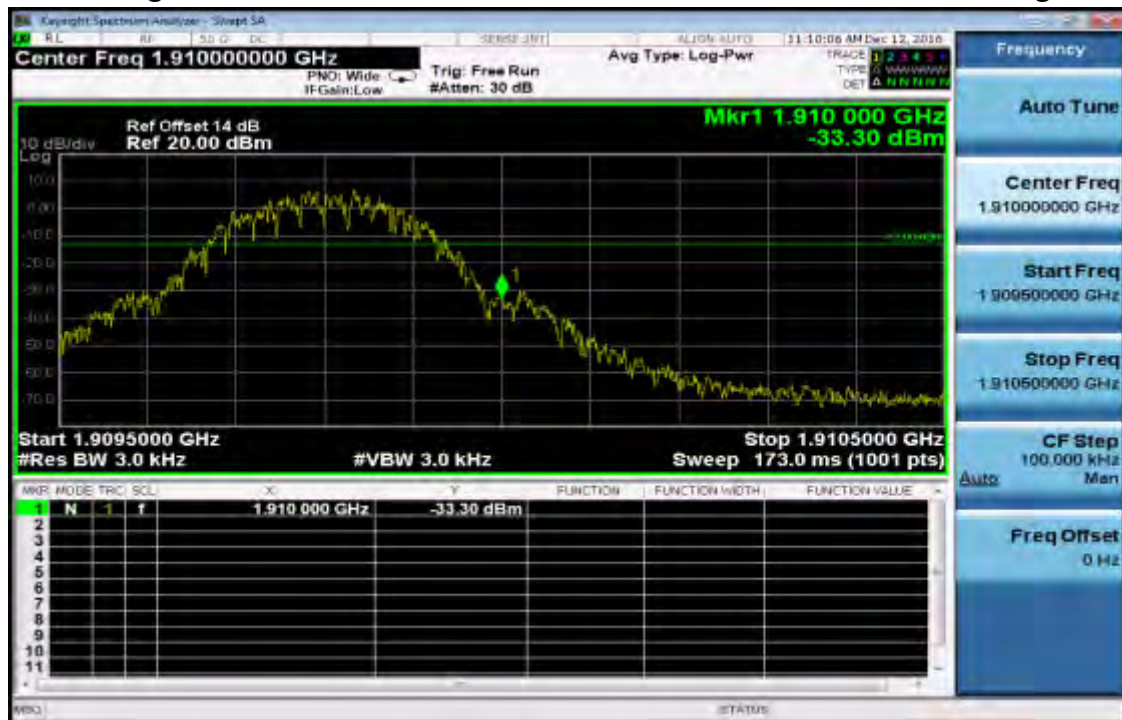
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## Band edge emission at antenna terminals – GPRS 1900 Channel Lowest



## Band edge emission at antenna terminals – GPRS 1900 Channel Highest



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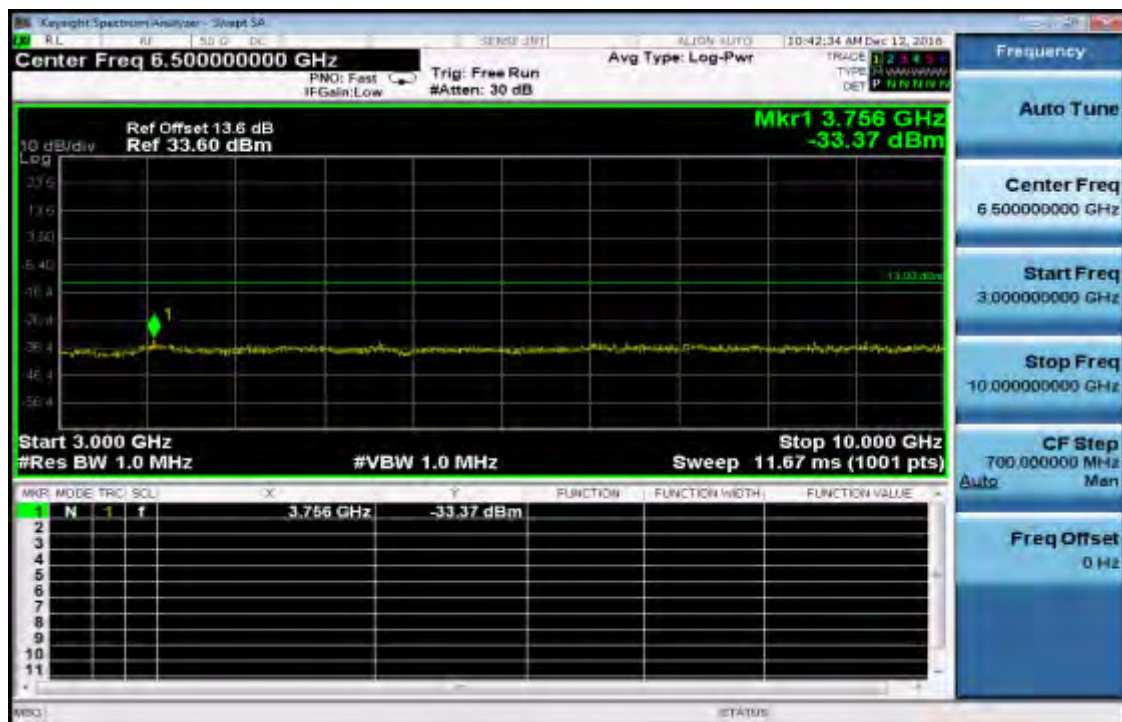
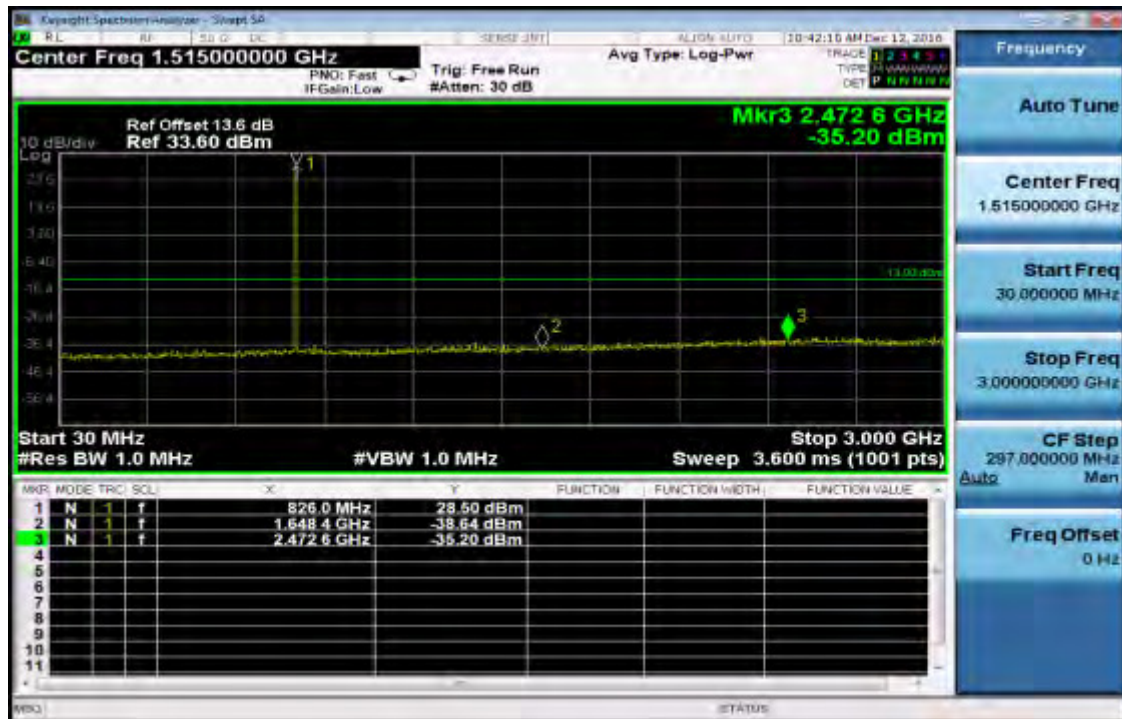
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## Out of Band emission at antenna terminals – EDGE 850 Channel Lowest



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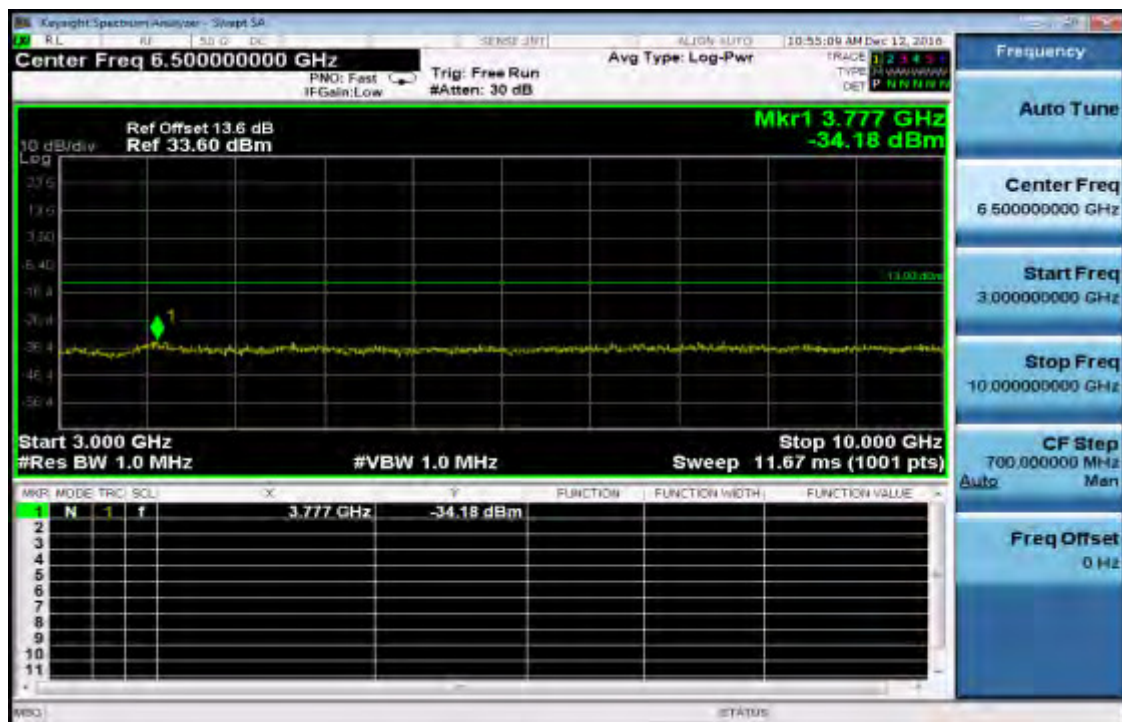
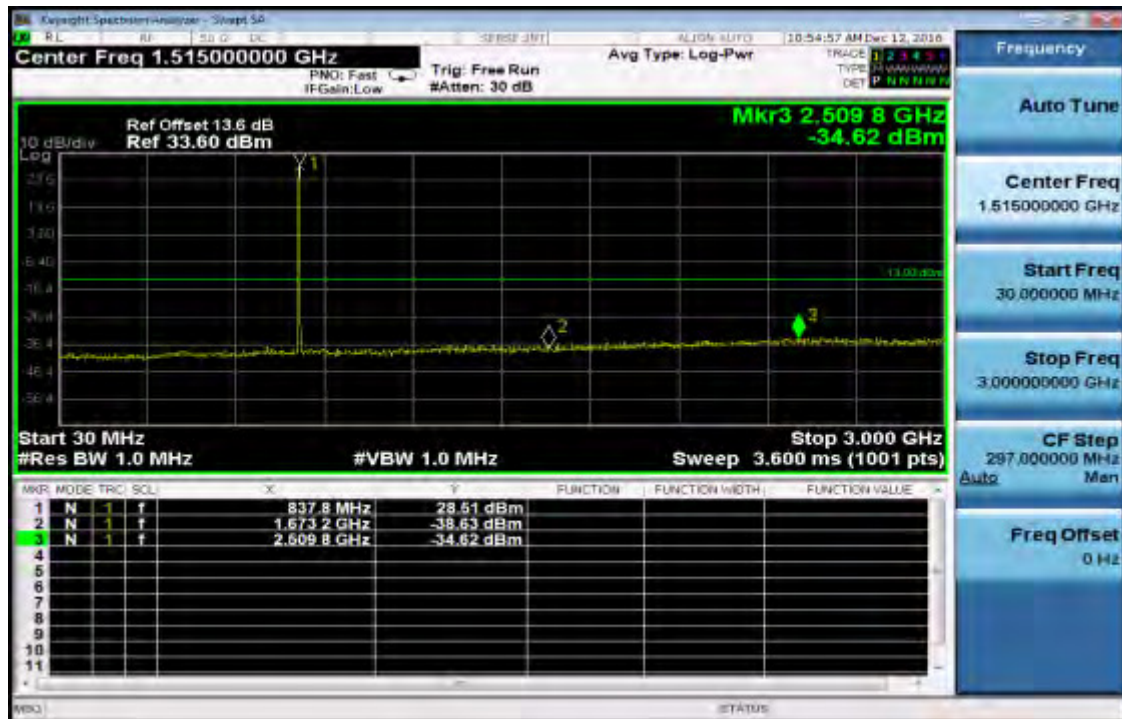
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## Out of Band emission at antenna terminals – EDGE 850 Channel Mid



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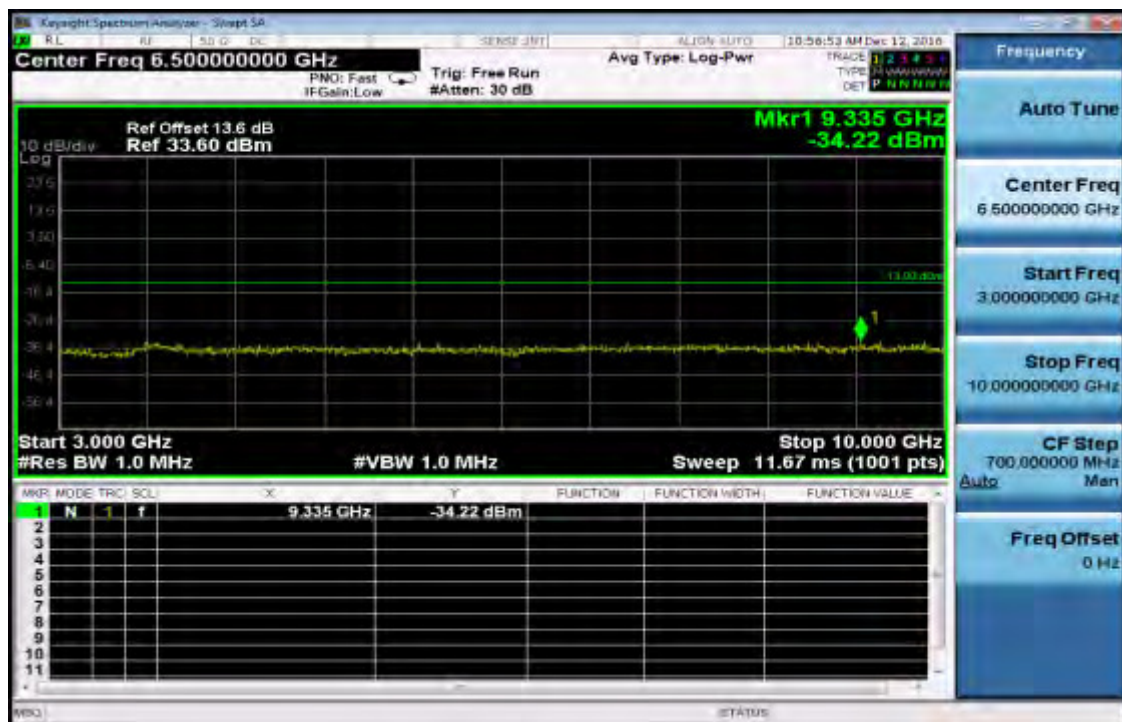
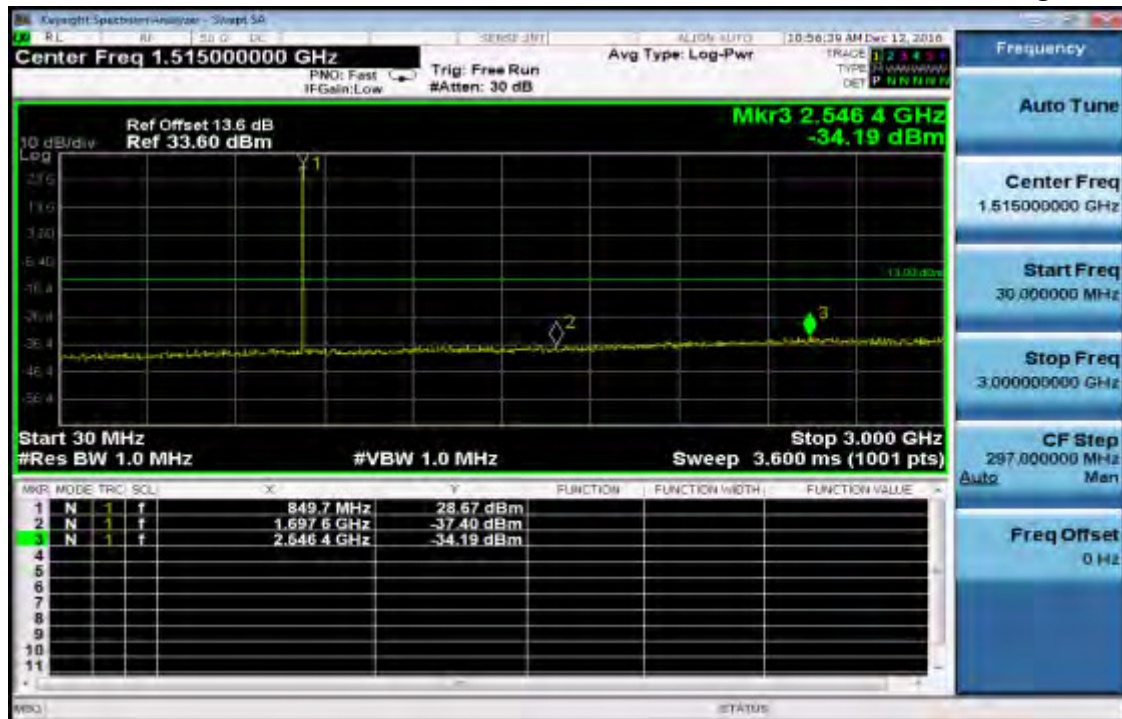
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## Out of Band emission at antenna terminals – EDGE 850 Channel Highest



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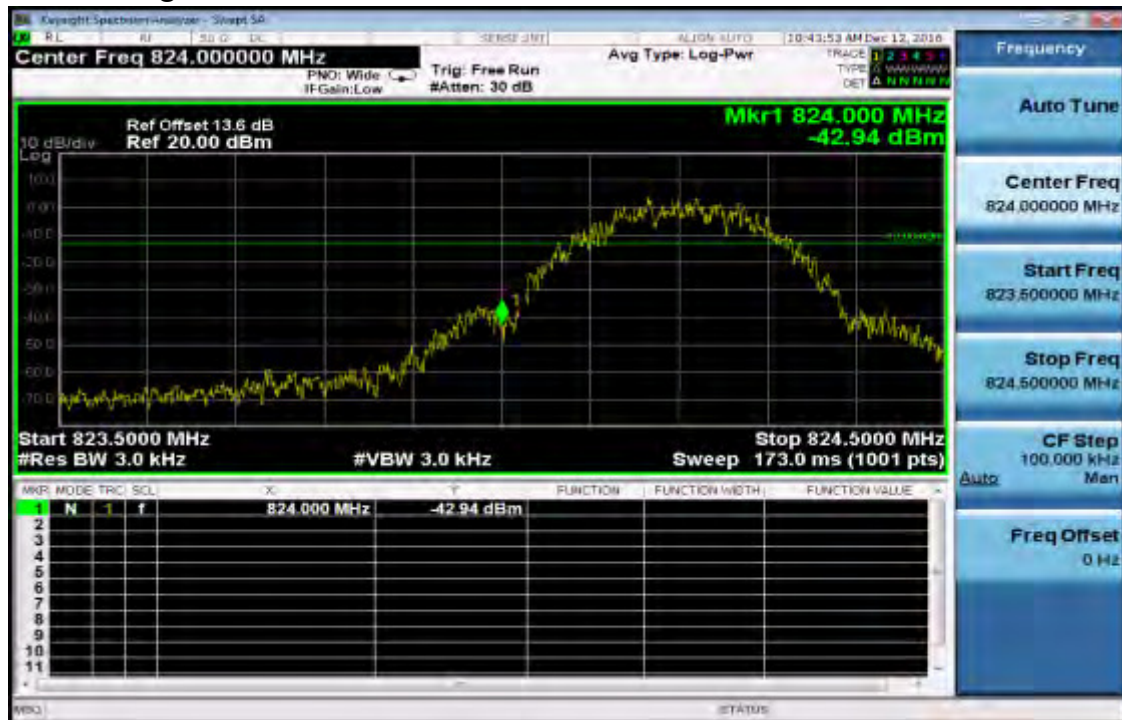
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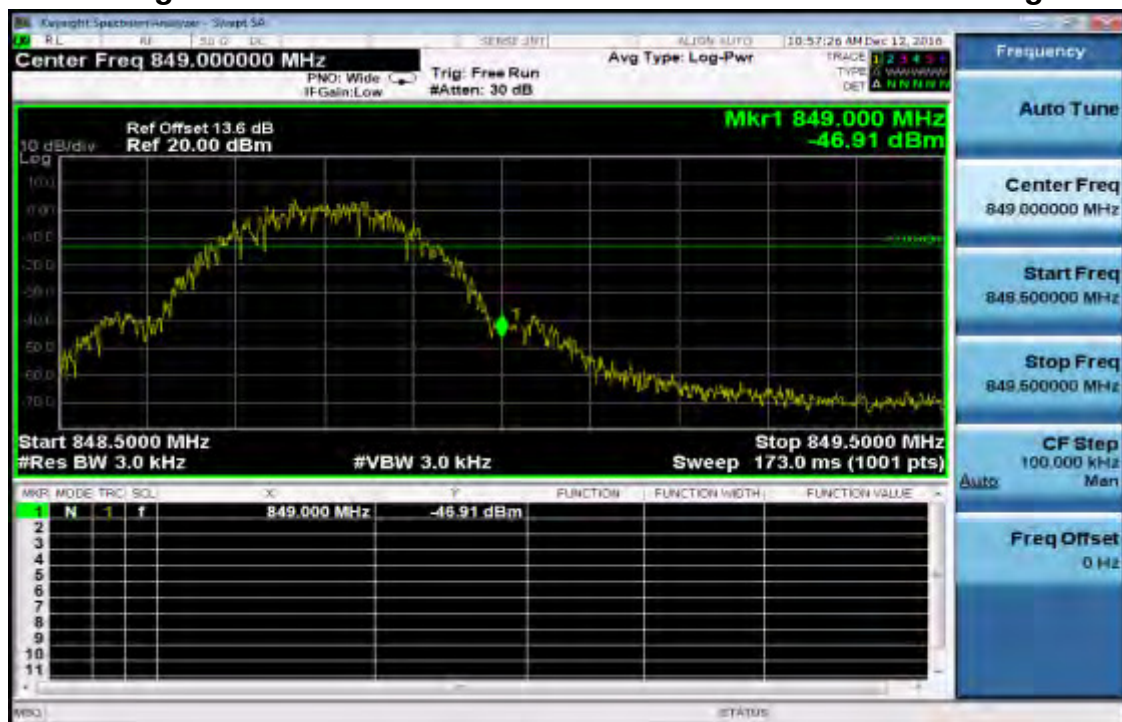
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## Band edge emission at antenna terminals – EDGE 850 Channel Lowest



## Band edge emission at antenna terminals – EDGE 850 Channel Highest



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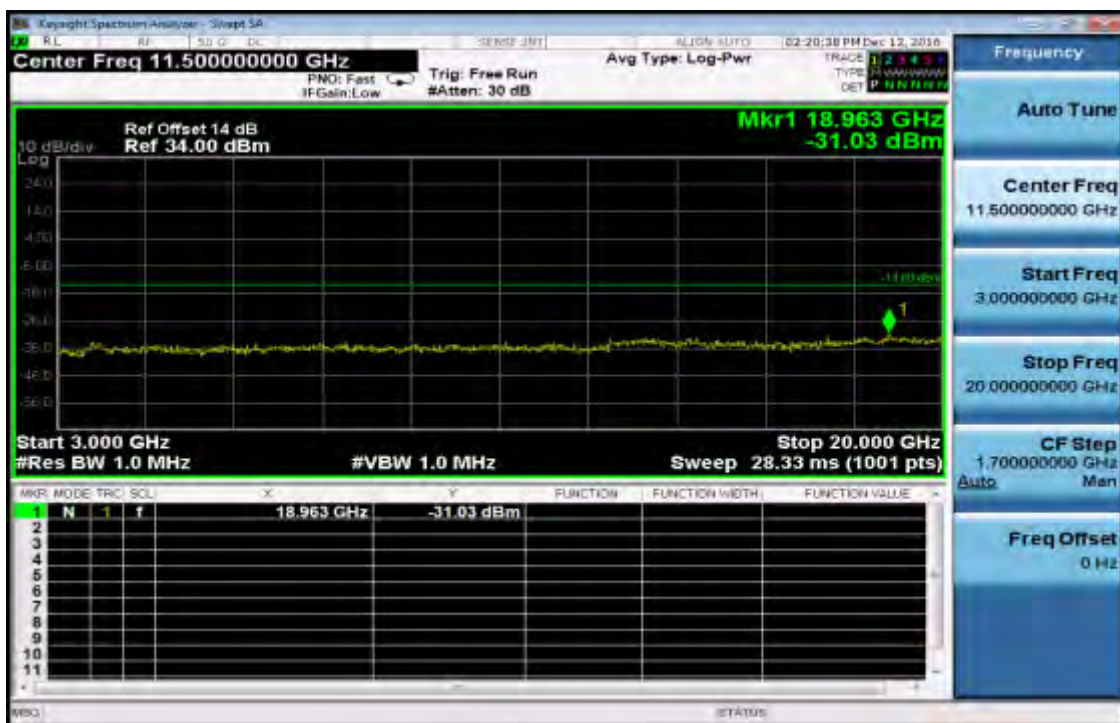
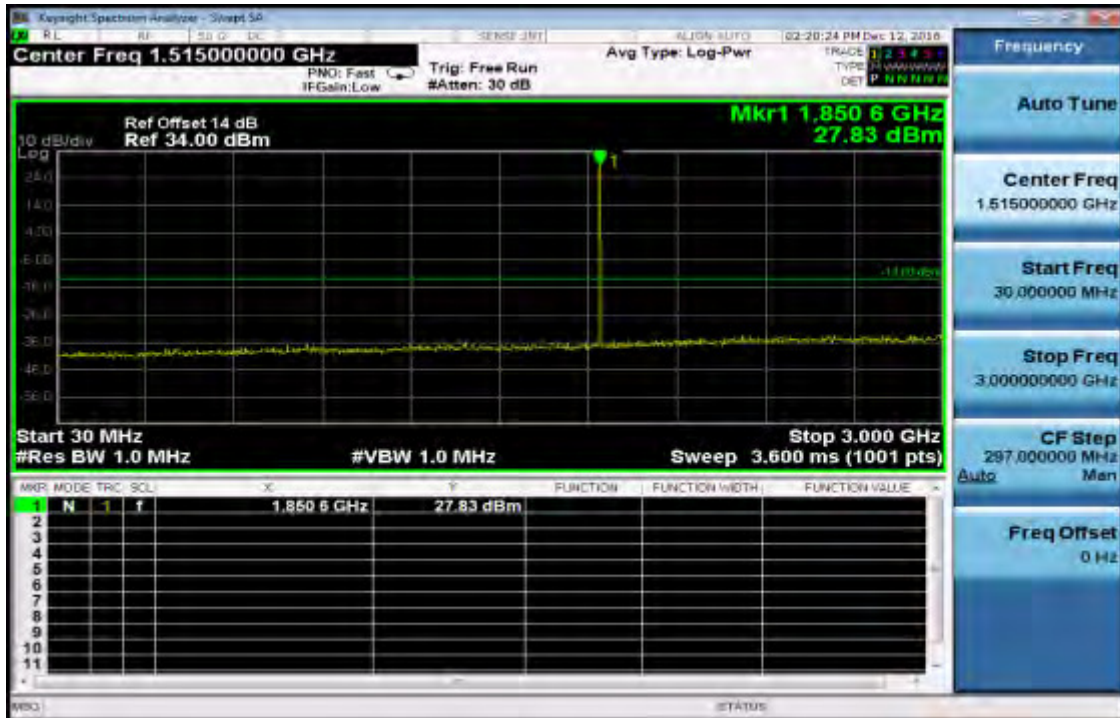
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## Out of Band emission at antenna terminals – EDGE 1900 Channel Lowest



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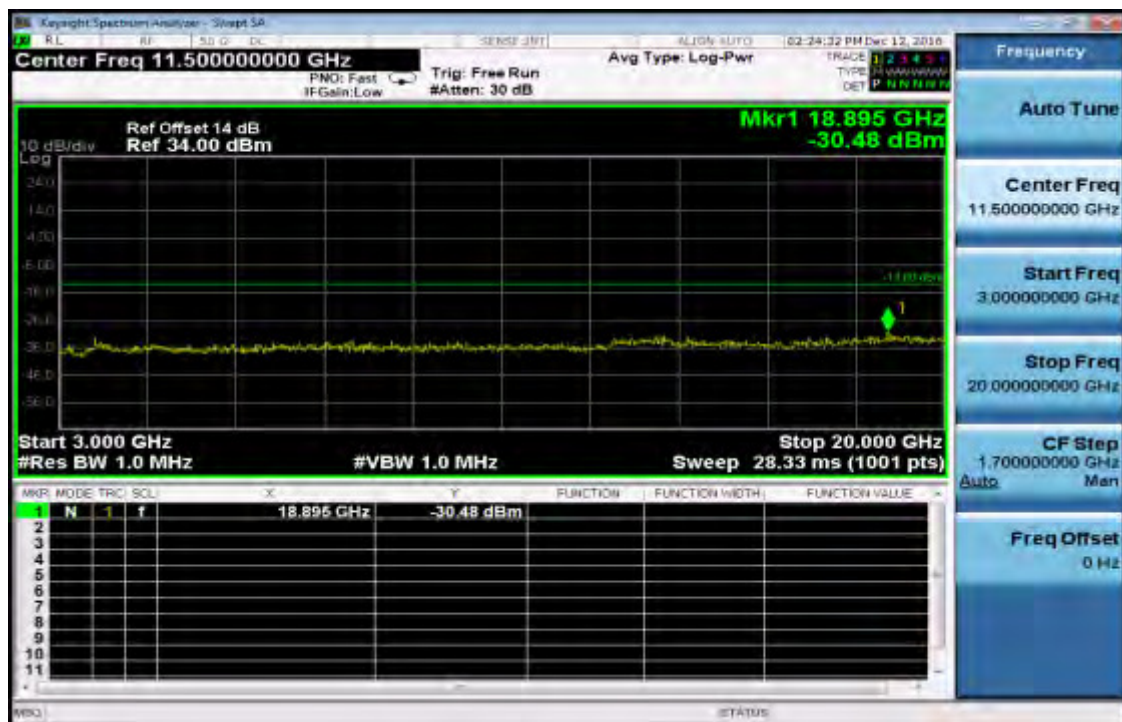
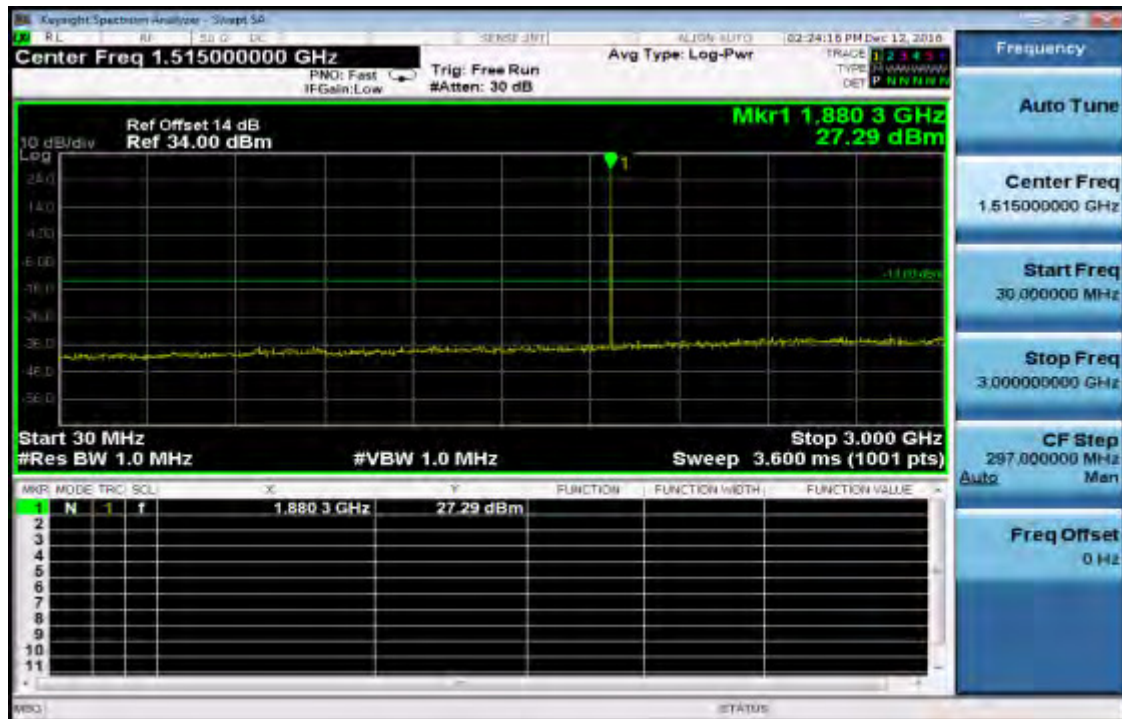
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## Out of Band emission at antenna terminals – EDGE 1900 Channel Mid



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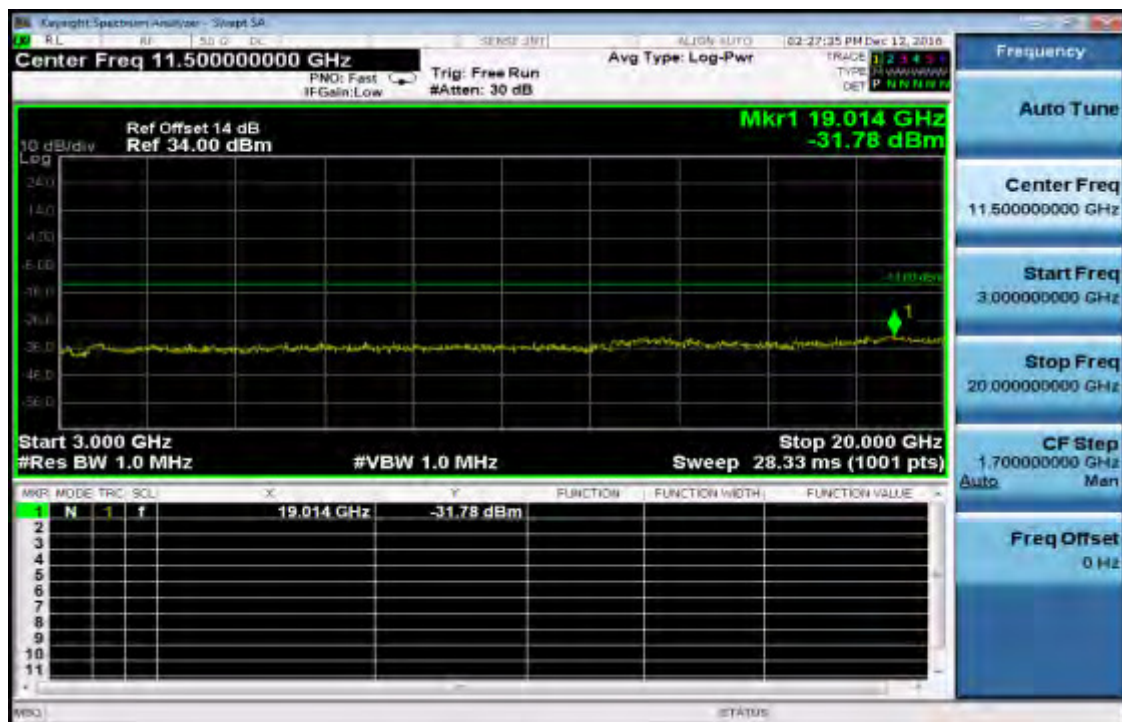
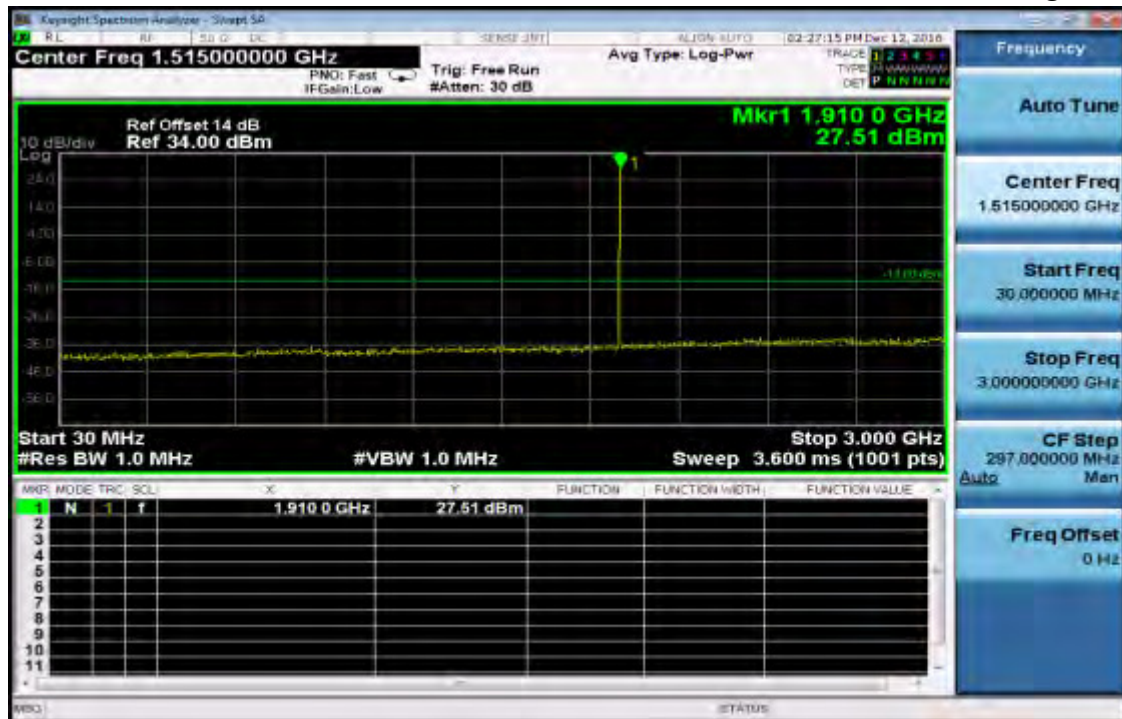
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## Out of Band emission at antenna terminals – EDGE 1900 Channel Highest



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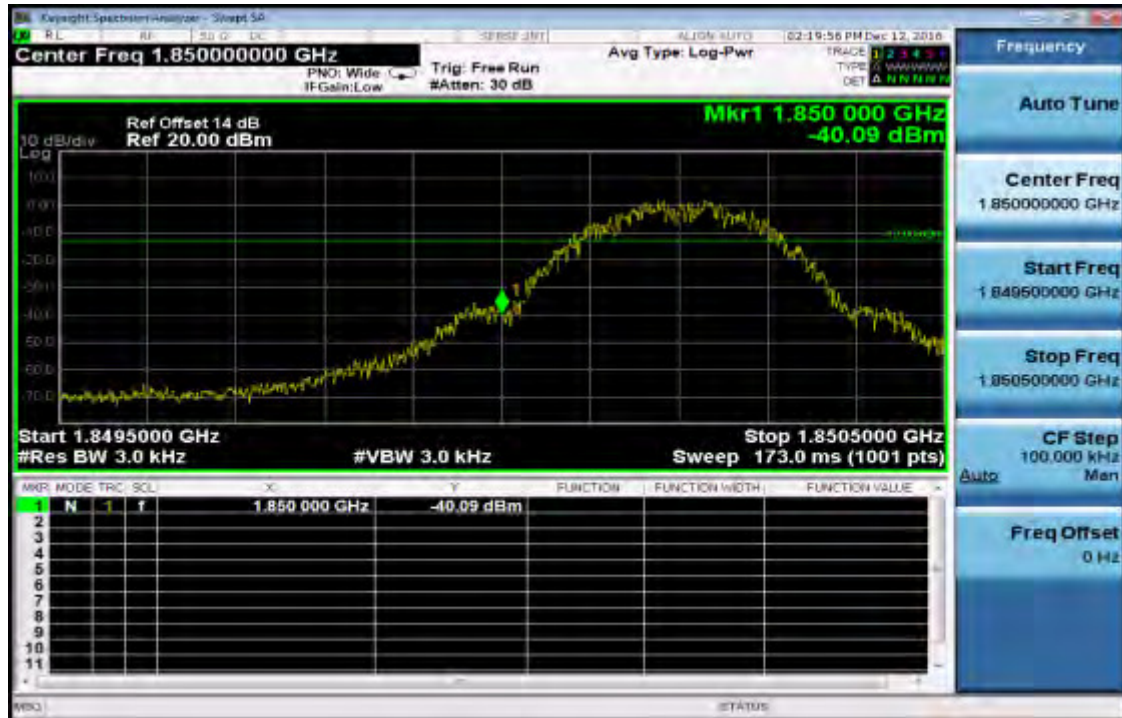
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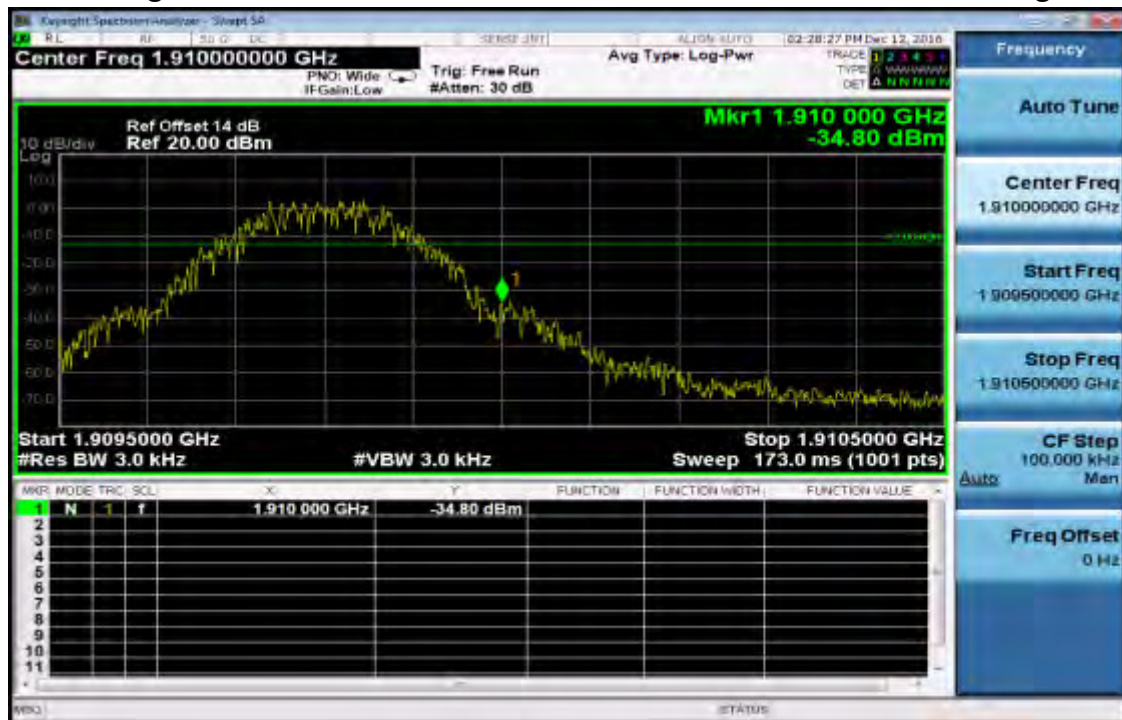
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## Band edge emission at antenna terminals – EDGE 1900 Channel Lowest



## Band edge emission at antenna terminals – EDGE 1900 Channel Highest



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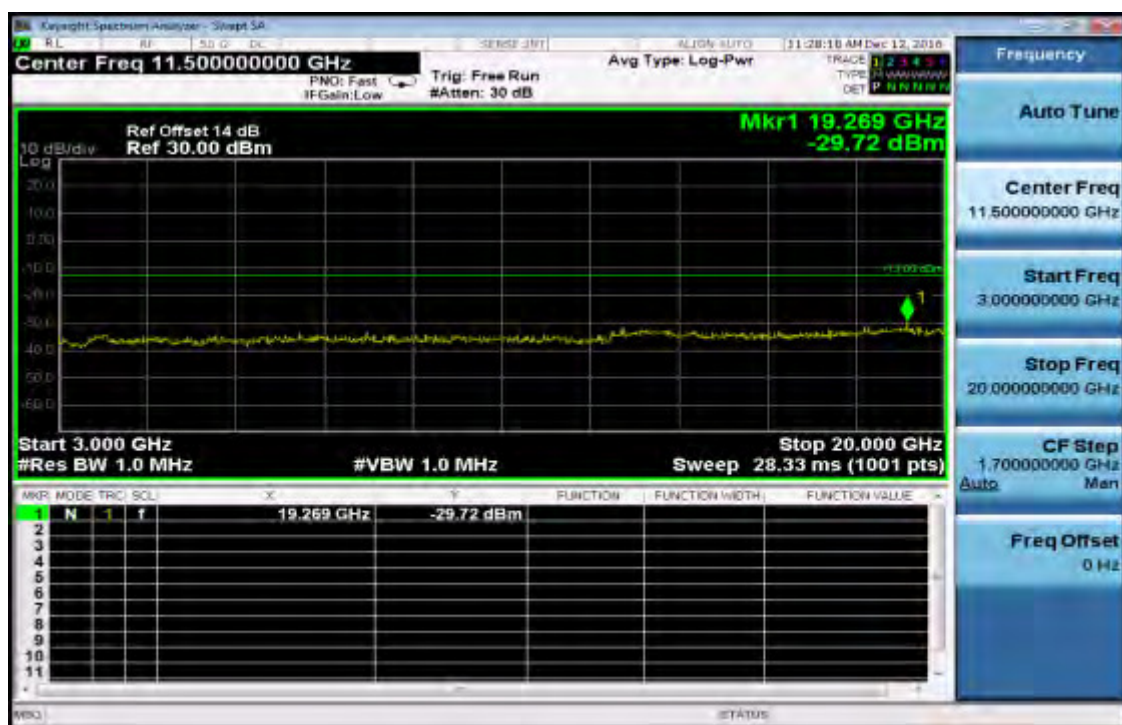
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## Out of Band emission at antenna terminals – HSDPA II Channel Lowest



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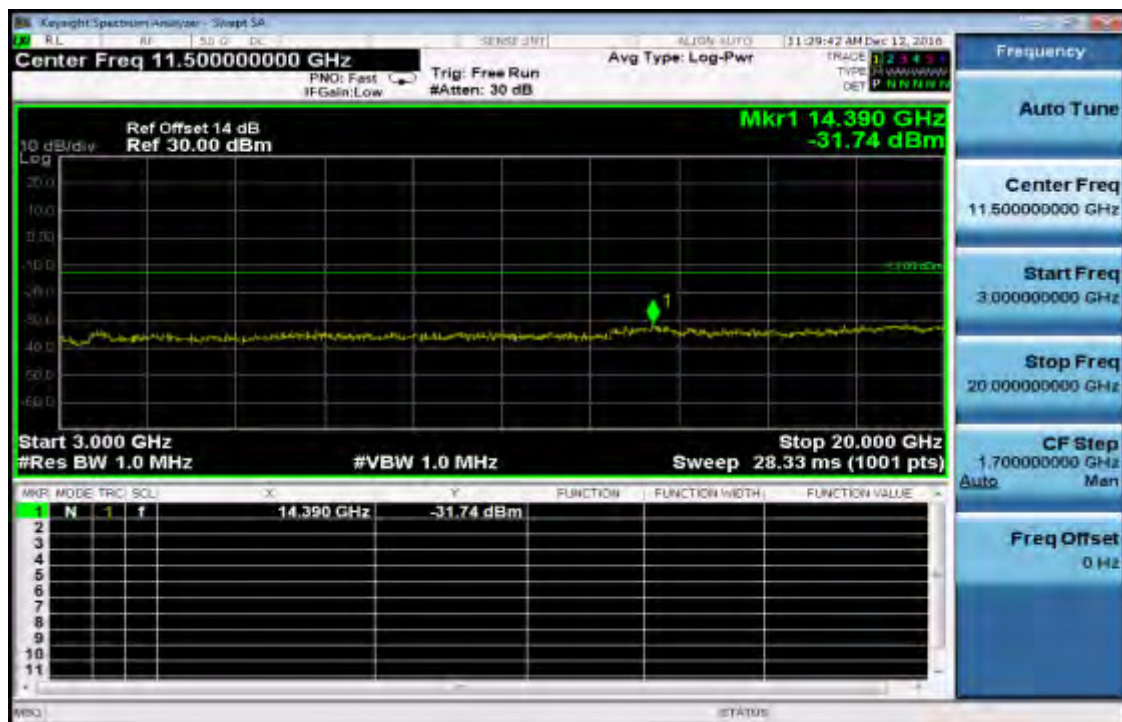
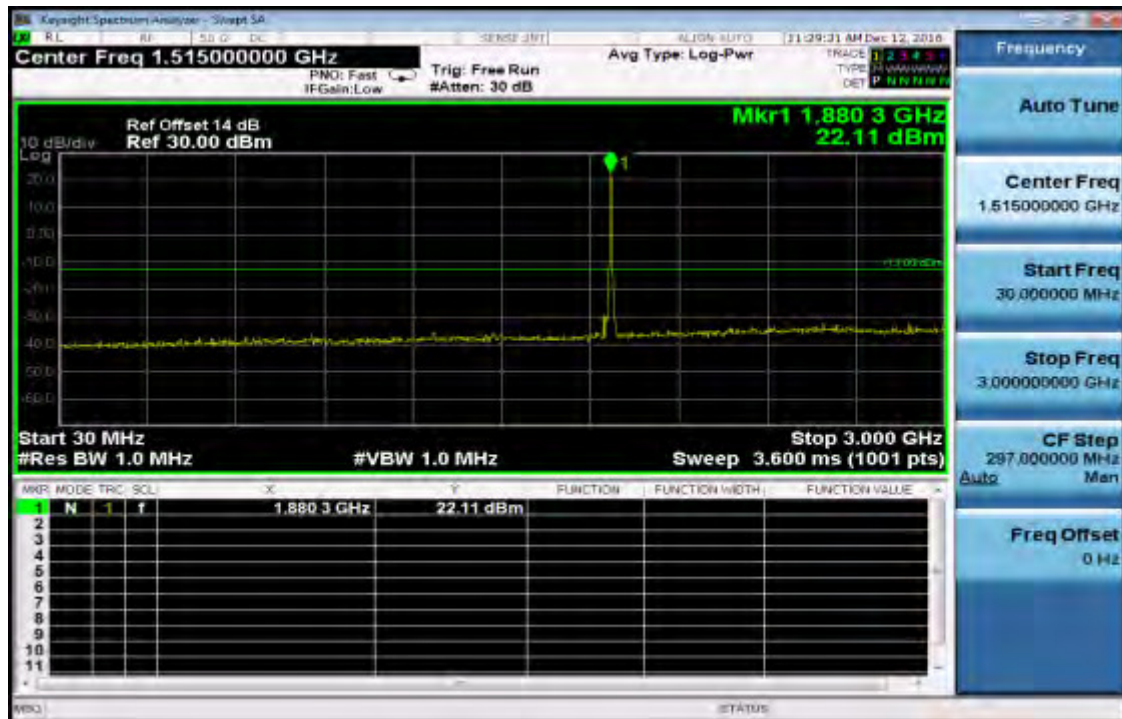
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## Out of Band emission at antenna terminals – HSDPA II Channel Mid



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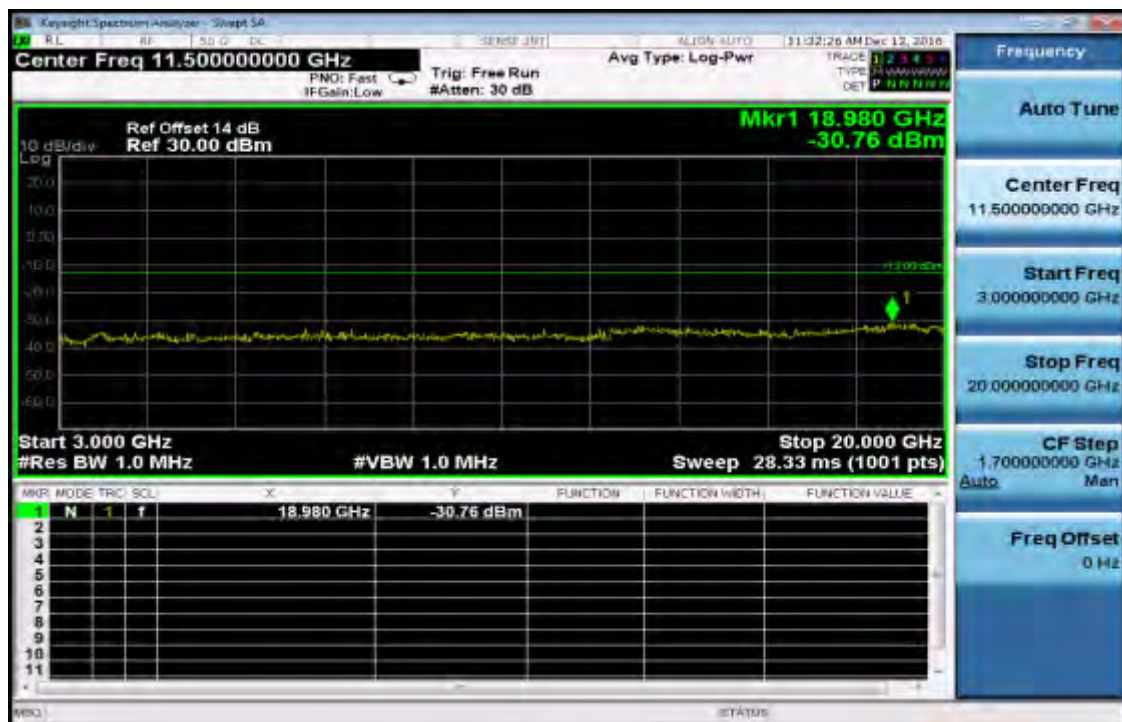
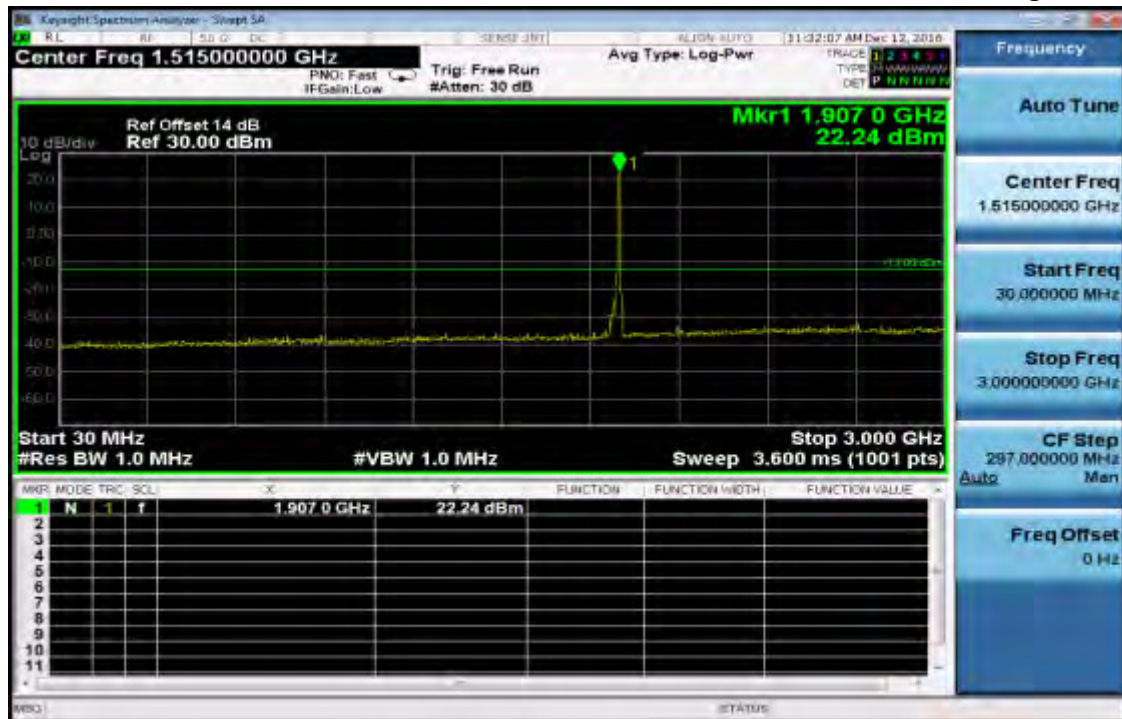
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## Out of Band emission at antenna terminals – HSDPA II Channel Highest



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## Band edge emission at antenna terminals – HSDPA II Channel Lowest



## Band edge emission at antenna terminals – HSDPA II Channel Highest



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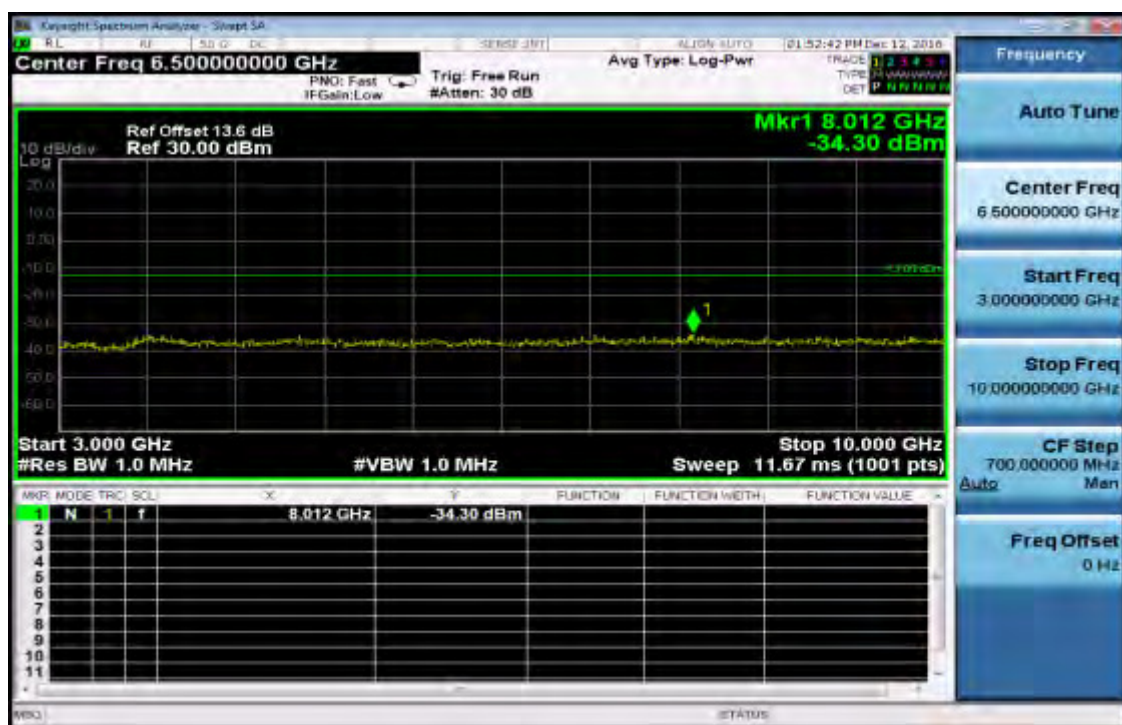
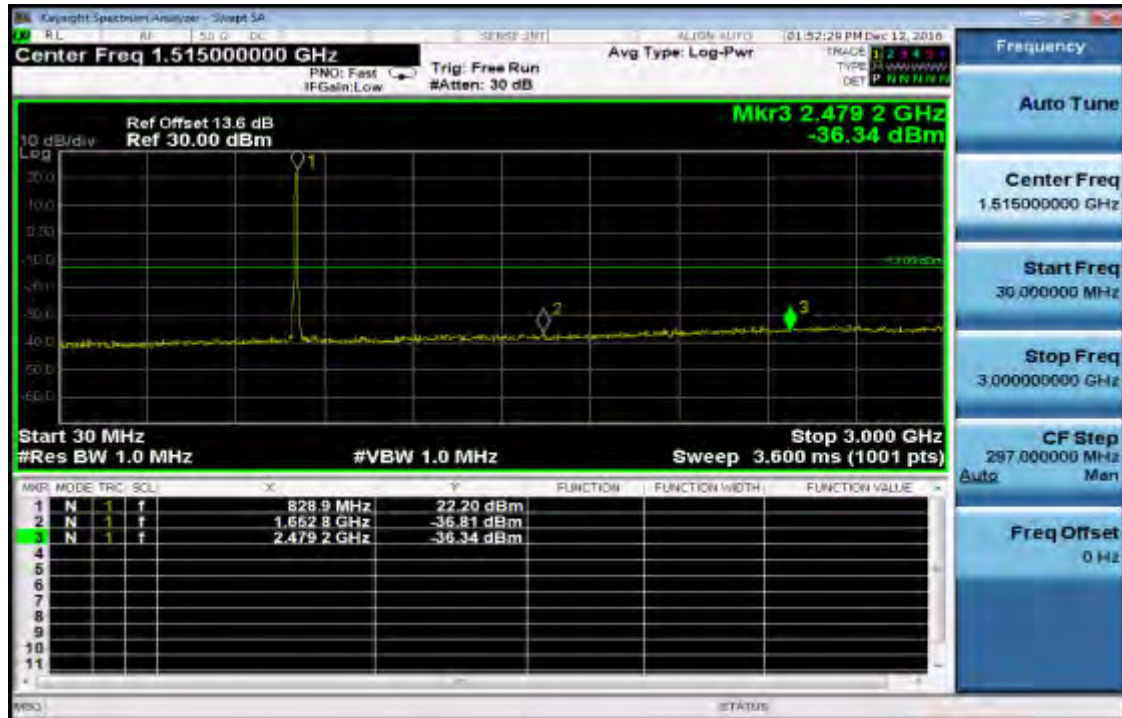
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## Out of Band emission at antenna terminals – HSUPA V Channel Lowest



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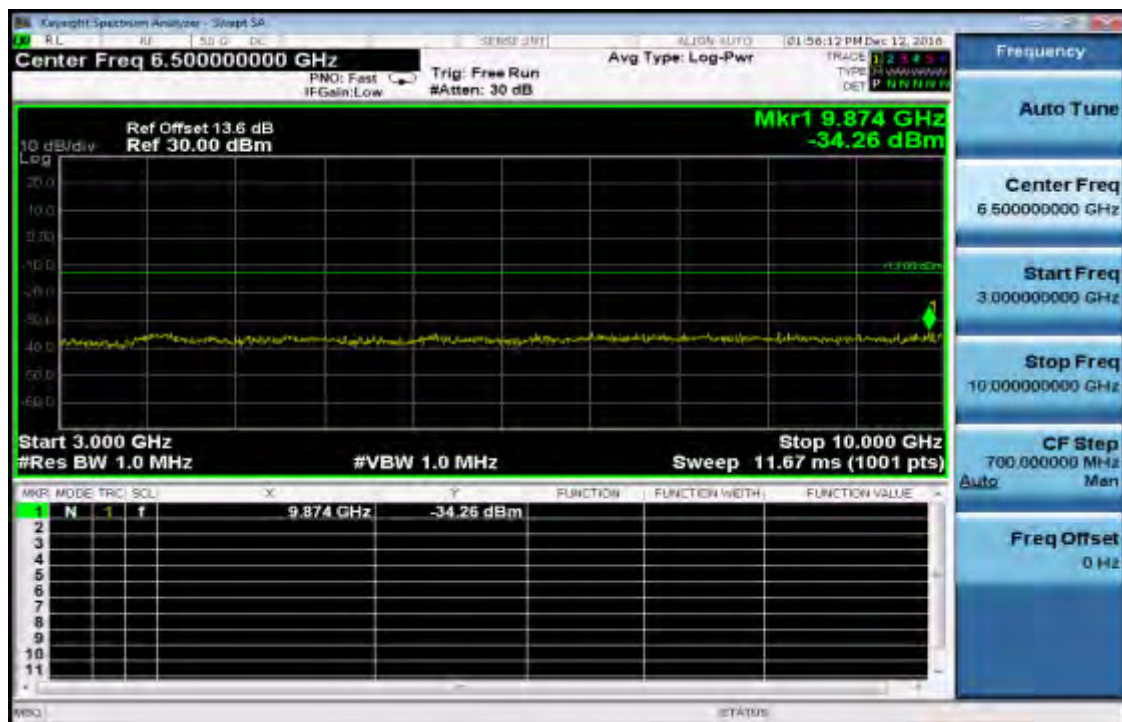
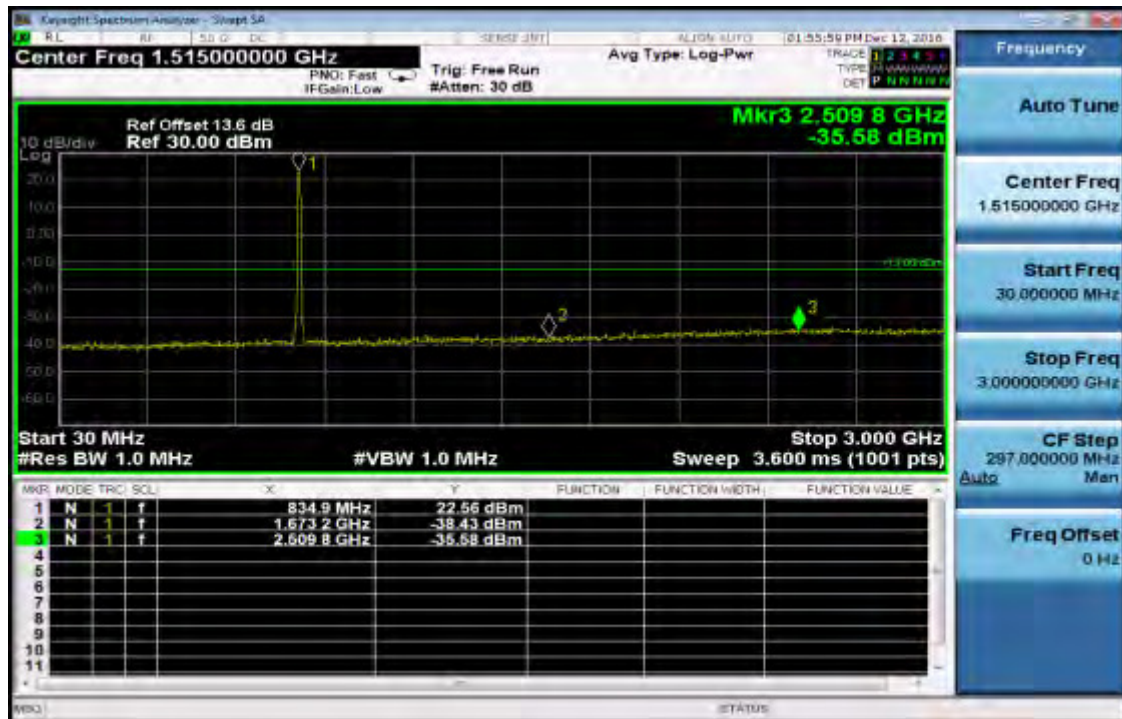
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## Out of Band emission at antenna terminals – HSUPA V Channel Mid



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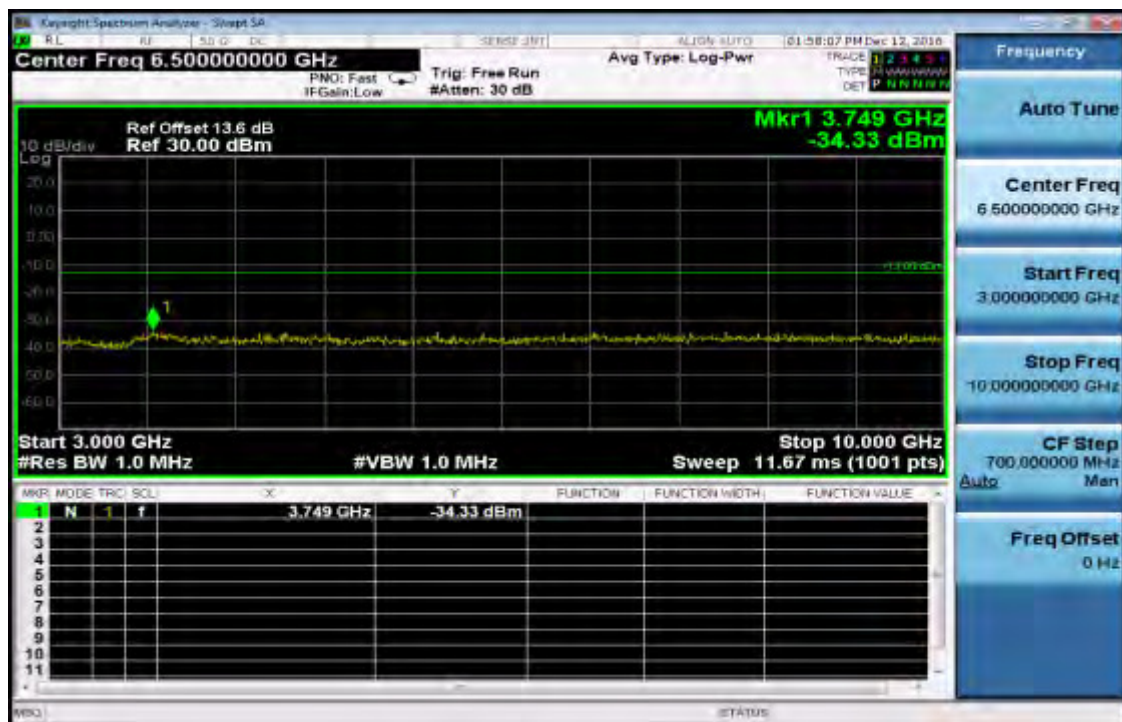
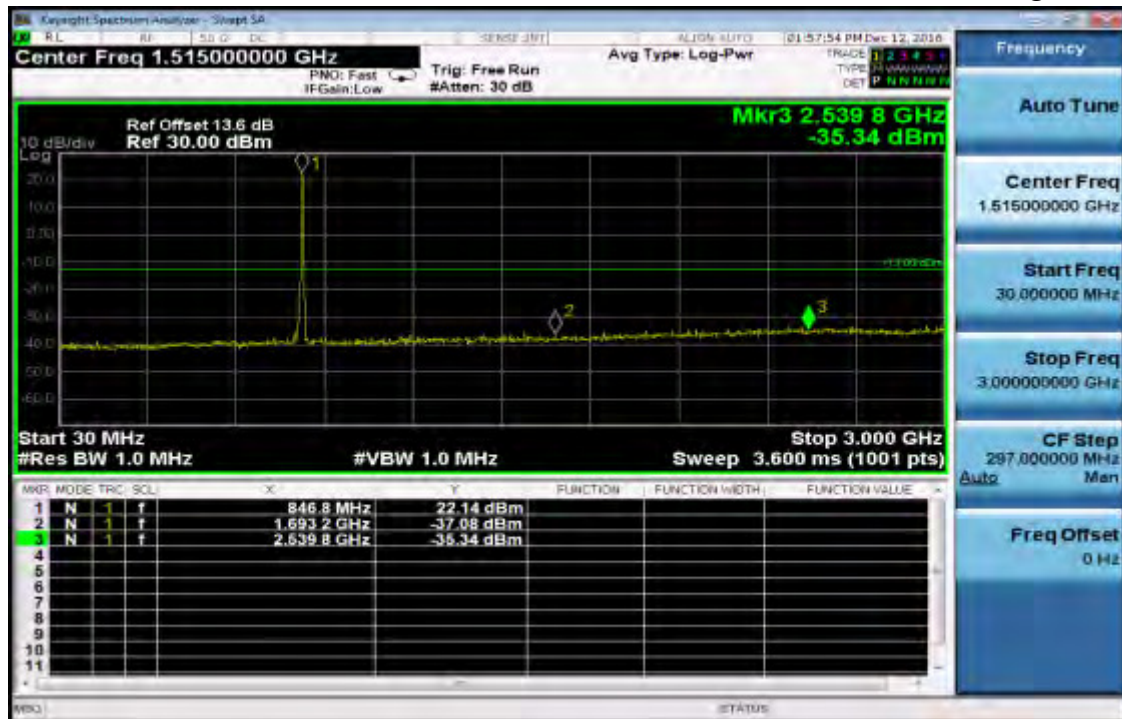
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## Out of Band emission at antenna terminals – HSUPA V Channel Highest



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### Band edge emission at antenna terminals – HSUPA V Channel Lowest



### Band edge emission at antenna terminals – HSUPA V Channel Highest



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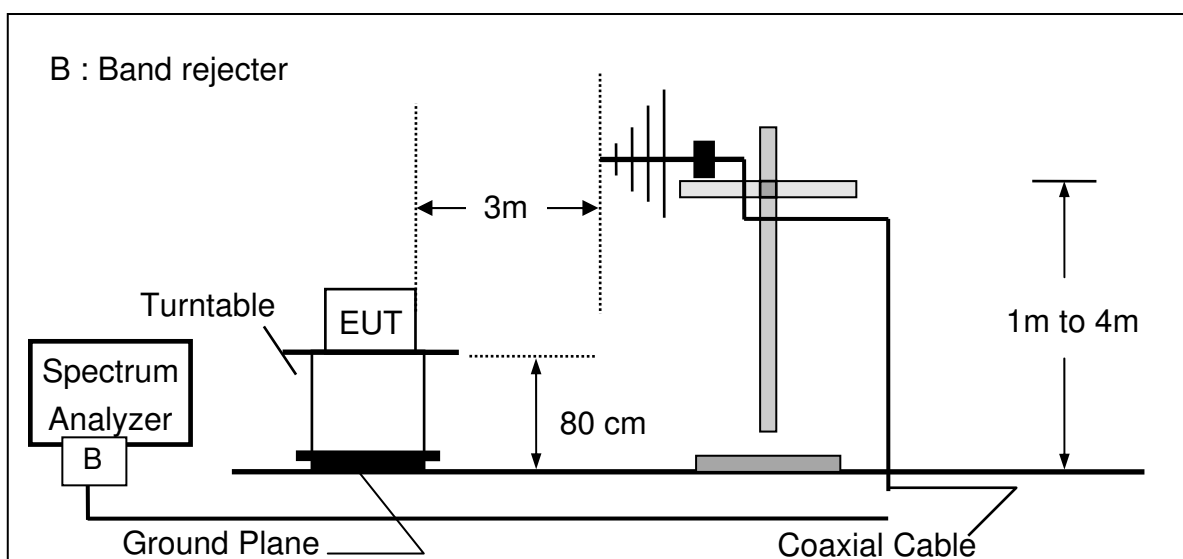
## 10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

### 10.1. Standard Applicable

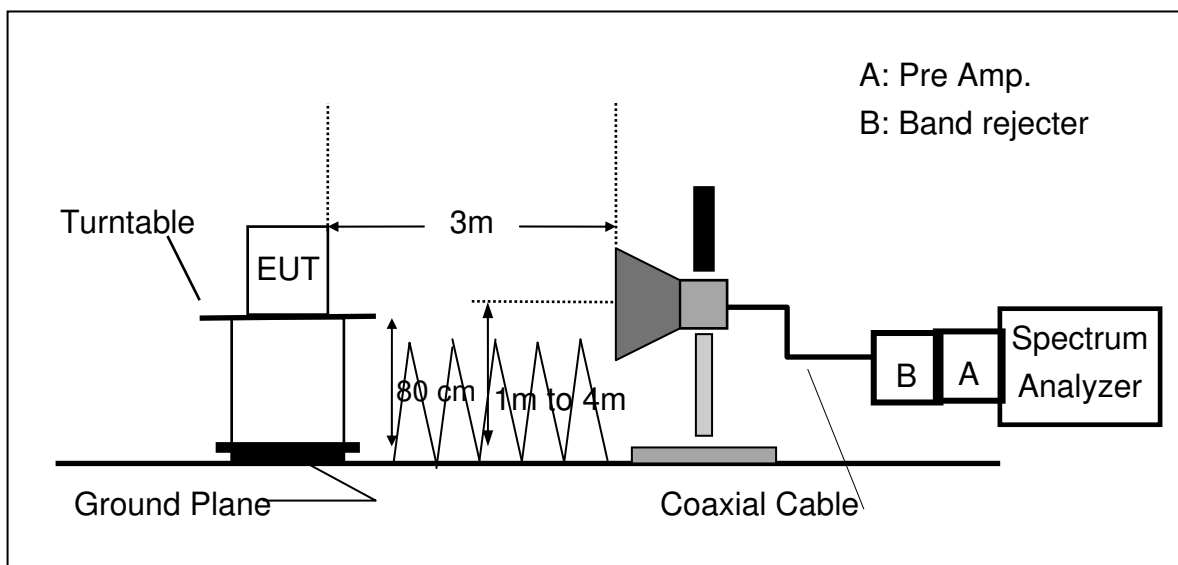
According to FCC §2.1053, FCC §22.917(a), §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than  $43 + 10 \log$  (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

### 10.2. EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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### 10.3. Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$$

$$\text{EIRP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBi)} + \text{Cable Loss(dB)}$$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.  
“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.  
“---” : denotes Noise Floor.

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#### 10.4. Measurement Equipment Used:

| SGS FAC-I                    |               |                 |               |                  |                 |
|------------------------------|---------------|-----------------|---------------|------------------|-----------------|
| Name of Equipment            | Manufacturer  | Model           | Serial Number | Calibration Date | Calibration Due |
| Spectrum Analyzer            | R&S           | FSV-30          | 101398        | 10/05/2016       | 10/04/2017      |
| Bi-log Antenna               | SCHWAZBECK    | VULB9160        | 9160-3158     | 10/28/2016       | 10/27/2017      |
| Bi-log Antenna               | SCHWAZBECK    | VULB9168        | 300           | 12/16/2015       | 12/15/2016      |
| Horn antenna                 | ETS.LINDGREN  | 3117            | 143279        | 11/14/2016       | 11/13/2017      |
| Horn antenna                 | ETS.LINDGREN  | 3117            | 123991        | 12/12/2016       | 12/11/2017      |
| Horn Antenna                 | Schwarzbeck   | BBHA9170        | 184           | 12/12/2016       | 12/11/2017      |
| Horn Antenna                 | Schwarzbeck   | BBHA9170        | 185           | 07/18/2016       | 07/17/2017      |
| Filter 2400-2483.5 MHz       | EWT           | EWT-14-0166     | M1            | 01/02/2016       | 01/01/2017      |
| Pre-Amplifier                | HP            | 8447F           | 3113A06892    | 01/02/2016       | 01/01/2017      |
| Pre-Amplifier                | HP            | 8449B           | 3008A01973    | 01/02/2016       | 01/01/2017      |
| Network Analyze              | Anritsu       | MS4644A         | 1216312       | 05/26/2016       | 05/25/2017      |
| Signal Generator             | Agilent       | E4438C          | MY45093613    | 07/07/2016       | 07/06/2017      |
| Low Loss Cable               | Huber Suhner  | SUCOFLEX 104EPA | 1166TX        | 01/02/2016       | 01/01/2017      |
| Low Loss Cable               | Huber Suhner  | SUCOFLEX 104EPA | 1166RX        | 01/02/2016       | 01/01/2017      |
| Attenuator                   | Mini-Circuit  | BW-S10W2+       | 3             | 01/02/2016       | 01/01/2017      |
| Turn Table                   | HD            | DT420           | N/A           | N.C.R            | N.C.R           |
| Antenna Tower                | HD            | MA240-N         | 240/657       | N.C.R            | N.C.R           |
| Controller                   | HD            | HD100           | N/A           | N.C.R            | N.C.R           |
| Site Cal                     | SGS           | 1166 chamber    | N/A           | 01/02/2016       | 01/01/2017      |
| Filter 800-1000              | Micro-Tronics | EWT             | M1            | 01/02/2016       | 01/01/2017      |
| Filter 1800-2000             | Micro-Tronics | EWT             | M1            | 01/02/2016       | 01/01/2017      |
| 1GHz High Pass Filter        | Micro-Tronics | HPM50108        | 32            | 01/02/2016       | 01/01/2017      |
| 2GHz High Pass Filter        | Micro-Tronics | HPM50110        | 36            | 01/02/2016       | 01/01/2017      |
| Radio Communication Analyzer | Anritsu       | MT8820C         | 6201465317    | 12/10/2016       | 12/09/2017      |

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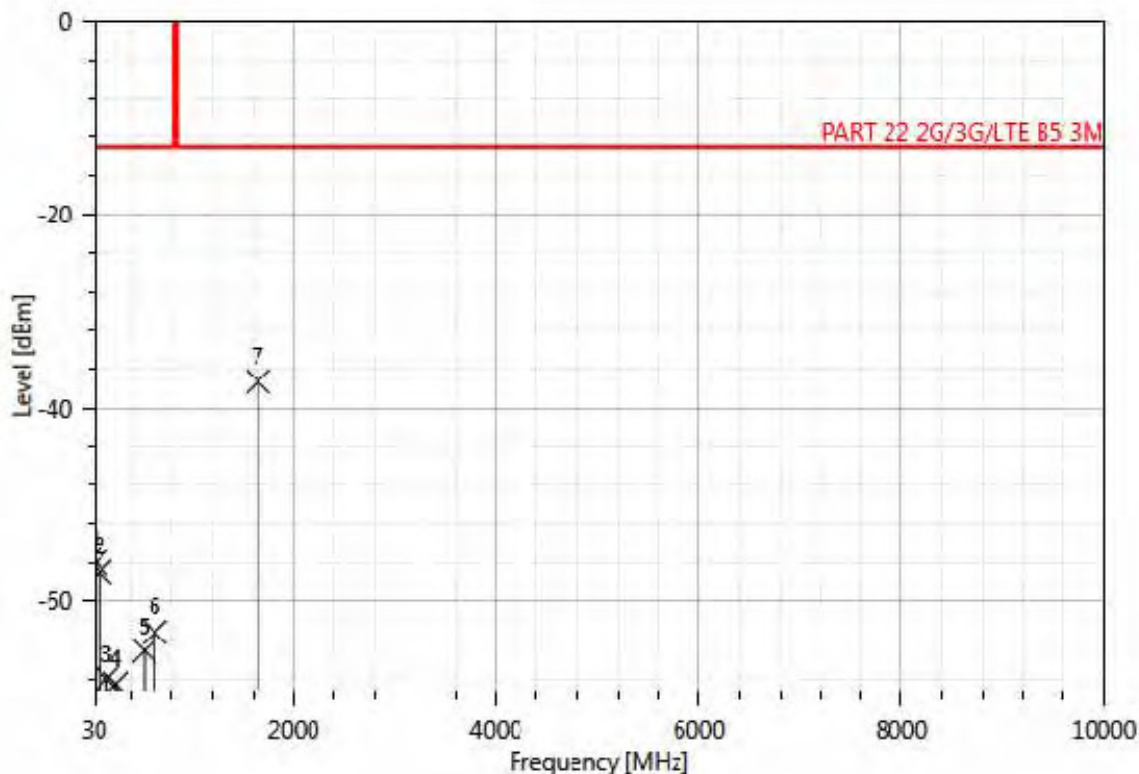
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## 10.5. Measurement Result:

### Radiated Spurious Emission Measurement Result: EDGE 850 Mode

|                         |           |                            |                  |
|-------------------------|-----------|----------------------------|------------------|
| Operation Mode :        | EDGE 850  | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 824.2 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH LOW | Test Engineer :            | Mike             |
| EUT Pol. :              | E1 Plane  | Measurement Antenna Pol. : | VERTICAL         |



| Freq.   | Note    | Decetor  | ERP    | SG Output | Antenna | Cable | Limit  | Margin |
|---------|---------|----------|--------|-----------|---------|-------|--------|--------|
| MHz     | F/H/E/S | Mode     | Level  | Level     | Gain    | Loss  | @3m    |        |
|         |         | QP/AV/PK | dBm    | dBm       | dBd     | dB    | dBm    | dB     |
| 41.64   | S       | Peak     | -55.98 | -42.14    | -12.83  | -1.00 | -13.00 | -42.98 |
| 84.32   | S       | Peak     | -56.93 | -53.97    | -1.78   | -1.18 | -13.00 | -43.93 |
| 156.10  | S       | Peak     | -68.00 | -64.73    | -1.81   | -1.46 | -13.00 | -55.00 |
| 246.31  | S       | Peak     | -68.53 | -70.16    | 3.38    | -1.75 | -13.00 | -55.53 |
| 522.76  | S       | Peak     | -65.12 | -66.44    | 3.73    | -2.42 | -13.00 | -52.12 |
| 628.49  | S       | Peak     | -63.20 | -63.91    | 3.18    | -2.47 | -13.00 | -50.20 |
| 1648.00 | H       | Peak     | -37.27 | -40.16    | 7.11    | -4.22 | -13.00 | -24.27 |

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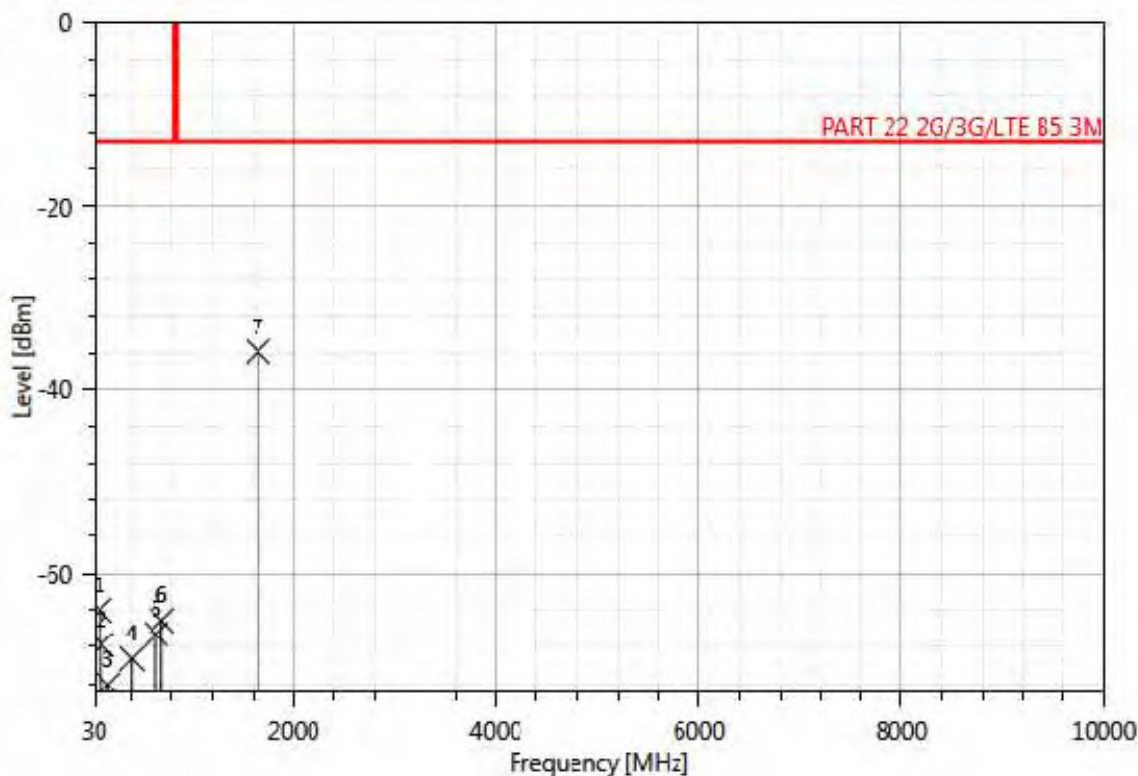
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Operation Mode : EDGE 850      Test Date : 12/14/2016  
Fundamental Frequency : 824.2 MHz      Temp. / Humi. : 21 deg\_C / 62 RH  
Operation Band : Tx CH LOW      Test Engineer : Mike  
EUT Pol. : E1 Plane      Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 85.29        | S               | Peak                        | -64.05              | -61.32                    | -1.54                  | -1.19               | -13.00              | -51.05       |
| 102.75       | S               | Peak                        | -67.76              | -64.63                    | -1.87                  | -1.26               | -13.00              | -54.76       |
| 167.74       | S               | Peak                        | -72.10              | -69.51                    | -1.07                  | -1.51               | -13.00              | -59.10       |
| 401.51       | S               | Peak                        | -69.28              | -70.71                    | 3.82                   | -2.39               | -13.00              | -56.28       |
| 643.04       | S               | Peak                        | -66.61              | -67.34                    | 3.15                   | -2.43               | -13.00              | -53.61       |
| 697.36       | S               | Peak                        | -65.14              | -65.29                    | 3.08                   | -2.93               | -13.00              | -52.14       |
| 1648.00      | H               | Peak                        | -35.85              | -38.73                    | 7.11                   | -4.22               | -13.00              | -22.85       |

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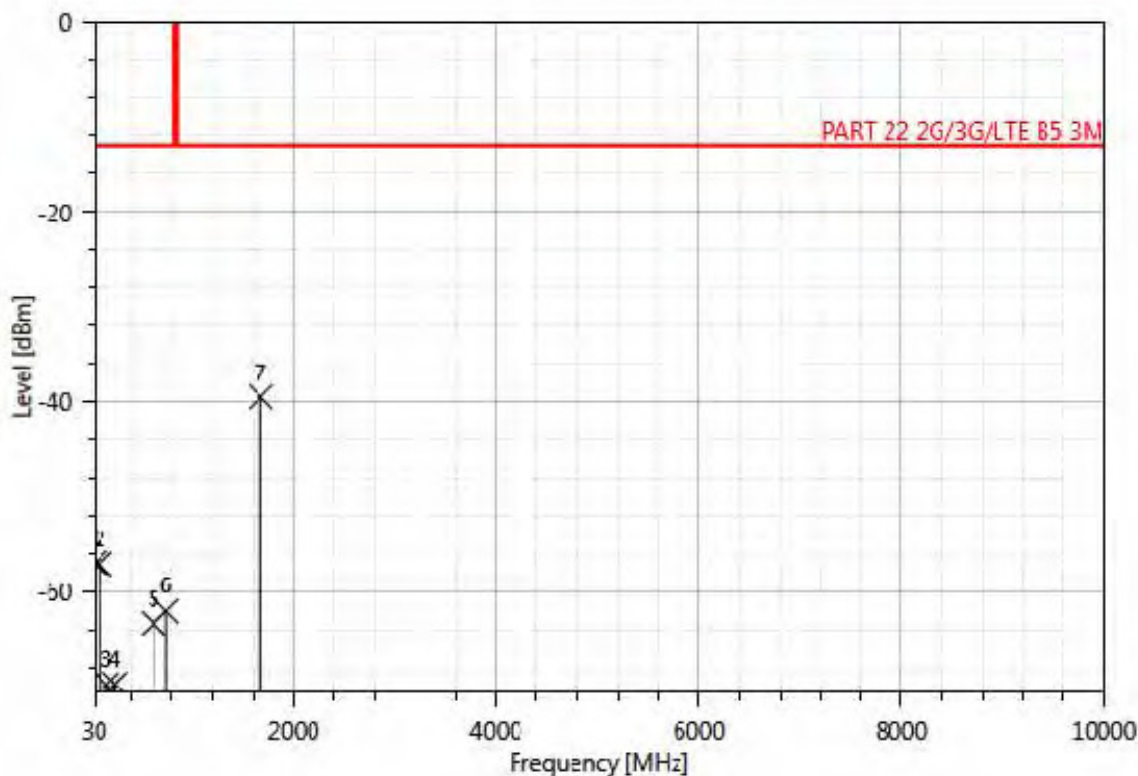
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|                         |           |                            |                  |
|-------------------------|-----------|----------------------------|------------------|
| Operation Mode :        | EDGE 850  | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 836.6 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH MID | Test Engineer :            | Mike             |
| EUT Pol. :              | E1 Plane  | Measurement Antenna Pol. : | VERTICAL         |



| Freq.   | Note    | Decetor  | ERP    | SG Output | Antenna | Cable | Limit  | Margin |
|---------|---------|----------|--------|-----------|---------|-------|--------|--------|
| MHz     | F/H/E/S | Mode     | Level  | Level     | Gain    | Loss  | @3m    |        |
|         |         | QP/AV/PK | dBm    | dBm       | dBd     | dB    | dBm    | dB     |
| 39.70   | S       | Peak     | -56.98 | -42.88    | -13.11  | -0.99 | -13.00 | -43.98 |
| 83.35   | S       | Peak     | -57.14 | -53.94    | -2.01   | -1.18 | -13.00 | -44.14 |
| 154.16  | S       | Peak     | -69.82 | -66.46    | -1.90   | -1.45 | -13.00 | -56.82 |
| 236.61  | S       | Peak     | -69.75 | -71.24    | 3.23    | -1.73 | -13.00 | -56.75 |
| 616.85  | S       | Peak     | -63.35 | -63.98    | 3.21    | -2.58 | -13.00 | -50.35 |
| 742.95  | S       | Peak     | -62.07 | -62.12    | 3.17    | -3.12 | -13.00 | -49.07 |
| 1675.00 | H       | Peak     | -39.51 | -42.42    | 7.20    | -4.29 | -13.00 | -26.51 |

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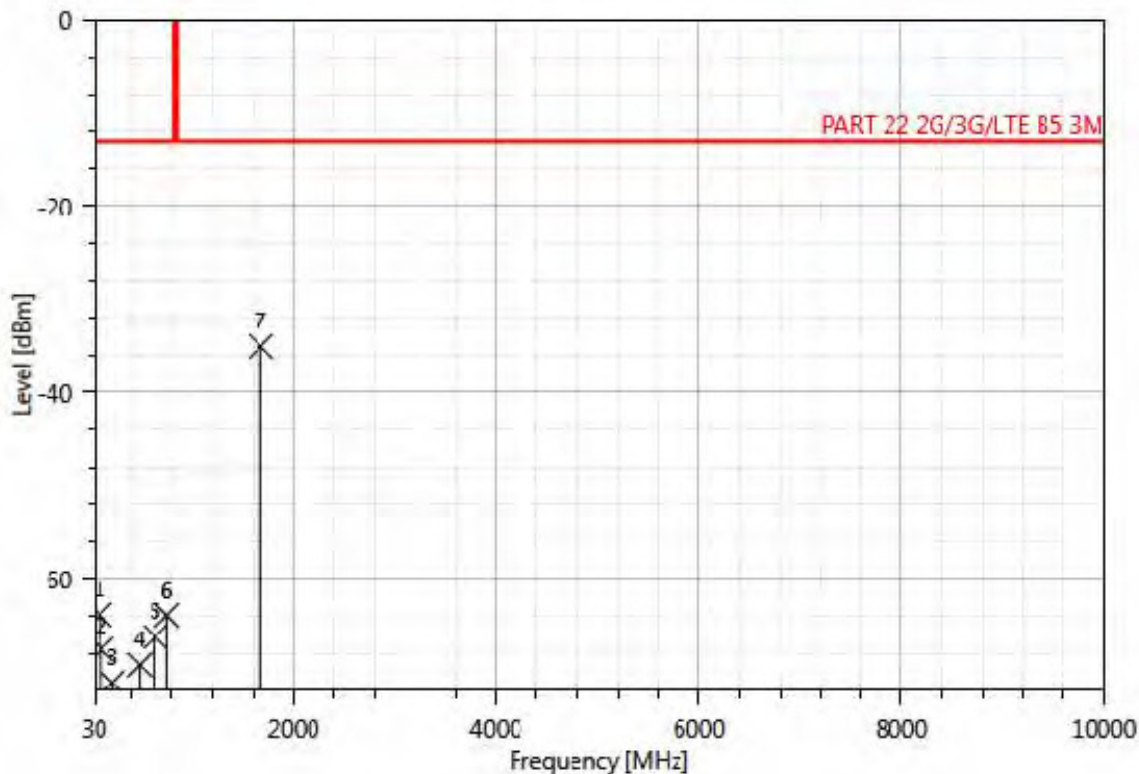
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Operation Mode : EDGE 850  
Fundamental Frequency : 836.6 MHz  
Operation Band : Tx CH MID  
EUT Pol. : E1 Plane

Test Date : 12/14/2016  
Temp. / Humi. : 21 deg\_C / 62 RH  
Test Engineer : Mike  
Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 85.29        | S               | Peak                        | -63.89              | -61.16                    | -1.54                  | -1.19               | -13.00              | -50.89       |
| 102.75       | S               | Peak                        | -67.59              | -64.46                    | -1.87                  | -1.26               | -13.00              | -54.59       |
| 211.39       | S               | Peak                        | -71.16              | -72.98                    | 3.50                   | -1.68               | -13.00              | -58.16       |
| 476.20       | S               | Peak                        | -69.24              | -70.77                    | 3.76                   | -2.23               | -13.00              | -56.24       |
| 631.40       | S               | Peak                        | -66.25              | -66.96                    | 3.18                   | -2.46               | -13.00              | -53.25       |
| 749.74       | S               | Peak                        | -63.93              | -64.04                    | 3.18                   | -3.08               | -13.00              | -50.93       |
| 1675.00      | H               | Peak                        | -35.06              | -37.97                    | 7.20                   | -4.29               | -13.00              | -22.06       |

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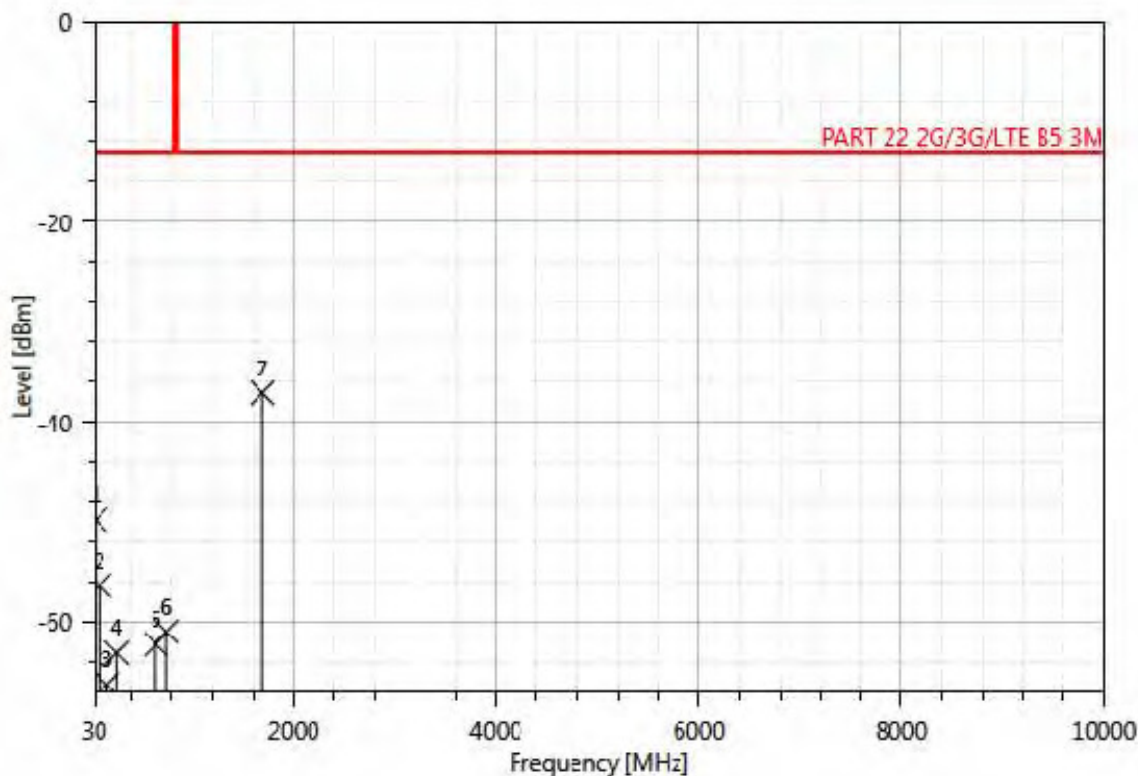
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Operation Mode : EDGE 850      Test Date : 12/14/2016  
Fundamental Frequency : 848.8 MHz      Temp. / Humi. : 21 deg\_C / 62 RH  
Operation Band : Tx CH HIGH      Test Engineer : Mike  
EUT Pol. : E1 Plane      Measurement Antenna Pol. : VERTICAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 41.64        | S               | Peak                        | -49.76              | -35.92                    | -12.83                 | -1.00               | -13.00              | -36.76       |
| 81.41        | S               | Peak                        | -56.36              | -52.69                    | -2.50                  | -1.17               | -13.00              | -43.36       |
| 157.07       | S               | Peak                        | -66.27              | -63.04                    | -1.77                  | -1.46               | -13.00              | -53.27       |
| 255.04       | S               | Peak                        | -63.12              | -64.92                    | 3.56                   | -1.76               | -13.00              | -50.12       |
| 641.10       | S               | Peak                        | -62.25              | -62.98                    | 3.16                   | -2.43               | -13.00              | -49.25       |
| 744.89       | S               | Peak                        | -60.96              | -61.03                    | 3.17                   | -3.11               | -13.00              | -47.96       |
| 1693.00      | H               | Peak                        | -37.11              | -40.07                    | 7.27                   | -4.30               | -13.00              | -24.11       |

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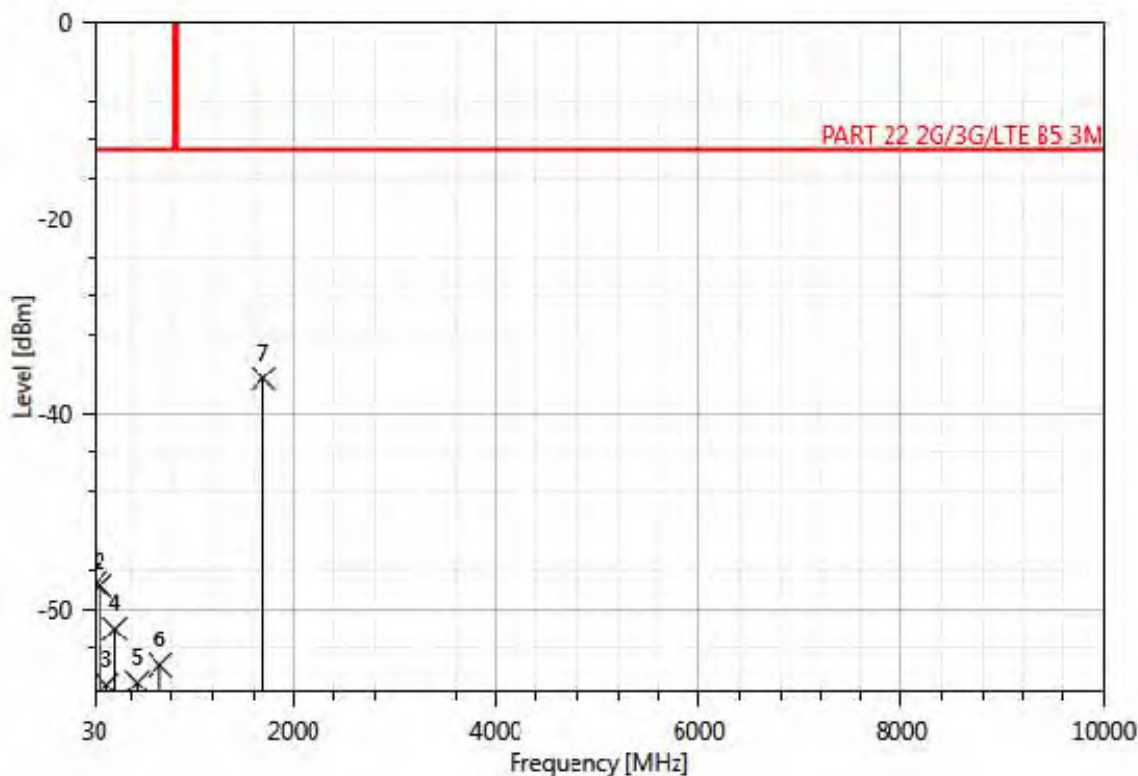
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Operation Mode : EDGE 850      Test Date : 12/14/2016  
Fundamental Frequency : 848.8 MHz      Temp. / Humi. : 21 deg\_C / 62 RH  
Operation Band : Tx CH HIGH      Test Engineer : Mike  
EUT Pol. : E1 Plane      Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 39.70        | S               | Peak                        | -57.29              | -43.19                    | -13.11                 | -0.99               | -13.00              | -44.29       |
| 85.29        | S               | Peak                        | -57.61              | -54.88                    | -1.54                  | -1.19               | -13.00              | -44.61       |
| 154.16       | S               | Peak                        | -67.69              | -64.33                    | -1.90                  | -1.45               | -13.00              | -54.69       |
| 236.61       | S               | Peak                        | -62.00              | -63.49                    | 3.23                   | -1.73               | -13.00              | -49.00       |
| 451.95       | S               | Peak                        | -67.46              | -68.92                    | 3.65                   | -2.19               | -13.00              | -54.46       |
| 679.90       | S               | Peak                        | -65.69              | -66.18                    | 3.10                   | -2.62               | -13.00              | -52.69       |
| 1702.00      | H               | Peak                        | -36.43              | -39.41                    | 7.30                   | -4.31               | -13.00              | -23.43       |

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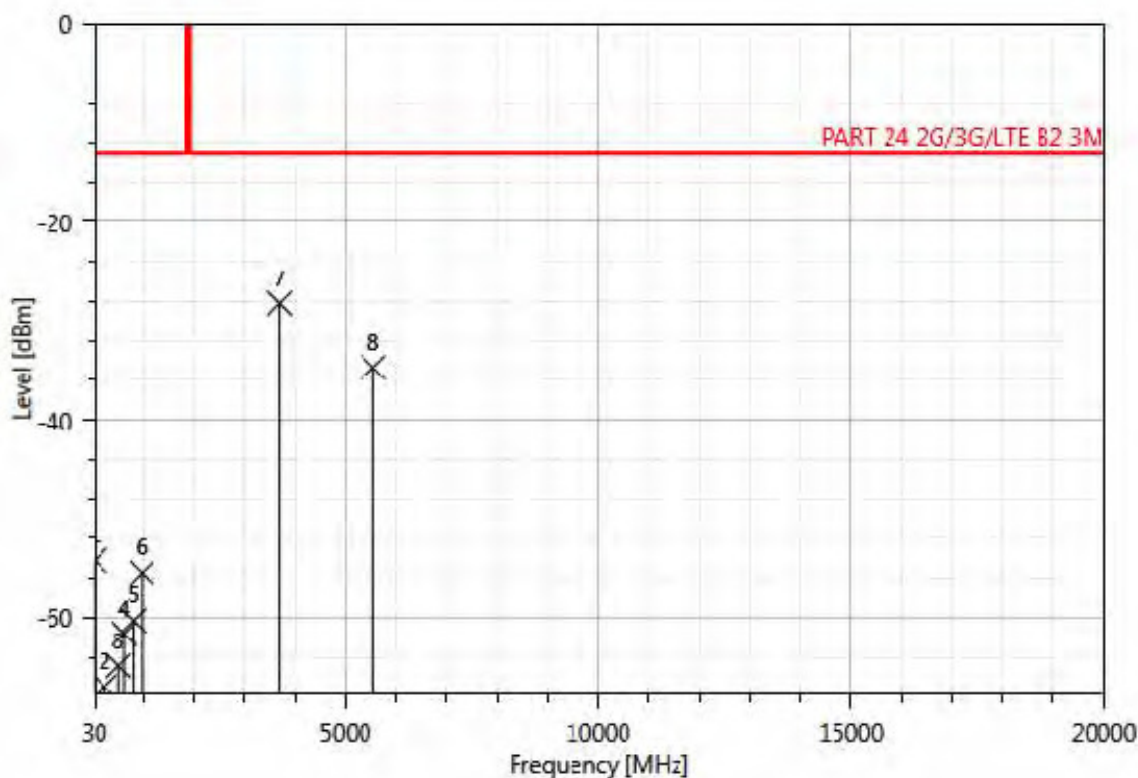
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## Radiated Spurious Emission Measurement Result: GPRS 1900 Mode

|                         |            |                            |                  |
|-------------------------|------------|----------------------------|------------------|
| Operation Mode :        | GPRS 1900  | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 1850.2 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH LOW  | Test Engineer :            | Mike             |
| EUT Pol. :              | E2 Plane   | Measurement Antenna Pol. : | VERTICAL         |



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 39.70        | S               | Peak                        | -54.19               | -42.24                    | -10.96                 | -0.99               | -13.00              | -41.19       |
| 236.61       | S               | Peak                        | -66.93               | -70.58                    | 5.38                   | -1.73               | -13.00              | -53.93       |
| 513.06       | S               | Peak                        | -64.81               | -68.39                    | 5.94                   | -2.35               | -13.00              | -51.81       |
| 624.61       | S               | Peak                        | -61.61               | -64.44                    | 5.34                   | -2.51               | -13.00              | -48.61       |
| 806.00       | S               | Peak                        | -60.27               | -62.86                    | 5.48                   | -2.89               | -13.00              | -47.27       |
| 972.84       | S               | Peak                        | -55.44               | -57.92                    | 5.65                   | -3.17               | -13.00              | -42.44       |
| 3700.40      | H               | Peak                        | -28.19               | -34.05                    | 12.44                  | -6.58               | -13.00              | -15.19       |
| 5550.60      | H               | Peak                        | -34.70               | -39.36                    | 12.90                  | -8.24               | -13.00              | -21.70       |

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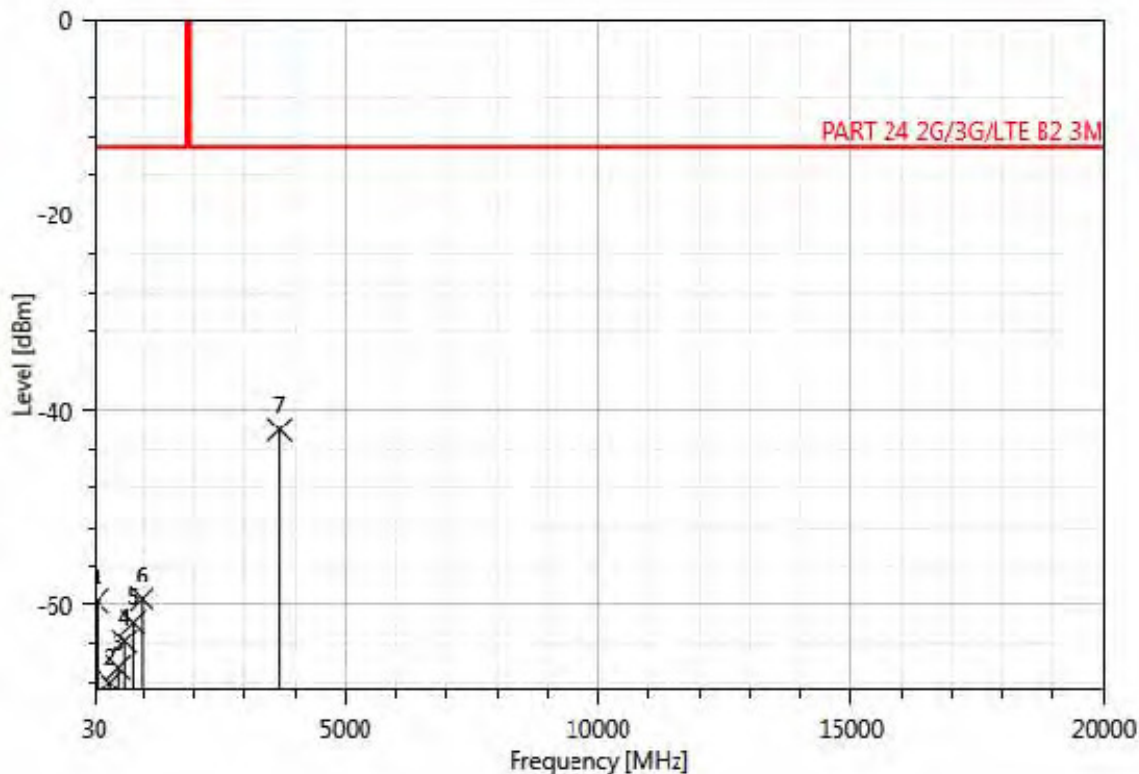
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|                         |            |                            |                  |
|-------------------------|------------|----------------------------|------------------|
| Operation Mode :        | GPRS 1900  | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 1850.2 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH LOW  | Test Engineer :            | Mike             |
| EUT Pol. :              | E2 Plane   | Measurement Antenna Pol. : | HORIZONTAL       |



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 85.29        | S               | Peak                        | -59.62               | -59.04                    | 0.61                   | -1.19               | -13.00              | -46.62       |
| 343.31       | S               | Peak                        | -67.96               | -71.94                    | 5.98                   | -1.99               | -13.00              | -54.96       |
| 513.06       | S               | Peak                        | -66.41               | -69.99                    | 5.94                   | -2.35               | -13.00              | -53.41       |
| 633.34       | S               | Peak                        | -63.75               | -66.62                    | 5.32                   | -2.46               | -13.00              | -50.75       |
| 798.24       | S               | Peak                        | -61.77               | -64.36                    | 5.49                   | -2.90               | -13.00              | -48.77       |
| 972.84       | S               | Peak                        | -59.40               | -61.89                    | 5.65                   | -3.17               | -13.00              | -46.40       |
| 3700.40      | H               | Peak                        | -42.02               | -47.88                    | 12.44                  | -6.58               | -13.00              | -29.02       |

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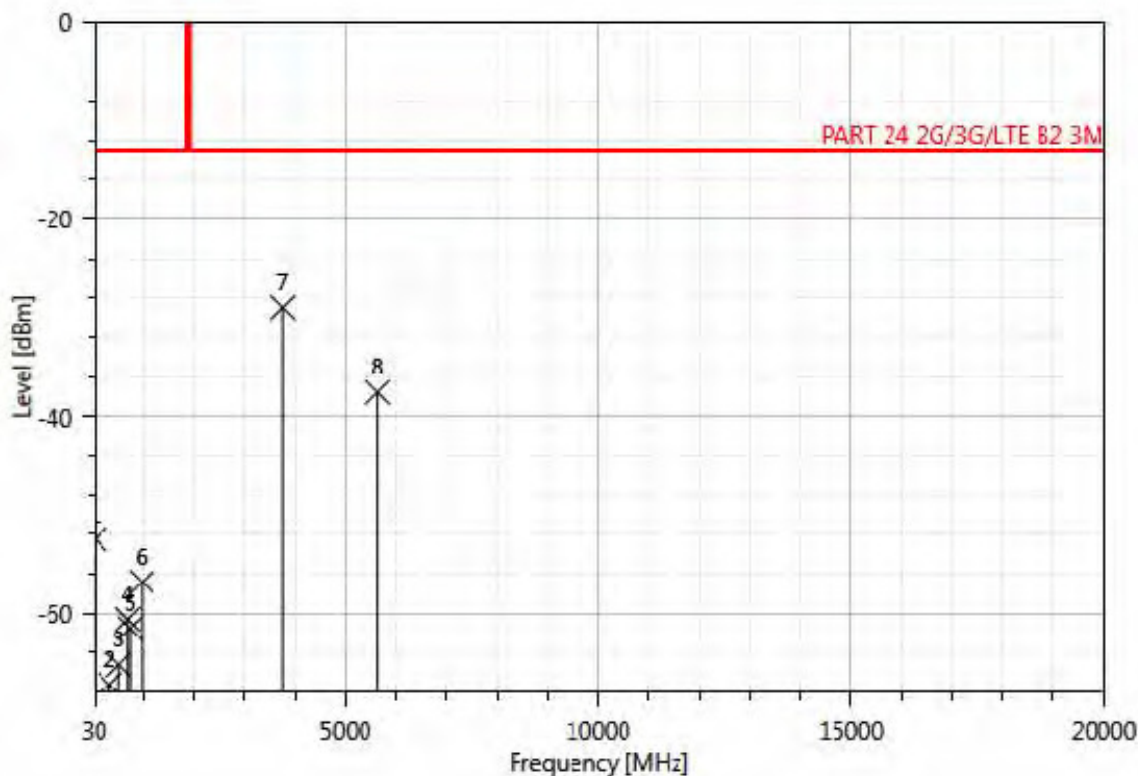
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Operation Mode : GPRS 1900  
Fundamental Frequency : 1880 MHz  
Operation Band : Tx CH MID  
EUT Pol. : E2 Plane

Test Date : 12/14/2016  
Temp. / Humi. : 21 deg\_C / 62 RH  
Test Engineer : Mike  
Measurement Antenna Pol. : VERTICAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 41.64        | S               | Peak                        | -52.49               | -40.80                    | -10.68                 | -1.00               | -13.00              | -39.49       |
| 335.55       | S               | Peak                        | -67.23               | -71.24                    | 5.95                   | -1.93               | -13.00              | -54.23       |
| 515.97       | S               | Peak                        | -65.21               | -68.76                    | 5.92                   | -2.36               | -13.00              | -52.21       |
| 691.54       | S               | Peak                        | -60.60               | -63.02                    | 5.24                   | -2.83               | -13.00              | -47.60       |
| 740.04       | S               | Peak                        | -61.52               | -63.70                    | 5.31                   | -3.14               | -13.00              | -48.52       |
| 972.84       | S               | Peak                        | -56.81               | -59.29                    | 5.65                   | -3.17               | -13.00              | -43.81       |
| 3760.00      | H               | Peak                        | -28.95               | -34.80                    | 12.45                  | -6.60               | -13.00              | -15.95       |
| 5640.00      | H               | Peak                        | -37.58               | -42.12                    | 12.90                  | -8.36               | -13.00              | -24.58       |

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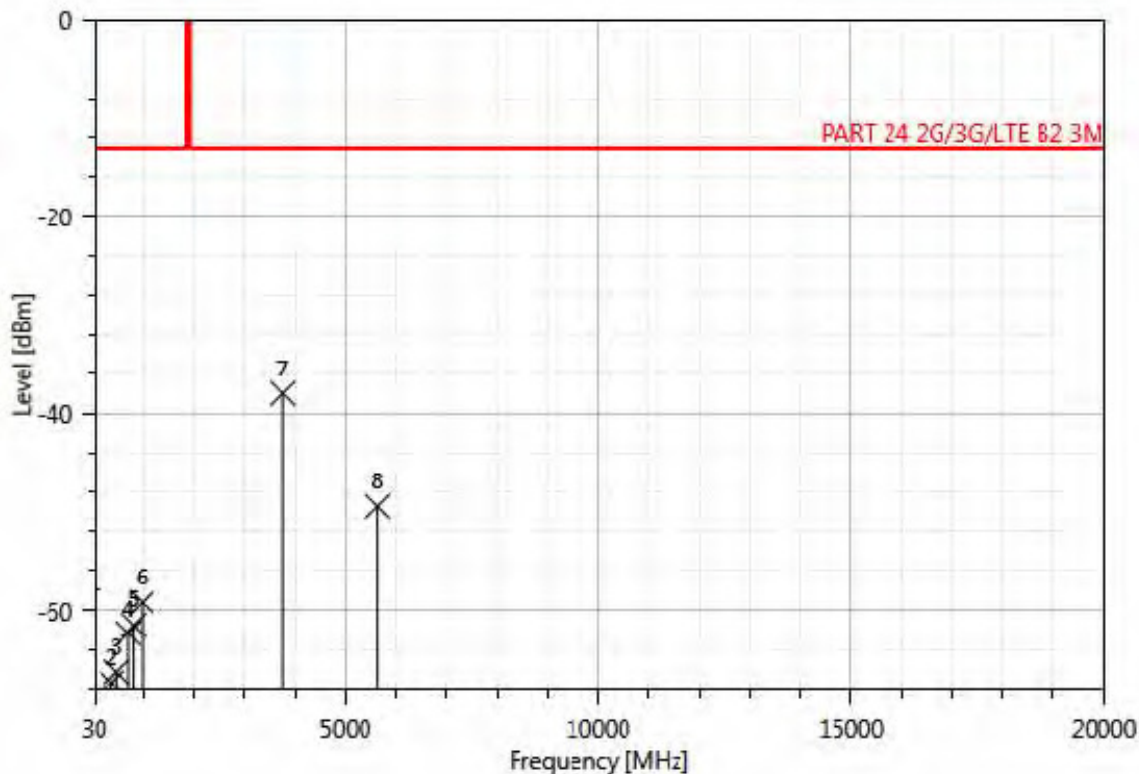
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|                         |           |                            |                  |
|-------------------------|-----------|----------------------------|------------------|
| Operation Mode :        | GPRS 1900 | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 1880 MHz  | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH MID | Test Engineer :            | Mike             |
| EUT Pol. :              | E2 Plane  | Measurement Antenna Pol. : | HORIZONTAL       |



| Freq.   | Note    | Decetor  | EIRP   | SG Output | Antenna | Cable | Limit  | Margin |
|---------|---------|----------|--------|-----------|---------|-------|--------|--------|
| MHz     | F/H/E/S | Mode     | Level  | Level     | Gain    | Loss  | @3m    | dB     |
|         |         | QP/AV/PK | dBm    | dBm       | dBi     | dB    | dBm    |        |
| 30.00   | S       | Peak     | -59.84 | -46.26    | -12.63  | -0.96 | -13.00 | -46.84 |
| 377.26  | S       | Peak     | -67.35 | -71.10    | 5.99    | -2.24 | -13.00 | -54.35 |
| 473.29  | S       | Peak     | -66.25 | -69.92    | 5.90    | -2.23 | -13.00 | -53.25 |
| 702.21  | S       | Peak     | -62.36 | -64.58    | 5.24    | -3.02 | -13.00 | -49.36 |
| 806.00  | S       | Peak     | -61.51 | -64.10    | 5.48    | -2.89 | -13.00 | -48.51 |
| 978.66  | S       | Peak     | -59.23 | -61.81    | 5.77    | -3.19 | -13.00 | -46.23 |
| 3760.00 | H       | Peak     | -37.96 | -43.81    | 12.45   | -6.60 | -13.00 | -24.96 |
| 5640.00 | H       | Peak     | -49.43 | -53.97    | 12.90   | -8.36 | -13.00 | -36.43 |

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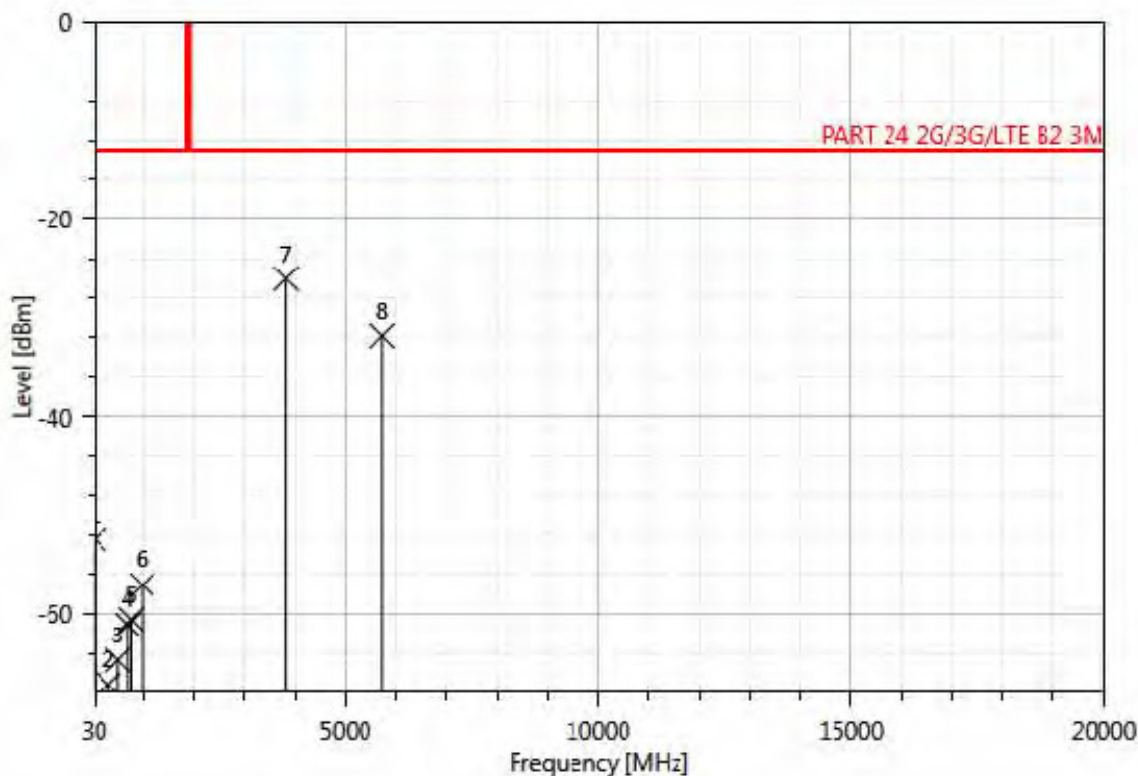
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Operation Mode : GPRS 1900  
Fundamental Frequency : 1909.8 MHz  
Operation Band : Tx CH HIGH  
EUT Pol. : E2 Plane

Test Date : 12/14/2016  
Temp. / Humi. : 21 deg\_C / 62 RH  
Test Engineer : Mike  
Measurement Antenna Pol. : VERTICAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 37.76        | S               | Peak                        | -52.45               | -40.30                    | -11.17                 | -0.98               | -13.00              | -39.45       |
| 313.24       | S               | Peak                        | -67.16               | -71.07                    | 5.84                   | -1.93               | -13.00              | -54.16       |
| 498.51       | S               | Peak                        | -64.68               | -68.38                    | 6.00                   | -2.30               | -13.00              | -51.68       |
| 696.39       | S               | Peak                        | -61.12               | -63.45                    | 5.24                   | -2.91               | -13.00              | -48.12       |
| 759.44       | S               | Peak                        | -60.54               | -62.88                    | 5.36                   | -3.02               | -13.00              | -47.54       |
| 977.69       | S               | Peak                        | -57.06               | -59.63                    | 5.75                   | -3.19               | -13.00              | -44.06       |
| 3819.60      | H               | Peak                        | -26.02               | -31.83                    | 12.47                  | -6.65               | -13.00              | -13.02       |
| 5729.40      | H               | Peak                        | -31.88               | -36.39                    | 12.90                  | -8.39               | -13.00              | -18.88       |

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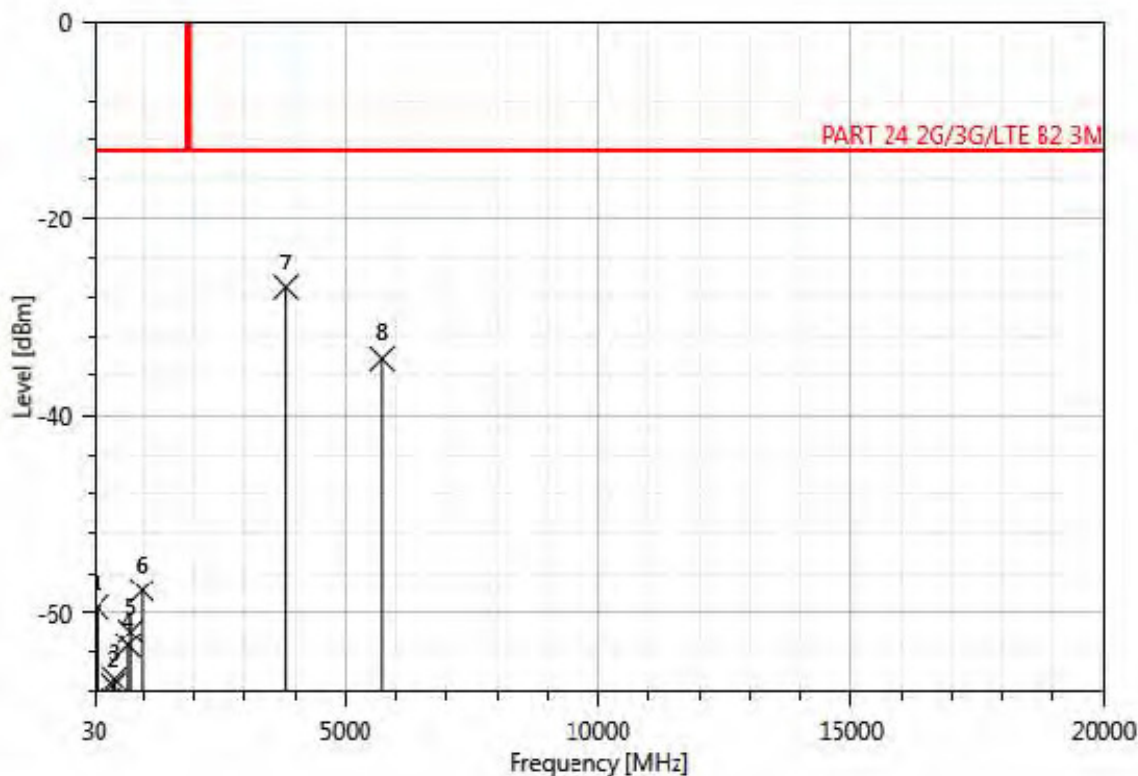
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Operation Mode : GPRS 1900  
Fundamental Frequency : 1909.8 MHz  
Operation Band : Tx CH HIGH  
EUT Pol. : E2 Plane

Test Date : 12/14/2016  
Temp. / Humi. : 21 deg\_C / 62 RH  
Test Engineer : Mike  
Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 85.29        | S               | Peak                        | -59.49               | -58.91                    | 0.61                   | -1.19               | -13.00              | -46.49       |
| 411.21       | S               | Peak                        | -67.33               | -70.87                    | 5.93                   | -2.39               | -13.00              | -54.33       |
| 442.25       | S               | Peak                        | -66.74               | -70.37                    | 5.82                   | -2.19               | -13.00              | -53.74       |
| 697.36       | S               | Peak                        | -63.35               | -65.65                    | 5.23                   | -2.93               | -13.00              | -50.35       |
| 744.89       | S               | Peak                        | -61.96               | -64.17                    | 5.32                   | -3.11               | -13.00              | -48.96       |
| 972.84       | S               | Peak                        | -57.79               | -60.28                    | 5.65                   | -3.17               | -13.00              | -44.79       |
| 3819.60      | H               | Peak                        | -26.98               | -32.79                    | 12.47                  | -6.65               | -13.00              | -13.98       |
| 5729.40      | H               | Peak                        | -34.20               | -38.71                    | 12.90                  | -8.39               | -13.00              | -21.20       |

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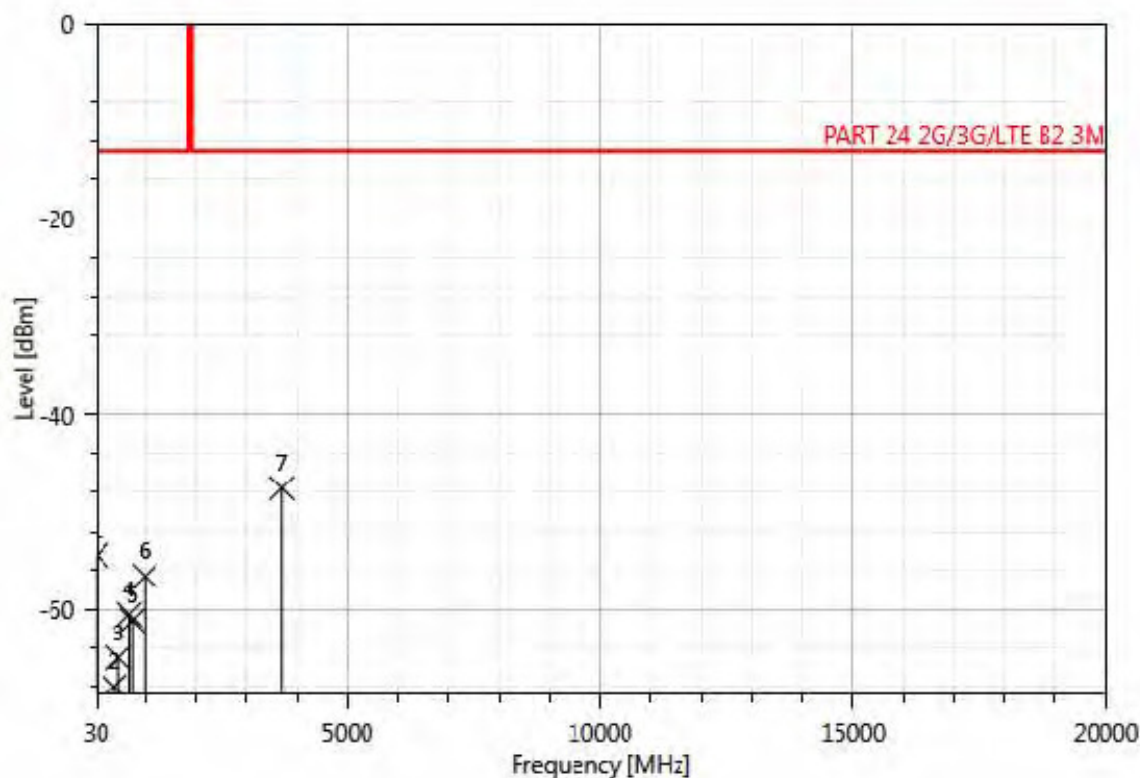
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## Radiated Spurious Emission Measurement Result: HSDPA Band II Mode

|                         |            |                            |                  |
|-------------------------|------------|----------------------------|------------------|
| Operation Mode :        | HSDPA B2   | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 1852.4 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH LOW  | Test Engineer :            | Mike             |
| EUT Pol. :              | E2 Plane   | Measurement Antenna Pol. : | VERTICAL         |



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 39.70        | S               | Peak                        | -54.52               | -42.57                    | -10.96                 | -0.99               | -13.00              | -41.52       |
| 386.96       | S               | Peak                        | -67.94               | -71.62                    | 5.98                   | -2.30               | -13.00              | -54.94       |
| 471.35       | S               | Peak                        | -64.99               | -68.66                    | 5.89                   | -2.22               | -13.00              | -51.99       |
| 682.81       | S               | Peak                        | -60.53               | -63.11                    | 5.25                   | -2.67               | -13.00              | -47.53       |
| 744.89       | S               | Peak                        | -61.17               | -63.38                    | 5.32                   | -3.11               | -13.00              | -48.17       |
| 990.30       | S               | Peak                        | -56.62               | -59.39                    | 6.01                   | -3.24               | -13.00              | -43.62       |
| 3704.80      | H               | Peak                        | -47.60               | -53.46                    | 12.44                  | -6.58               | -13.00              | -34.60       |

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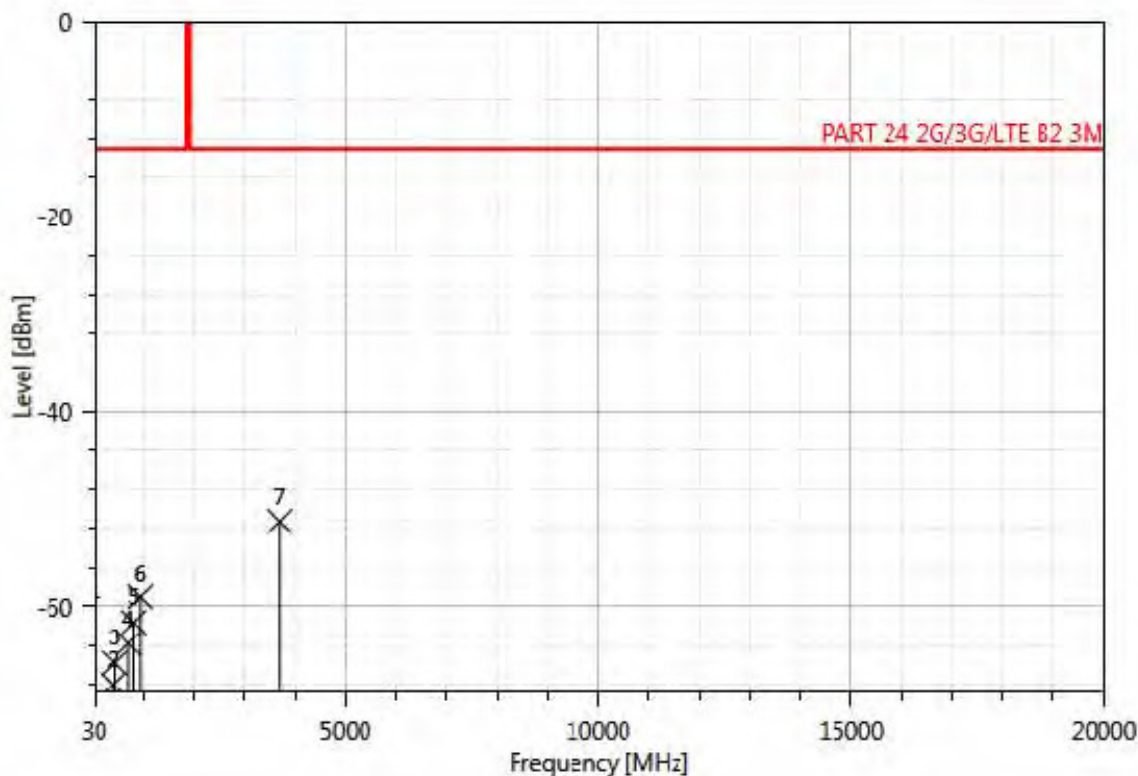
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|                         |            |                            |                  |
|-------------------------|------------|----------------------------|------------------|
| Operation Mode :        | HSDPA B2   | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 1852.4 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH LOW  | Test Engineer :            | Mike             |
| EUT Pol. :              | E2 Plane   | Measurement Antenna Pol. : | HORIZONTAL       |



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 30.00        | S               | Peak                        | -60.99               | -47.40                    | -12.63                 | -0.96               | -13.00              | -47.99       |
| 418.00       | S               | Peak                        | -68.02               | -71.58                    | 5.91                   | -2.35               | -13.00              | -55.02       |
| 445.16       | S               | Peak                        | -65.81               | -69.44                    | 5.81                   | -2.18               | -13.00              | -52.81       |
| 702.21       | S               | Peak                        | -63.81               | -66.03                    | 5.24                   | -3.02               | -13.00              | -50.81       |
| 803.09       | S               | Peak                        | -61.66               | -64.25                    | 5.49                   | -2.90               | -13.00              | -48.66       |
| 934.04       | S               | Peak                        | -59.08               | -61.11                    | 5.26                   | -3.23               | -13.00              | -46.08       |
| 3704.80      | H               | Peak                        | -51.25               | -57.12                    | 12.44                  | -6.58               | -13.00              | -38.25       |

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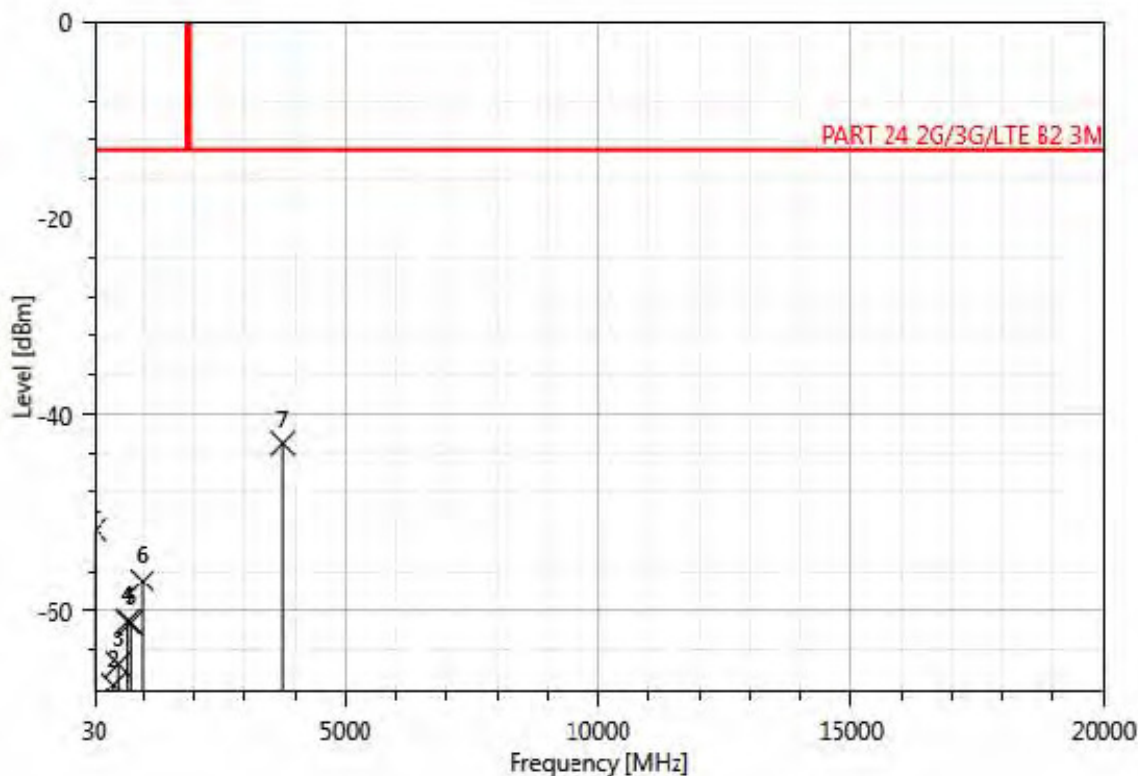
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Operation Mode : HSDPA B2      Test Date : 12/14/2016  
Fundamental Frequency : 1880 MHz      Temp. / Humi. : 21 deg\_C / 62 RH  
Operation Band : Tx CH MID      Test Engineer : Mike  
EUT Pol. : E2 Plane      Measurement Antenna Pol. : VERTICAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 39.70        | S               | Peak                        | -51.78               | -39.83                    | -10.96                 | -0.99               | -13.00              | -38.78       |
| 416.06       | S               | Peak                        | -67.57               | -71.13                    | 5.91                   | -2.36               | -13.00              | -54.57       |
| 515.00       | S               | Peak                        | -65.49               | -69.06                    | 5.92                   | -2.36               | -13.00              | -52.49       |
| 689.60       | S               | Peak                        | -61.10               | -63.55                    | 5.24                   | -2.79               | -13.00              | -48.10       |
| 752.65       | S               | Peak                        | -61.22               | -63.50                    | 5.34                   | -3.06               | -13.00              | -48.22       |
| 980.60       | S               | Peak                        | -57.02               | -59.63                    | 5.81                   | -3.20               | -13.00              | -44.02       |
| 3760.00      | H               | Peak                        | -43.00               | -48.86                    | 12.45                  | -6.60               | -13.00              | -30.00       |

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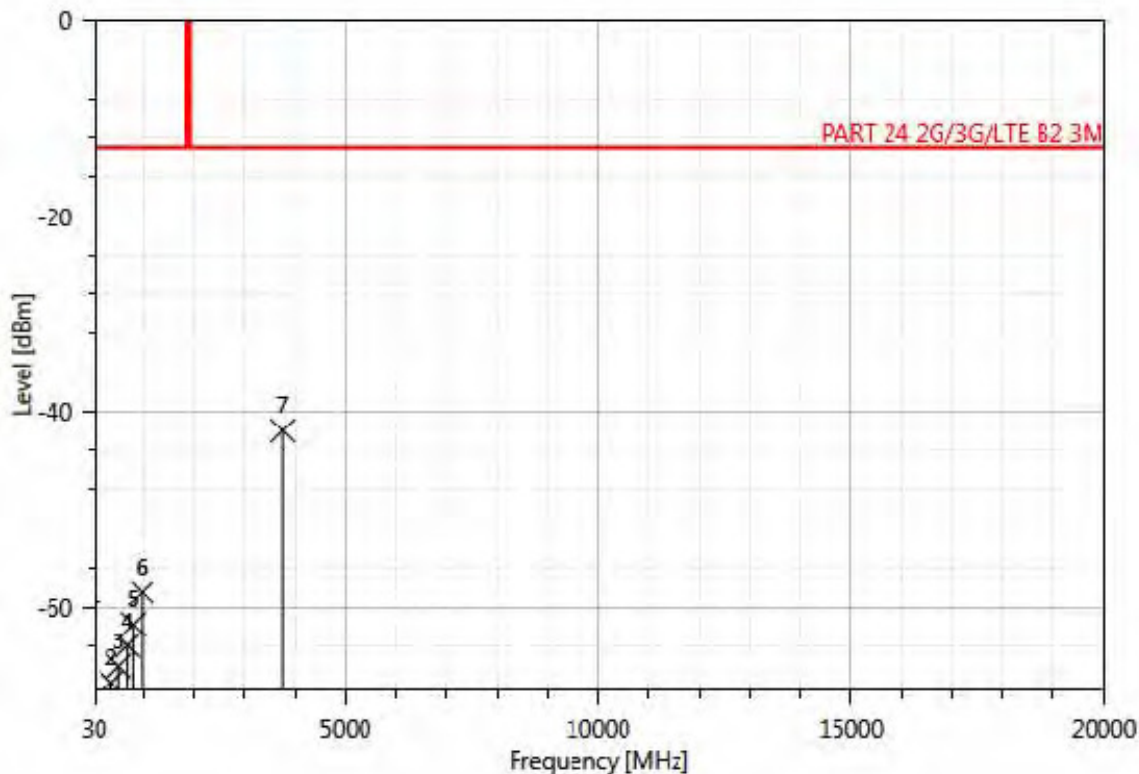
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|                         |           |                            |                  |
|-------------------------|-----------|----------------------------|------------------|
| Operation Mode :        | HSDPA B2  | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 1880 MHz  | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH MID | Test Engineer :            | Mike             |
| EUT Pol. :              | E2 Plane  | Measurement Antenna Pol. : | HORIZONTAL       |



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 30.00        | S               | Peak                        | -61.29               | -47.71                    | -12.63                 | -0.96               | -13.00              | -48.29       |
| 367.56       | S               | Peak                        | -67.69               | -71.50                    | 6.00                   | -2.18               | -13.00              | -54.69       |
| 515.00       | S               | Peak                        | -66.01               | -69.57                    | 5.92                   | -2.36               | -13.00              | -53.01       |
| 687.66       | S               | Peak                        | -63.89               | -66.38                    | 5.25                   | -2.76               | -13.00              | -50.89       |
| 798.24       | S               | Peak                        | -61.74               | -64.32                    | 5.49                   | -2.90               | -13.00              | -48.74       |
| 972.84       | S               | Peak                        | -58.51               | -60.99                    | 5.65                   | -3.17               | -13.00              | -45.51       |
| 3760.00      | H               | Peak                        | -41.95               | -47.81                    | 12.45                  | -6.60               | -13.00              | -28.95       |

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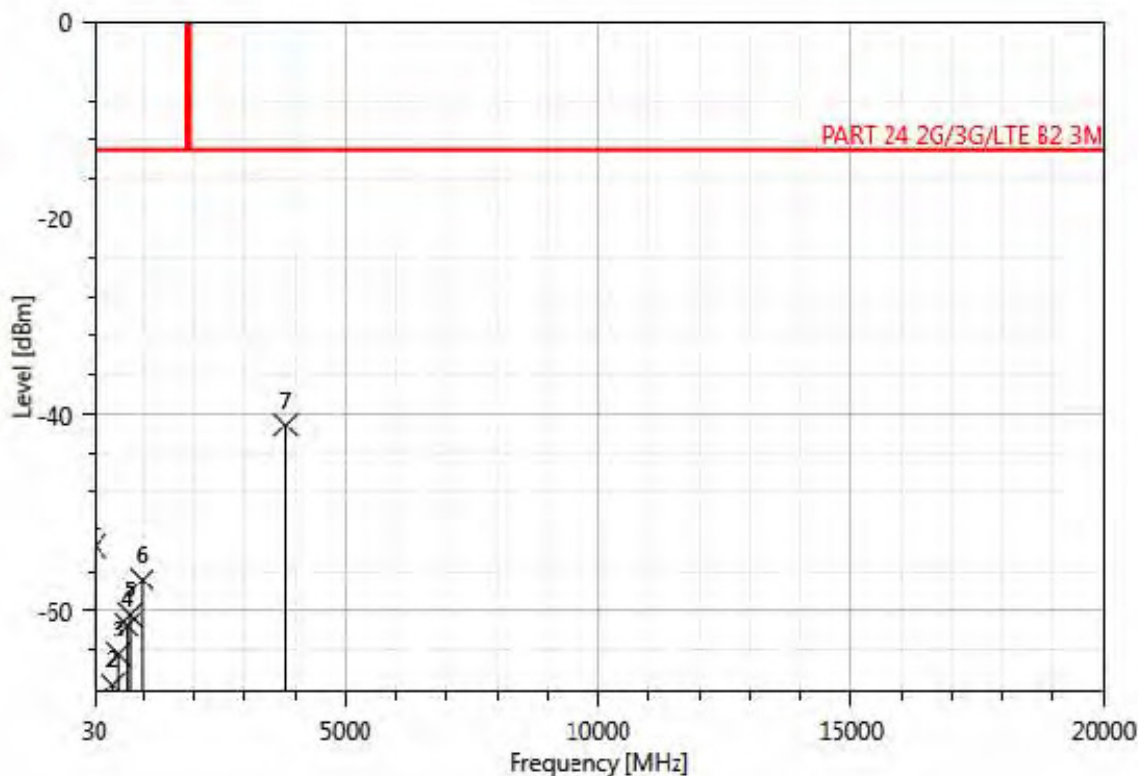
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Operation Mode : HSDPA B2      Test Date : 12/14/2016  
Fundamental Frequency : 1907.6 MHz      Temp. / Humi. : 21 deg\_C / 62 RH  
Operation Band : Tx CH HIGH      Test Engineer : Mike  
EUT Pol. : E2 Plane      Measurement Antenna Pol. : VERTICAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 41.64        | S               | Peak                        | -53.47               | -41.79                    | -10.68                 | -1.00               | -13.00              | -40.47       |
| 400.54       | S               | Peak                        | -67.55               | -71.14                    | 5.97                   | -2.38               | -13.00              | -54.55       |
| 515.97       | S               | Peak                        | -64.50               | -68.06                    | 5.92                   | -2.36               | -13.00              | -51.50       |
| 686.69       | S               | Peak                        | -61.49               | -64.00                    | 5.25                   | -2.74               | -13.00              | -48.49       |
| 741.01       | S               | Peak                        | -60.44               | -62.62                    | 5.31                   | -3.13               | -13.00              | -47.44       |
| 975.75       | S               | Peak                        | -56.87               | -59.40                    | 5.71                   | -3.18               | -13.00              | -43.87       |
| 3815.20      | H               | Peak                        | -41.09               | -46.93                    | 12.46                  | -6.63               | -13.00              | -28.09       |

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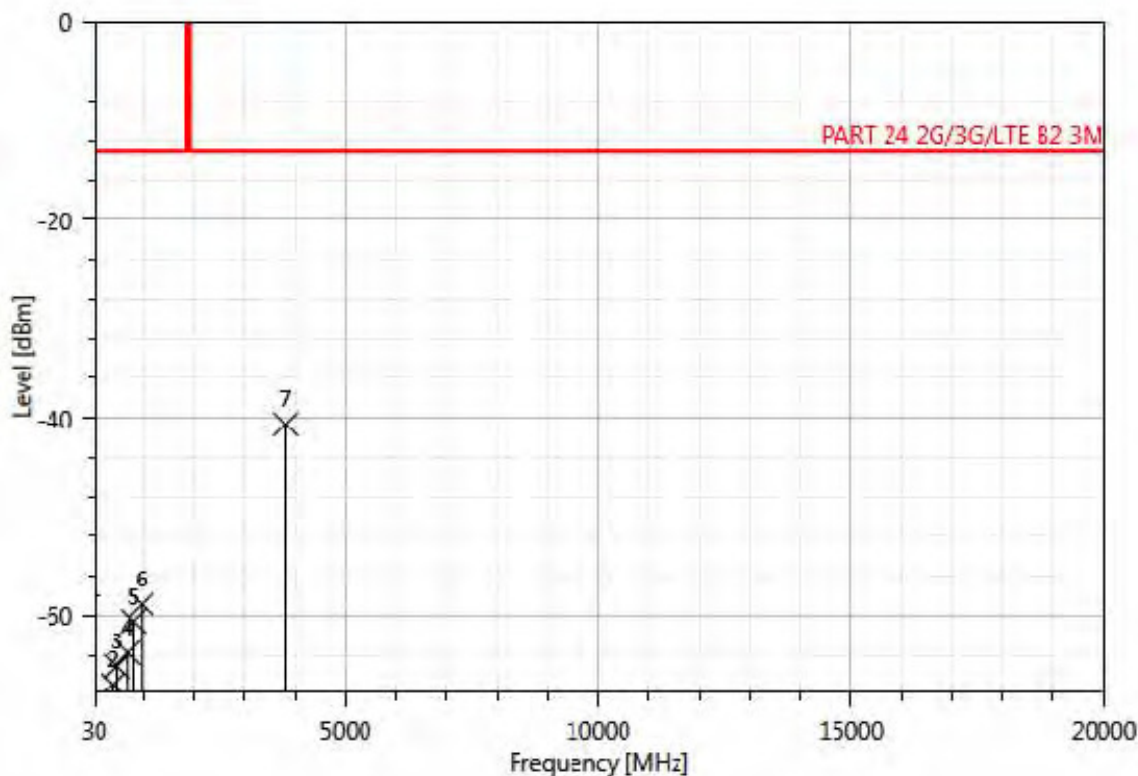
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|                         |            |                            |                  |
|-------------------------|------------|----------------------------|------------------|
| Operation Mode :        | HSDPA B2   | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 1907.6 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH HIGH | Test Engineer :            | Mike             |
| EUT Pol. :              | E2 Plane   | Measurement Antenna Pol. : | HORIZONTAL       |



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | EIRP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBi | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|----------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 30.00        | S               | Peak                        | -59.74               | -46.16                    | -12.63                 | -0.96               | -13.00              | -46.74       |
| 406.36       | S               | Peak                        | -66.96               | -70.49                    | 5.95                   | -2.42               | -13.00              | -53.96       |
| 482.99       | S               | Peak                        | -65.10               | -68.80                    | 5.94                   | -2.25               | -13.00              | -52.10       |
| 692.51       | S               | Peak                        | -63.75               | -66.15                    | 5.24                   | -2.84               | -13.00              | -50.75       |
| 801.15       | S               | Peak                        | -60.56               | -63.16                    | 5.49                   | -2.90               | -13.00              | -47.56       |
| 967.99       | S               | Peak                        | -58.84               | -61.24                    | 5.56                   | -3.15               | -13.00              | -45.84       |
| 3815.20      | H               | Peak                        | -40.65               | -46.48                    | 12.46                  | -6.63               | -13.00              | -27.65       |

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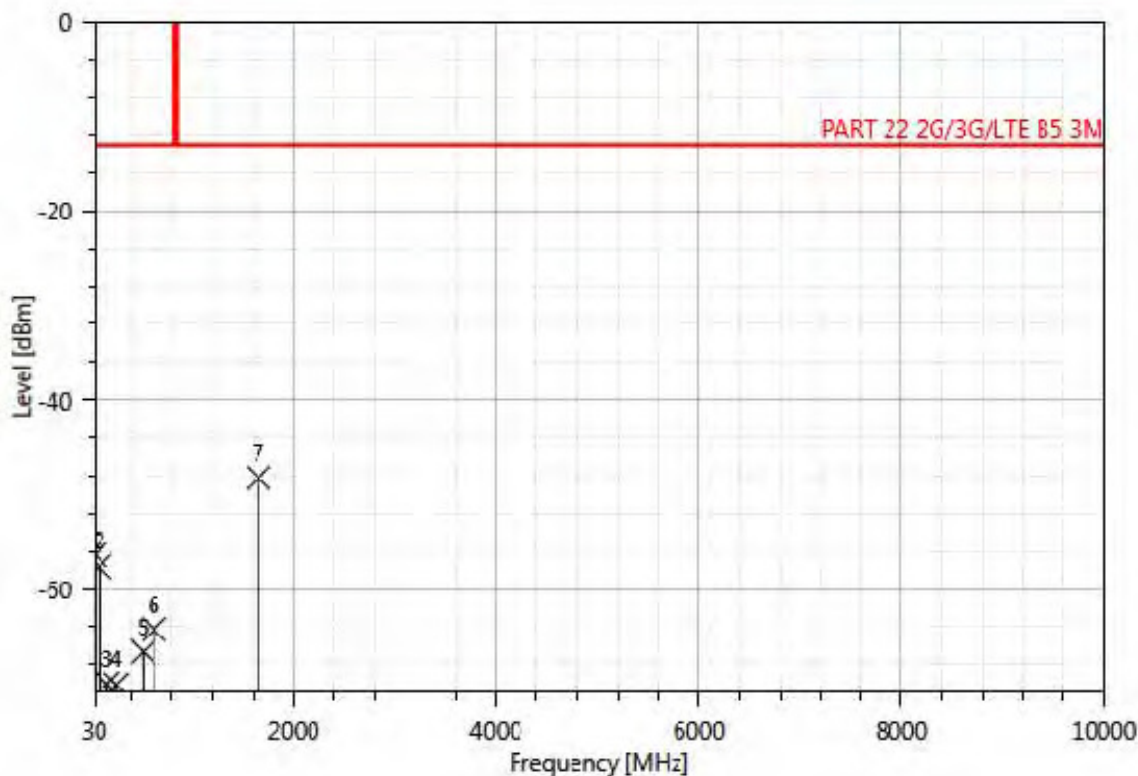
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## Radiated Spurious Emission Measurement Result: HSUPA V Mode

|                         |           |                            |                  |
|-------------------------|-----------|----------------------------|------------------|
| Operation Mode :        | HSUPA B5  | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 824.2 MHz | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH LOW | Test Engineer :            | Mike             |
| EUT Pol. :              | E1 Plane  | Measurement Antenna Pol. : | VERTICAL         |



| Freq.   | Note    | Decetor  | ERP          | SG Output    | Antenna     | Cable      | Limit      | Margin |
|---------|---------|----------|--------------|--------------|-------------|------------|------------|--------|
| MHz     | F/H/E/S | QP/AV/PK | Level<br>dBm | Level<br>dBm | Gain<br>dBd | Loss<br>dB | @3m<br>dBm | dB     |
| 36.79   | S       | Peak     | -56.35       | -41.94       | -13.43      | -0.98      | -13.00     | -43.35 |
| 78.50   | S       | Peak     | -57.59       | -53.14       | -3.29       | -1.15      | -13.00     | -44.59 |
| 159.98  | S       | Peak     | -70.01       | -66.90       | -1.64       | -1.48      | -13.00     | -57.01 |
| 250.19  | S       | Peak     | -70.09       | -71.78       | 3.44        | -1.76      | -13.00     | -57.09 |
| 512.09  | S       | Peak     | -66.64       | -68.08       | 3.79        | -2.35      | -13.00     | -53.64 |
| 619.76  | S       | Peak     | -64.25       | -64.90       | 3.20        | -2.55      | -13.00     | -51.25 |
| 1652.80 | H       | Peak     | -48.23       | -51.11       | 7.12        | -4.24      | -13.00     | -35.23 |

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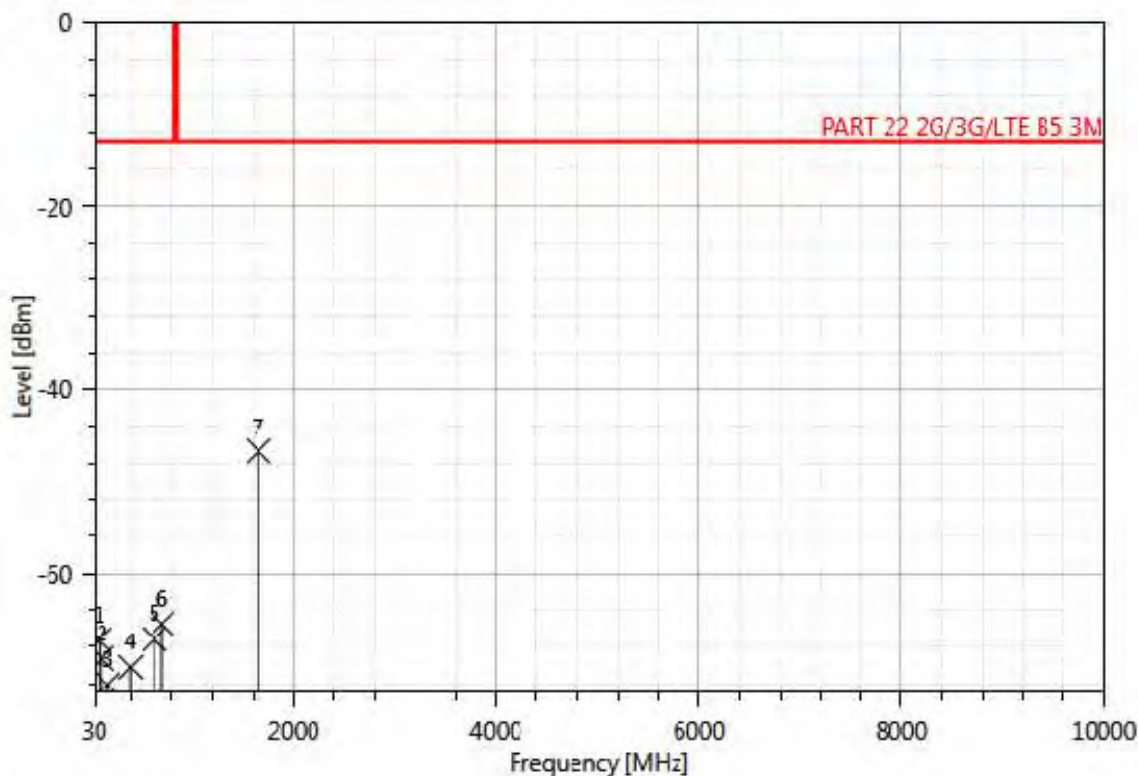
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Operation Mode : HSUPA B5      Test Date : 12/14/2016  
Fundamental Frequency : 824.2 MHz      Temp. / Humi. : 21 deg\_C / 62 RH  
Operation Band : Tx CH LOW      Test Engineer : Mike  
EUT Pol. : E1 Plane      Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 82.38        | S               | Peak                        | -67.24              | -63.81                    | -2.26                  | -1.17               | -13.00              | -54.24       |
| 104.69       | S               | Peak                        | -69.26              | -65.95                    | -2.04                  | -1.27               | -13.00              | -56.26       |
| 165.80       | S               | Peak                        | -72.11              | -69.40                    | -1.21                  | -1.50               | -13.00              | -59.11       |
| 388.90       | S               | Peak                        | -70.22              | -71.73                    | 3.83                   | -2.31               | -13.00              | -57.22       |
| 623.64       | S               | Peak                        | -67.16              | -67.84                    | 3.19                   | -2.52               | -13.00              | -54.16       |
| 702.21       | S               | Peak                        | -65.52              | -65.59                    | 3.09                   | -3.02               | -13.00              | -52.52       |
| 1652.80      | H               | Peak                        | -46.69              | -49.58                    | 7.12                   | -4.24               | -13.00              | -33.69       |

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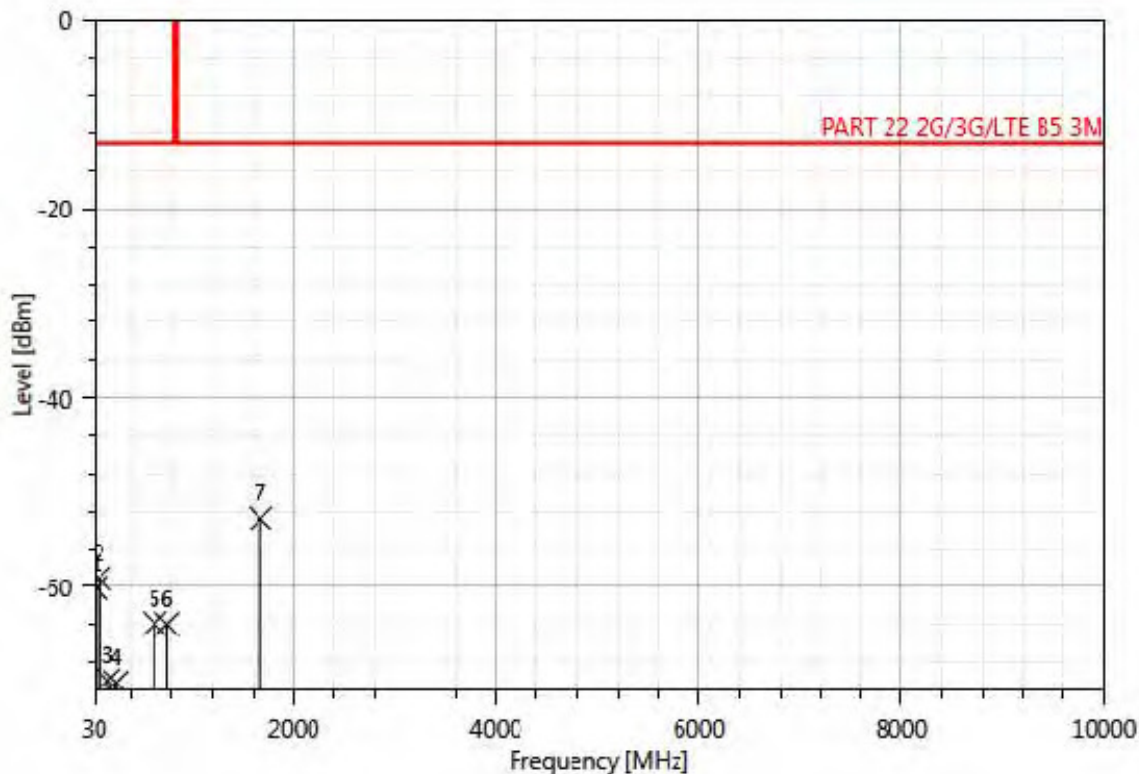
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Operation Band : Tx CH MID      Test Engineer : Mike  
EUT Pol. : E1 Plane      Measurement Antenna Pol. : VERTICAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 47.46        | S               | Peak                        | -60.09              | -47.22                    | -11.84                 | -1.03               | -13.00              | -47.09       |
| 76.56        | S               | Peak                        | -59.10              | -54.09                    | -3.87                  | -1.14               | -13.00              | -46.10       |
| 168.71       | S               | Peak                        | -69.90              | -67.38                    | -1.00                  | -1.51               | -13.00              | -56.90       |
| 250.19       | S               | Peak                        | -70.11              | -71.80                    | 3.44                   | -1.76               | -13.00              | -57.11       |
| 626.55       | S               | Peak                        | -63.86              | -64.56                    | 3.19                   | -2.49               | -13.00              | -50.86       |
| 750.71       | S               | Peak                        | -63.93              | -64.04                    | 3.18                   | -3.07               | -13.00              | -50.93       |
| 1673.20      | H               | Peak                        | -52.73              | -55.64                    | 7.20                   | -4.29               | -13.00              | -39.73       |

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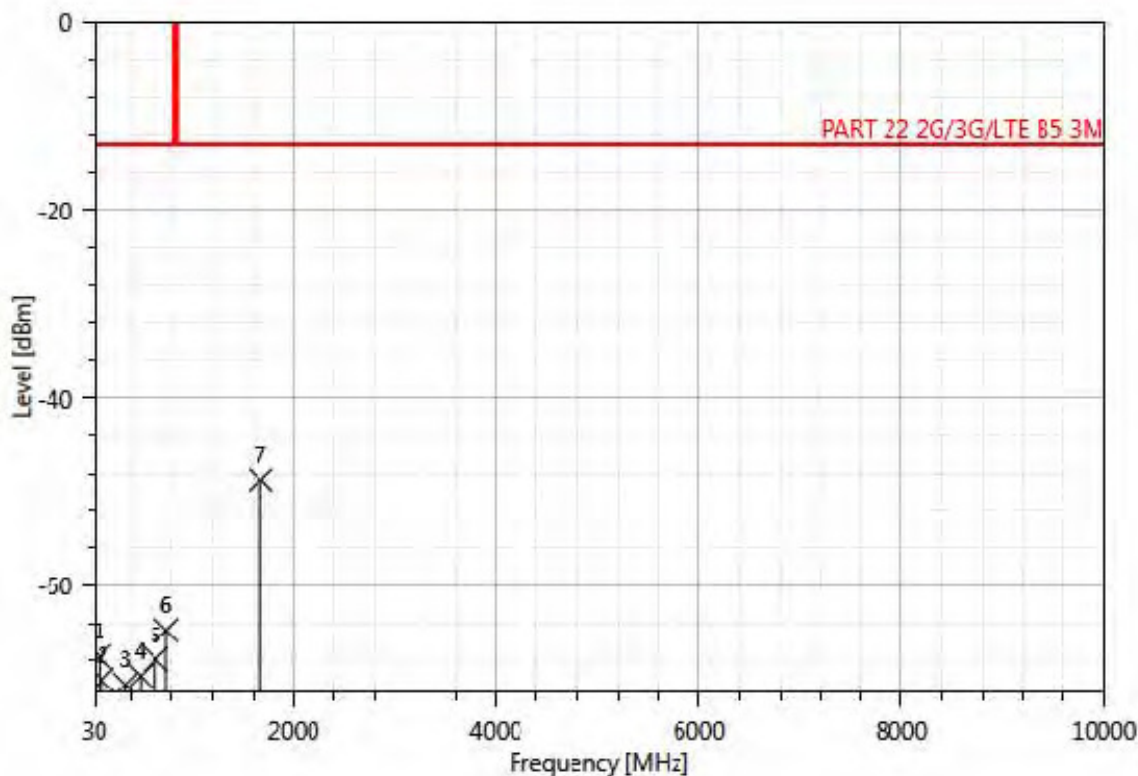
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Operation Mode : HSUPA B5  
Fundamental Frequency : 836.6 MHz  
Operation Band : Tx CH MID  
EUT Pol. : E1 Plane

Test Date : 12/14/2016  
Temp. / Humi. : 21 deg\_C / 62 RH  
Test Engineer : Mike  
Measurement Antenna Pol. : HORIZONTAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 81.41        | S               | Peak                        | -67.51              | -63.85                    | -2.50                  | -1.17               | -13.00              | -54.51       |
| 106.63       | S               | Peak                        | -70.00              | -66.52                    | -2.21                  | -1.27               | -13.00              | -57.00       |
| 338.46       | S               | Peak                        | -70.50              | -72.36                    | 3.81                   | -1.95               | -13.00              | -57.50       |
| 485.90       | S               | Peak                        | -69.59              | -71.14                    | 3.80                   | -2.26               | -13.00              | -56.59       |
| 638.19       | S               | Peak                        | -67.82              | -68.54                    | 3.16                   | -2.44               | -13.00              | -54.82       |
| 741.98       | S               | Peak                        | -64.72              | -64.76                    | 3.17                   | -3.13               | -13.00              | -51.72       |
| 1673.20      | H               | Peak                        | -48.74              | -51.65                    | 7.20                   | -4.29               | -13.00              | -35.74       |

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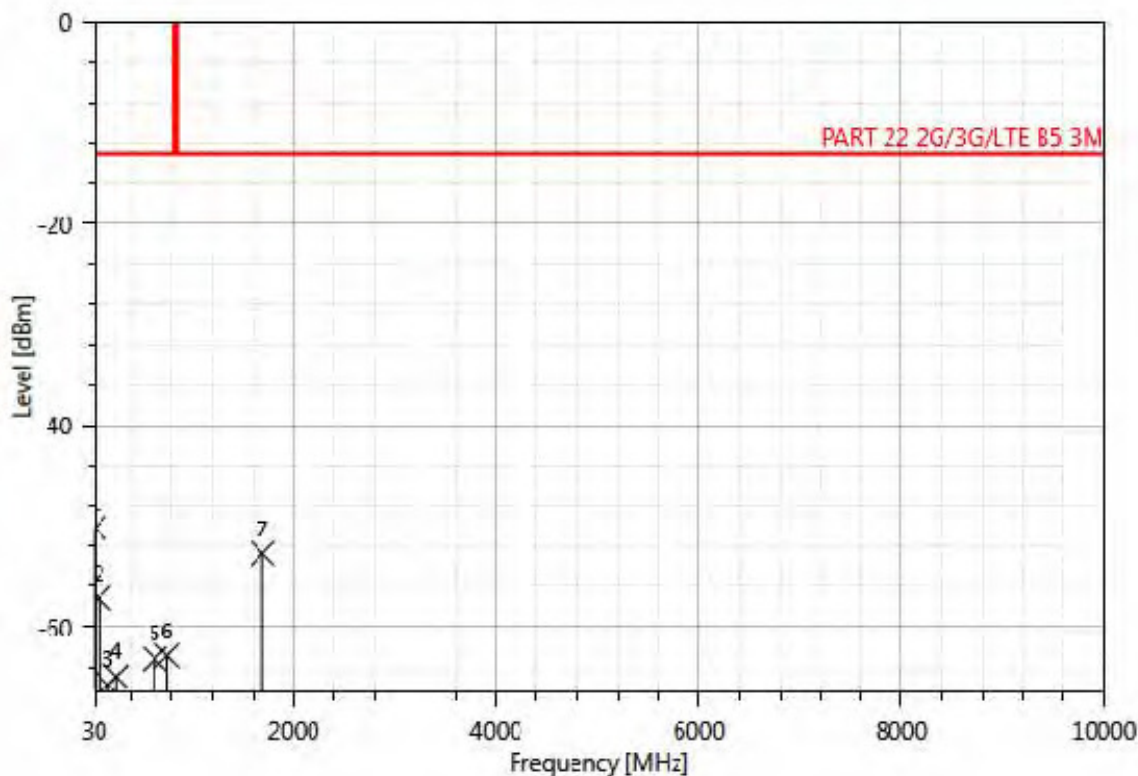
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Operation Mode : HSUPA B5      Test Date : 12/14/2016  
Fundamental Frequency : 848.8 MHz      Temp. / Humi. : 21 deg\_C / 62 RH  
Operation Band : Tx CH HIGH      Test Engineer : Mike  
EUT Pol. : E1 Plane      Measurement Antenna Pol. : VERTICAL



| Freq.<br>MHz | Note<br>F/H/E/S | Decetor<br>Mode<br>QP/AV/PK | ERP<br>Level<br>dBm | SG Output<br>Level<br>dBm | Antenna<br>Gain<br>dBd | Cable<br>Loss<br>dB | Limit<br>@3m<br>dBm | Margin<br>dB |
|--------------|-----------------|-----------------------------|---------------------|---------------------------|------------------------|---------------------|---------------------|--------------|
| 32.91        | S               | Peak                        | -50.18              | -35.12                    | -14.09                 | -0.97               | -13.00              | -37.18       |
| 76.56        | S               | Peak                        | -57.16              | -52.15                    | -3.87                  | -1.14               | -13.00              | -44.16       |
| 167.74       | S               | Peak                        | -65.71              | -63.13                    | -1.07                  | -1.51               | -13.00              | -52.71       |
| 251.16       | S               | Peak                        | -64.93              | -66.64                    | 3.47                   | -1.76               | -13.00              | -51.93       |
| 628.49       | S               | Peak                        | -63.19              | -63.89                    | 3.18                   | -2.47               | -13.00              | -50.19       |
| 751.68       | S               | Peak                        | -62.86              | -62.98                    | 3.19                   | -3.07               | -13.00              | -49.86       |
| 1693.20      | H               | Peak                        | -52.73              | -55.69                    | 7.27                   | -4.30               | -13.00              | -39.73       |

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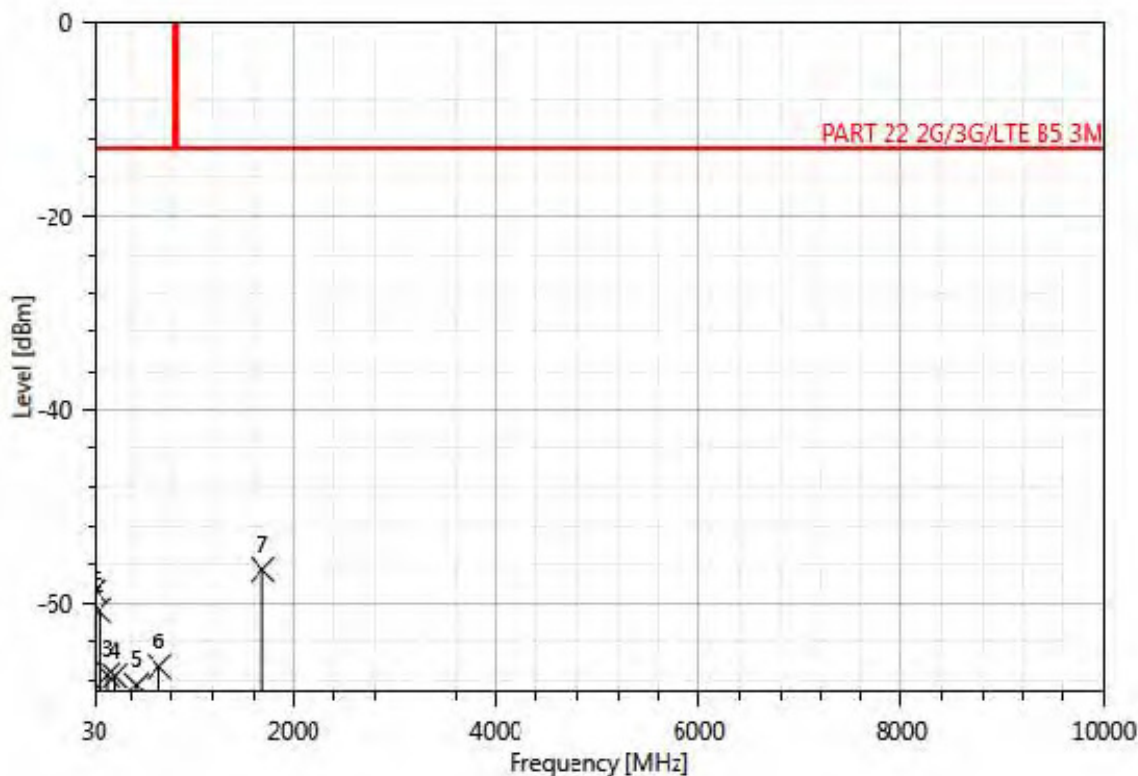
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|                         |            |                            |                  |
|-------------------------|------------|----------------------------|------------------|
| Operation Mode :        | HSUPA B5   | Test Date :                | 12/14/2016       |
| Fundamental Frequency : | 848.8 MHz  | Temp. / Humi. :            | 21 deg_C / 62 RH |
| Operation Band :        | Tx CH HIGH | Test Engineer :            | Mike             |
| EUT Pol. :              | E1 Plane   | Measurement Antenna Pol. : | HORIZONTAL       |



| Freq.   | Note    | Decetor  | ERP    | SG Output | Antenna | Cable | Limit  | Margin |
|---------|---------|----------|--------|-----------|---------|-------|--------|--------|
| MHz     | F/H/E/S | Mode     | Level  | Level     | Gain    | Loss  | @3m    |        |
|         |         | QP/AV/PK | dBm    | dBm       | dBd     | dB    | dBm    | dB     |
| 36.79   | S       | Peak     | -58.70 | -44.29    | -13.43  | -0.98 | -13.00 | -45.70 |
| 78.50   | S       | Peak     | -60.74 | -56.29    | -3.29   | -1.15 | -13.00 | -47.74 |
| 168.71  | S       | Peak     | -67.36 | -64.85    | -1.00   | -1.51 | -13.00 | -54.36 |
| 237.58  | S       | Peak     | -67.45 | -68.96    | 3.24    | -1.74 | -13.00 | -54.45 |
| 444.19  | S       | Peak     | -68.39 | -69.87    | 3.66    | -2.18 | -13.00 | -55.39 |
| 672.14  | S       | Peak     | -66.53 | -67.17    | 3.11    | -2.47 | -13.00 | -53.53 |
| 1693.20 | H       | Peak     | -56.48 | -59.44    | 7.27    | -4.30 | -13.00 | -43.48 |

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## 11. FREQUENCY STABILITY MEASUREMENT

### 11.1. Standard Applicable:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 11.2. Test Set-up:

**Note:** Measurement setup for testing on Antenna connector

### 11.3. Measurement Procedure:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25

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#### 11.4. Measurement Equipment Used:

| SGS Conducted Room    |               |              |               |            |            |
|-----------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE        | MFR           | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| EXA Spectrum Analyzer | Agilent       | N9030A       | MY53120760    | 02/26/2016 | 02/25/2017 |
| DC Block              | Mini-Circuits | BLK-18-S+    | 1             | 01/02/2016 | 01/01/2017 |
| Coaxial Cable         | HUBER+SUHNER  | SUCOFLEX 102 | 23670/2       | 01/02/2016 | 01/01/2017 |
| Attenuator            | Mini-Circuit  | BW-S10W2+    | 2             | 01/02/2016 | 01/01/2017 |
| Splitter              | Agilent       | 11636B       | N/A           | 01/02/2016 | 01/01/2017 |
| DC Power Supply       | Agilent       | E3640A       | MY52410006    | 11/21/2016 | 11/20/2017 |

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## 11.5. Measurement Result:

### FREQUENCY ERROR vs. VOLTAGE

| Reference Frequency: GPRS 850 Mid Channel 836.6 MHz |                  |           |            |            |
|-----------------------------------------------------|------------------|-----------|------------|------------|
| Limit: +/- 2.5 ppm                                  |                  |           |            |            |
| Power Supply                                        | Environment      | Frequency |            |            |
| Vdc                                                 | Temperature<br>( |           | Delta (Hz) | Limit (Hz) |

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## FREQUENCY ERROR vs. VOLTAGE

| Reference Frequency: GPRS 1900 Mid Channel 1880 MHz |                  |           |            |            |
|-----------------------------------------------------|------------------|-----------|------------|------------|
| Limit: +/- 2.5 ppm                                  |                  |           |            |            |
| Power Supply                                        | Environment      | Frequency | Delta (Hz) | Limit (Hz) |
| Vdc                                                 | Temperature<br>( |           |            |            |

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## FREQUENCY ERROR vs. VOLTAGE

| Reference Frequency: WCDMA II Mid Channel 1880 MHz |                  |           |            |            |
|----------------------------------------------------|------------------|-----------|------------|------------|
| Limit: +/- 2.5 ppm                                 |                  |           |            |            |
| Power Supply                                       | Environment      | Frequency | Delta (Hz) | Limit (Hz) |
| Vdc                                                | Temperature<br>( |           |            |            |

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## FREQUENCY ERROR vs. VOLTAGE

| Reference Frequency: WCDMA V Mid Channel 836.6 MHz |               |           |            |            |
|----------------------------------------------------|---------------|-----------|------------|------------|
| Limit: +/- 2.5 ppm                                 |               |           |            |            |
| Power Supply                                       | Environment   | Frequency |            |            |
| Vdc                                                | Temperature ( |           | Delta (Hz) | Limit (Hz) |

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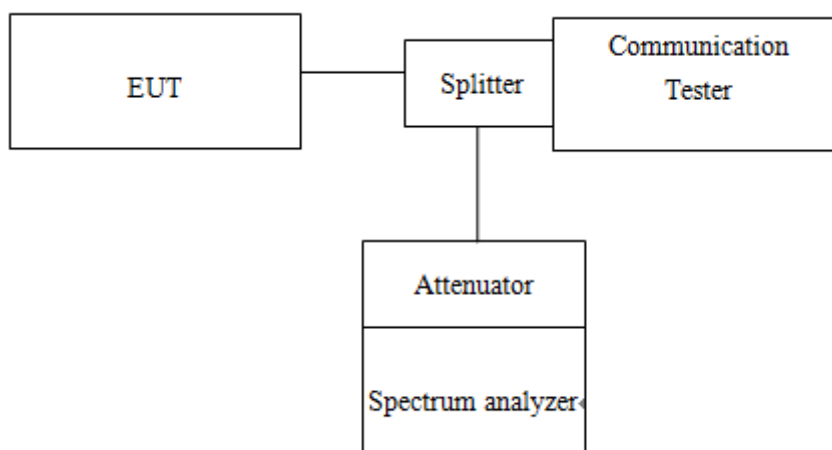
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## 12. PEAK TO AVERAGE RATIO

### 12.1. Standard Applicable

The peak-to-average ration (PAR) of the transmission may not exceed 13dB.

### 12.2. Test SET-UP



### 12.3. Measurement Procedure

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth; & internal = 1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

### 12.4. Measurement Equipment Used

| SGS Conducted Room    |               |              |               |            |            |
|-----------------------|---------------|--------------|---------------|------------|------------|
| EQUIPMENT TYPE        | MFR           | MODEL NUMBER | SERIAL NUMBER | LAST CAL.  | CAL DUE.   |
| EXA Spectrum Analyzer | Agilent       | N9030A       | MY53120760    | 02/26/2016 | 02/25/2017 |
| DC Block              | Mini-Circuits | BLK-18-S+    | 1             | 01/02/2016 | 01/01/2017 |
| Coaxial Cable         | HUBER+SUHNER  | SUCOFLEX 102 | 23670/2       | 01/02/2016 | 01/01/2017 |
| Attenuator            | Mini-Circuit  | BW-S10W2+    | 2             | 01/02/2016 | 01/01/2017 |
| Splitter              | Agilent       | 11636B       | N/A           | 01/02/2016 | 01/01/2017 |
| DC Power Supply       | Agilent       | E3640A       | MY52410006    | 11/21/2016 | 11/20/2017 |

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## 12.5. Measurement Result

### Tabular Results:

| Frequency<br>(MHz) | CH   | Peak-to-Average Ratio<br>(dB) |              |
|--------------------|------|-------------------------------|--------------|
|                    |      | GPRS                          | EDGE         |
| 1850.20            | 9296 | <b>8.93</b>                   | 11.42        |
| 1880.00            | 9400 | 9.98                          | 11.13        |
| 1909.80            | 9538 | 10.7                          | <b>11.33</b> |

| Frequency<br>(MHz) | CH   | Peak-to-Average Ratio<br>(dB) |                  |                  |
|--------------------|------|-------------------------------|------------------|------------------|
|                    |      | WCDMA<br>Band II              | HSDPA<br>Band II | HSUPA<br>Band II |
| 1852.4             | 9262 | 2.73                          | 4.02             | 3.41             |
| 1880.0             | 9400 | <b>2.67</b>                   | <b>3.48</b>      | <b>3.56</b>      |
| 1907.6             | 9538 | 2.66                          | 3.75             | 3.54             |

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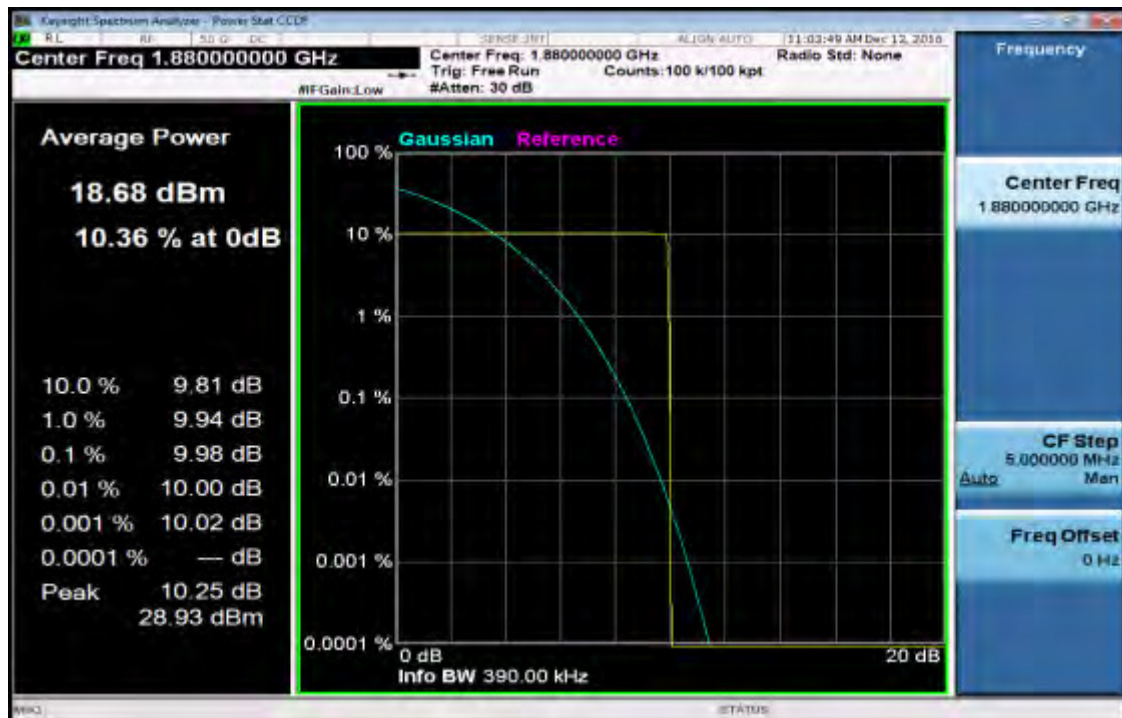
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## Measurement Results:

### GPRS 1900 Channel Low



### GPRS 1900 Channel Mid



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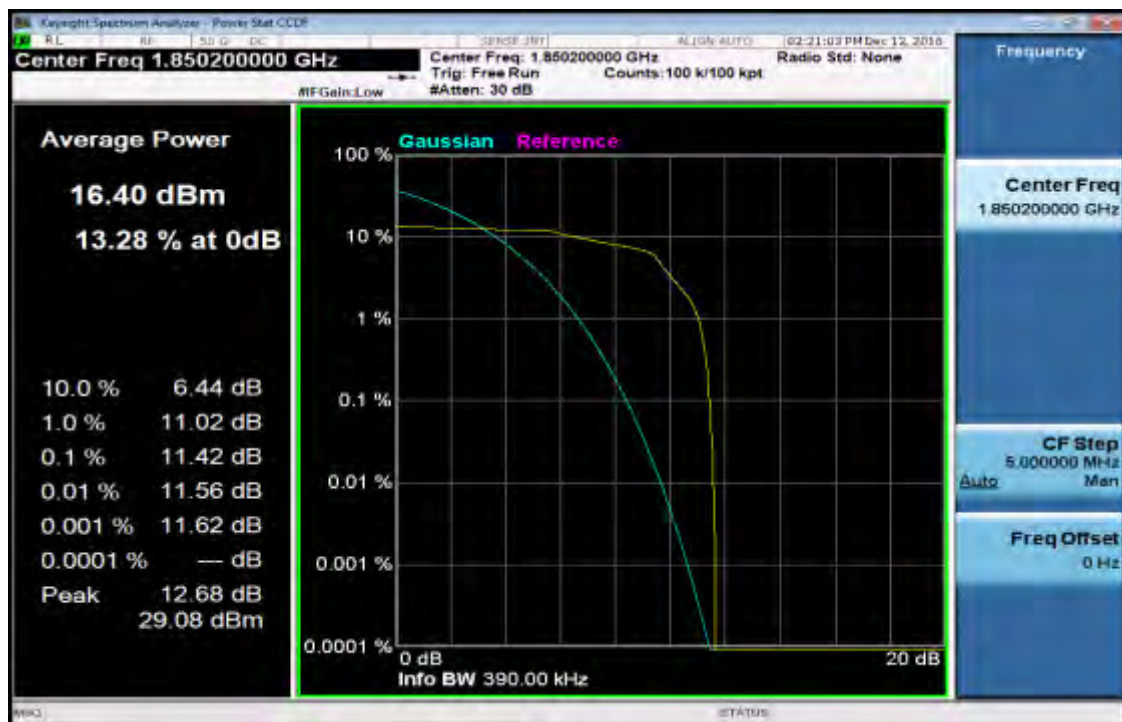
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## GPRS 1900 Channel High



## EDGE 1900 Channel Low



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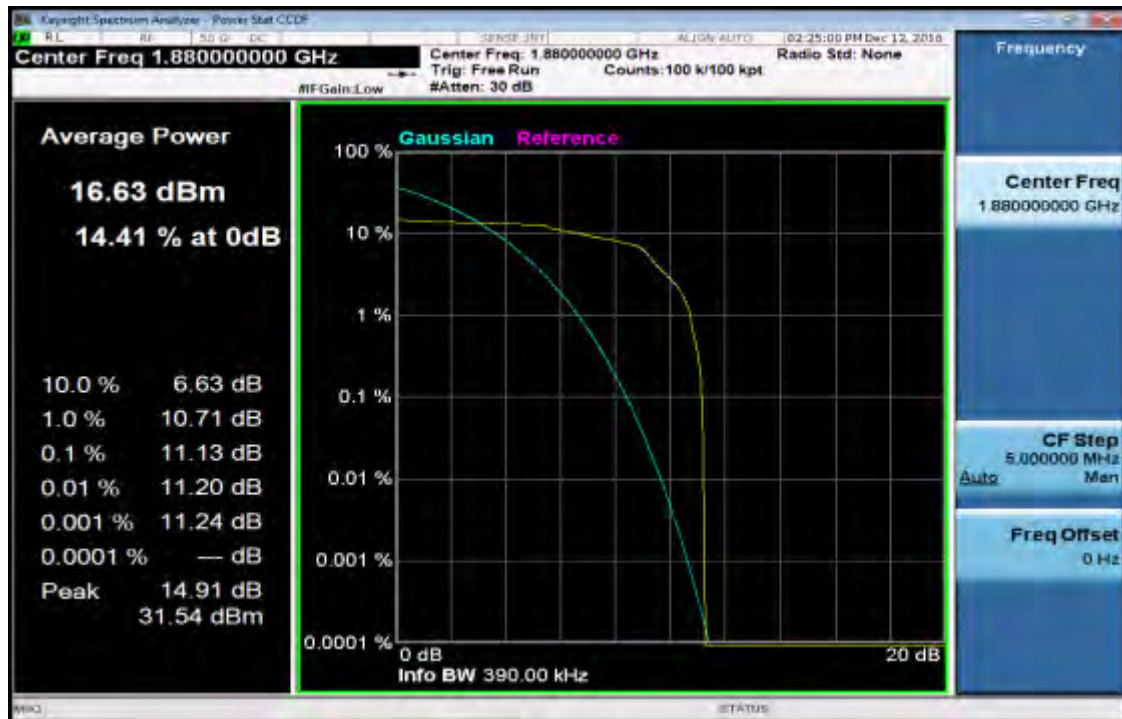
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## EDGE 1900 Channel Mid



## EDGE 1900 Channel High



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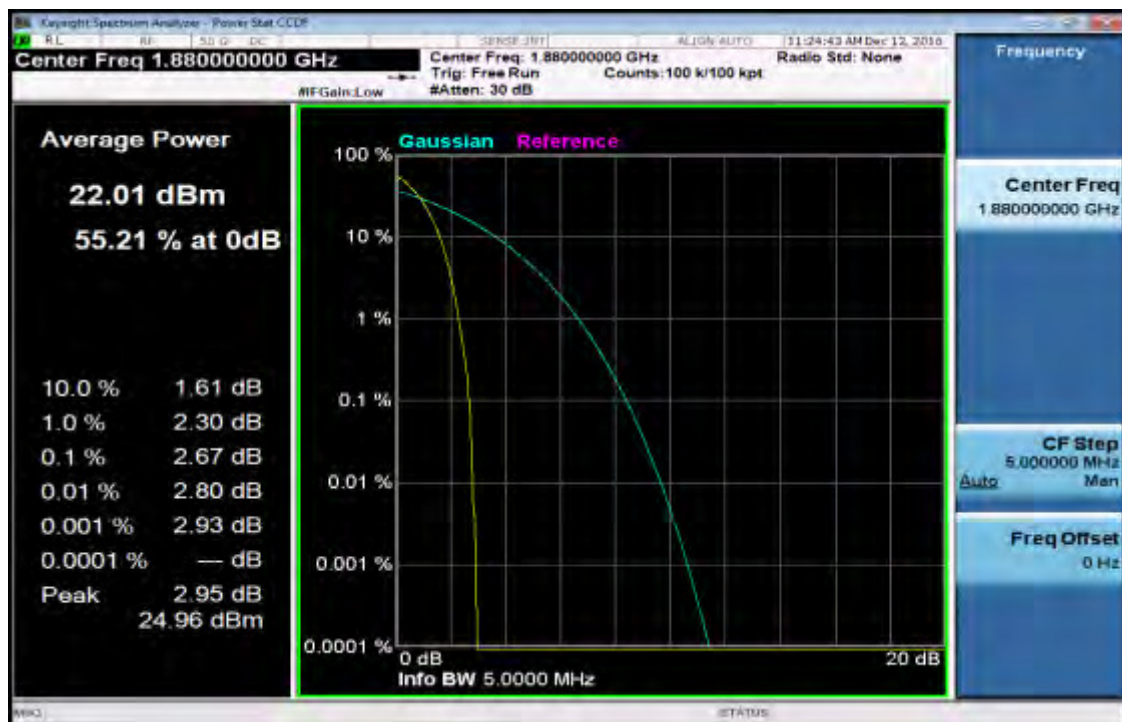
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## WCDMA II Channel Low



## WCDMA II Channel Mid



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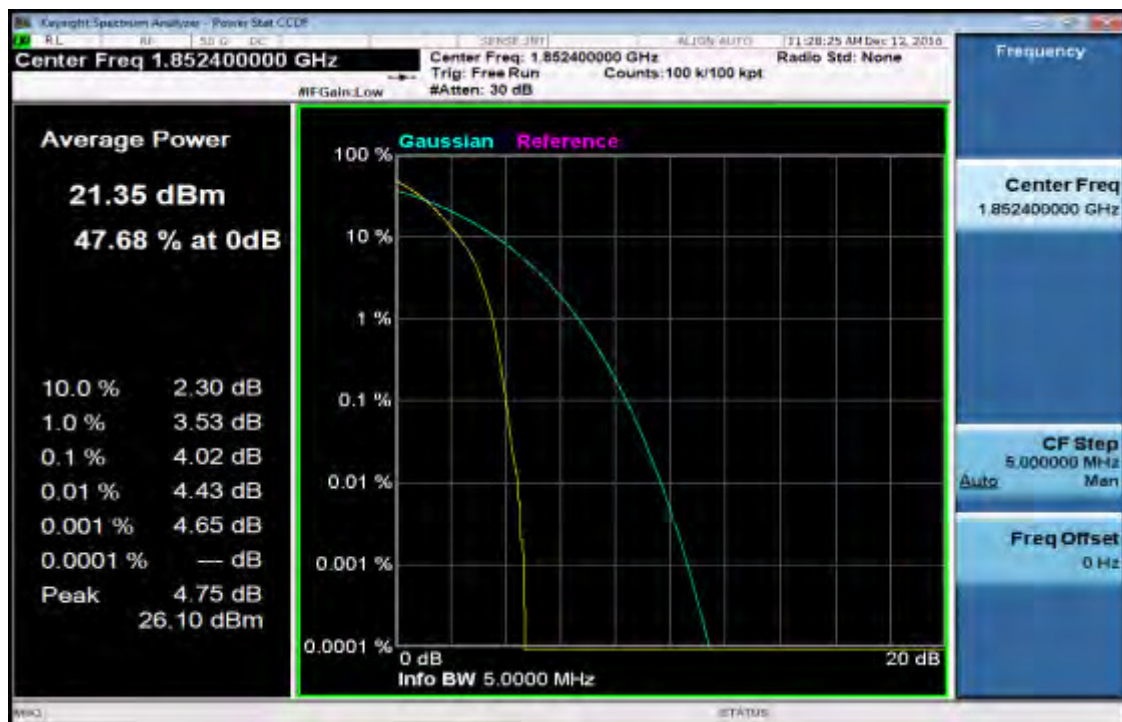
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## WCDMA II Channel High



## HSDPA II Channel Low



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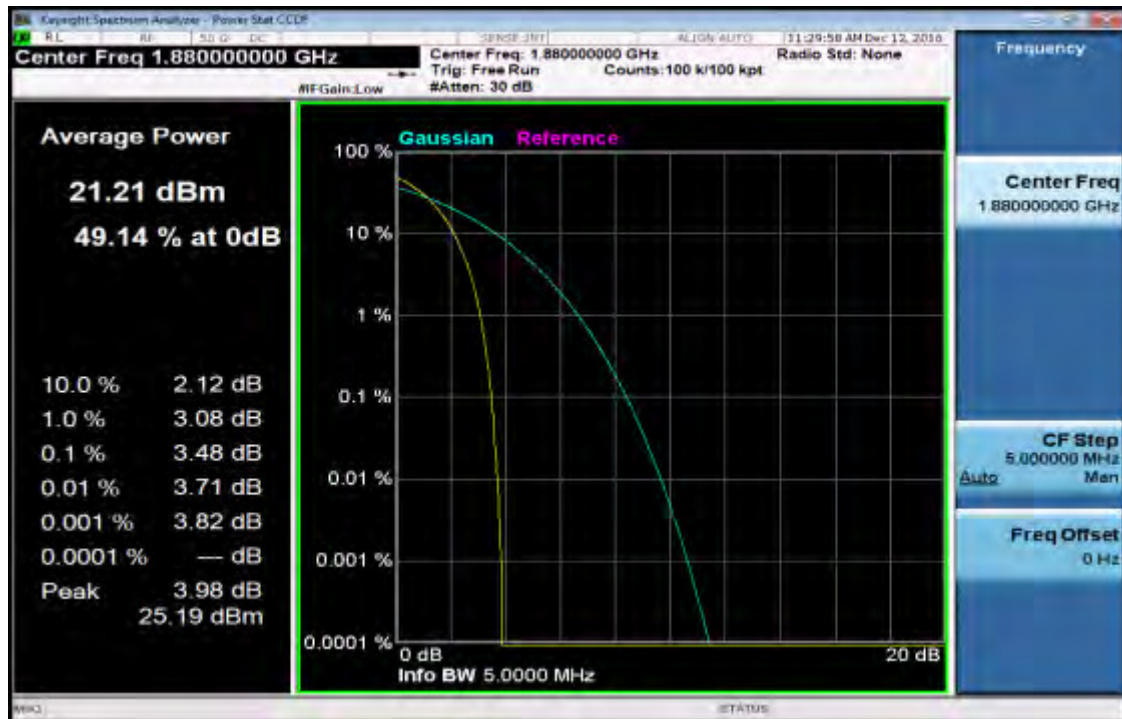
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## HSDPA II Channel Mid



## HSDPA II Channel High



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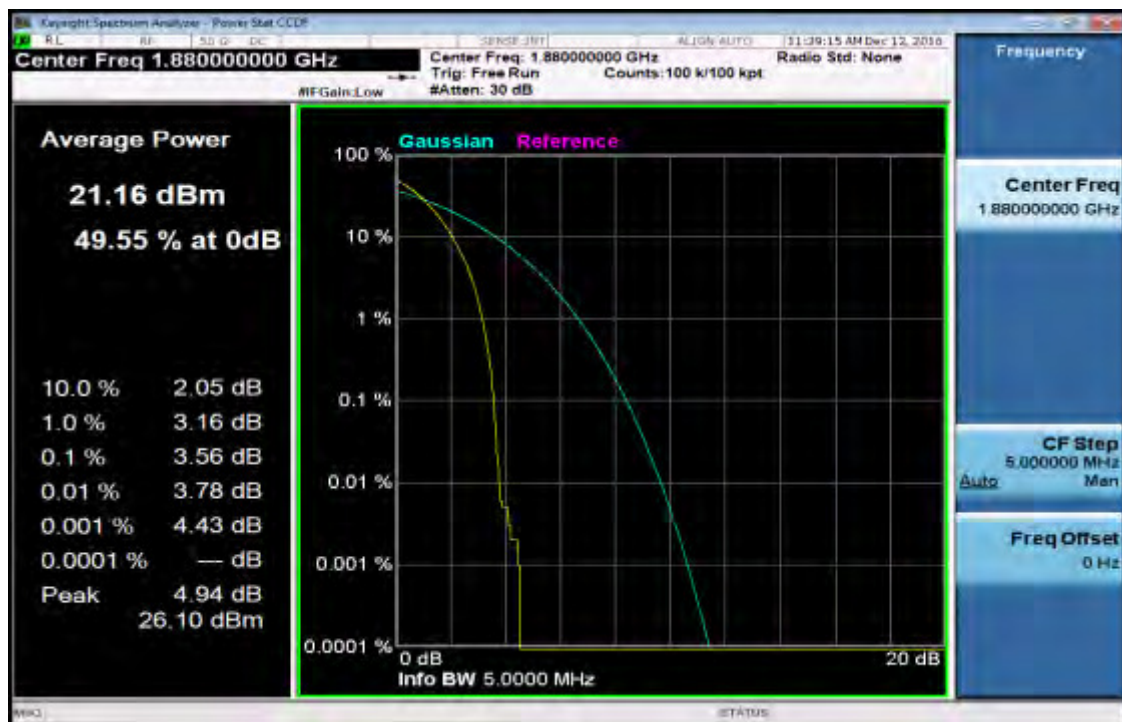
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## HSUPA II Channel Low



## HSUPA II Channel Mid



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## HSUPA II Channel High



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