



# RF TEST REPORT

**Applicant**      Quectel Wireless Solutions Co., Ltd.

**FCC ID**          XMR202011EC200TAU

**Product**        LTE Module

**Brand**           Quectel

**Model**           EC200T-AU, EC200T-AU MINIPCIE

**Report No.**      R2009A0613-R1V2

**Issue Date**     December 11, 2020

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2019)/ FCC CFR 47 Part 22H (2019)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Prepared by: Peng Tao*

*Approved by: Kai Xu*

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| Version                                                                                                                                                                                                                         | Revision description                | Issue Date        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------|
| Rev.0                                                                                                                                                                                                                           | /                                   | October 29, 2020  |
| Rev.1                                                                                                                                                                                                                           | Update test results of section 5.3. | December 9, 2020  |
| Rev.2                                                                                                                                                                                                                           | Update test results of section 5.2. | December 11, 2020 |
| Note: This revised report (Report No. R2009A0613-R1V2) supersedes and replaces the previously issued report (Report No. R2009A0613-R1V1). Please discard or destroy the previously issued report and dispose of it accordingly. |                                     |                   |



### Summary of measurement results

| No.                                                                                                                                                                                                                                                                                   | Test Case                                    | Clause in FCC rules               | Verdict |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------|---------|
| 1                                                                                                                                                                                                                                                                                     | RF Power Output and Effective Radiated Power | 2.1046<br>22.913(a)(5)            | PASS    |
| 2                                                                                                                                                                                                                                                                                     | Occupied Bandwidth                           | 2.1049                            | PASS    |
| 3                                                                                                                                                                                                                                                                                     | Band Edge Compliance                         | 2.1051 / 22.917(a)                | PASS    |
| 4                                                                                                                                                                                                                                                                                     | Peak-to-Average Power Ratio                  | 22.913(d)/<br>KDB 971168 D01(5.7) | PASS    |
| 5                                                                                                                                                                                                                                                                                     | Frequency Stability                          | 2.1055 / 22.355                   | PASS    |
| 6                                                                                                                                                                                                                                                                                     | Spurious Emissions at Antenna Terminals      | 2.1051 / 22.917(a)                | PASS    |
| 7                                                                                                                                                                                                                                                                                     | Radiates Spurious Emission                   | 2.1053 / 22.917 (a)               | PASS    |
| Date of Testing: September 21, 2020~December 11, 2020                                                                                                                                                                                                                                 |                                              |                                   |         |
| Date of Sample Received: September 21, 2020                                                                                                                                                                                                                                           |                                              |                                   |         |
| Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. |                                              |                                   |         |



## 1. Test Laboratory

### 1.1. Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

### 1.2. Test facility

#### **FCC (Designation number: CN1179, Test Firm Registration Number: 446626)**

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

#### **A2LA (Certificate Number: 3857.01)**

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

### 1.3. Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
Address: No.145, Jintang Rd, Tangzhen Industry Park, Pudong  
City: Shanghai  
Post code: 201201  
Country: P. R. China  
Contact: Xu Kai  
Telephone: +86-021-50791141/2/3  
Fax: +86-021-50791141/2/3-8000  
Website: <http://www.ta-shanghai.com>  
E-mail: [xukai@ta-shanghai.com](mailto:xukai@ta-shanghai.com)

## 2. General Description of Equipment under Test

### 2.3. Applicant and Manufacturer Information

|                      |                                                                                                                       |
|----------------------|-----------------------------------------------------------------------------------------------------------------------|
| Applicant            | Quectel Wireless Solutions Co., Ltd.                                                                                  |
| Applicant address    | Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233 |
| Manufacturer         | Quectel Wireless Solutions Co., Ltd.                                                                                  |
| Manufacturer address | Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233 |

### 2.4. General Information

| EUT Description                                                                                                |                                                                    |            |           |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------|-----------|
| Model                                                                                                          | EC200T-AU, EC200T-AU MINIPICIE                                     |            |           |
| IMEI                                                                                                           | EC200T-AU: 861157040008266<br>EC200T-AU MINIPICIE: 861157040006484 |            |           |
| Hardware Version                                                                                               | R1.0                                                               |            |           |
| Software Version                                                                                               | EC200TAUAAR05A01M16                                                |            |           |
| Power Supply                                                                                                   | External power supply                                              |            |           |
| Antenna Type                                                                                                   | External Antenna                                                   |            |           |
| Antenna Gain                                                                                                   | Frequency (MHz)                                                    | Gain (dBi) |           |
|                                                                                                                | 820                                                                | 2.53       |           |
|                                                                                                                | 830                                                                | 2.13       |           |
|                                                                                                                | 840                                                                | 1.89       |           |
|                                                                                                                | 850                                                                | 2.29       |           |
| Test Mode(s)                                                                                                   | GSM 850;                                                           |            |           |
| Test Modulation                                                                                                | (GSM/GPRS)GMSK, (EGPRS) GMSK/ 8PSK;                                |            |           |
| GPRS Multislot Class                                                                                           | 33                                                                 |            |           |
| EGPRS Multislot Class                                                                                          | 33                                                                 |            |           |
| Maximum E.R.P.                                                                                                 | GSM 850:                                                           | 33.33dBm   |           |
| Rated Power Supply Voltage                                                                                     | 3.8V                                                               |            |           |
| Extreme Voltage                                                                                                | Minimum: 3.4V    Maximum: 4.5V                                     |            |           |
| Extreme Temperature                                                                                            | Lowest: -30°C    Highest: +50°C                                    |            |           |
| Operating Voltage                                                                                              | Minimum: 3.4V    Maximum: 4.5V                                     |            |           |
| Operating Temperature                                                                                          | Lowest: -40°C    Highest: +85°C                                    |            |           |
| Operating Frequency Range(s)                                                                                   | Band                                                               | Tx (MHz)   | Rx (MHz)  |
|                                                                                                                | GSM850                                                             | 824 ~ 849  | 869 ~ 894 |
| Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant. |                                                                    |            |           |

The detailed product difference between EC200T-AU and EC200T-AU MINIPICIE please refers to the Difference Statements letter. For conducted test items, this report only record the test



results of EC200T-AU.



### 3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**Test standards:**

**FCC CFR 47 Part 22H (2019)**

**ANSI C63.26 (2015)**

**Reference standard:**

**FCC CFR47 Part 2 (2019)**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

## 4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (X axis, horizontal polarization) and the worst case was recorded.

All mode and data rates and positions were investigated. Subsequently, only the worst case emissions are reported.

The following testing in GSM is set based on the maximum RF Output Power.

Test modes are chosen to be reported as the worst case configuration below:

| Test items                                   | Modes/Modulation                         |
|----------------------------------------------|------------------------------------------|
|                                              | GSM 850                                  |
| RF Power Output and Effective Radiated power | GSM<br>GPRS<br>EGPRS                     |
| Occupied Bandwidth                           | GSM<br>GPRS(1Tx slot)<br>EGPRS(1Tx slot) |
| Band Edge Compliance                         | GSM<br>GPRS(1Tx slot)<br>EGPRS(1Tx slot) |
| Peak-to-Average Power Ratio                  | GSM<br>GPRS(1Tx slot)<br>EGPRS(1Tx slot) |
| Frequency Stability                          | GSM<br>GPRS(1Tx slot)<br>EGPRS(1Tx slot) |
| Spurious Emissions at Antenna Terminals      | GSM                                      |
| Radiates Spurious Emission                   | GSM                                      |

## 5. Test Case Results

### 5.1. RF Power Output and Effective Radiated Power

#### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

#### Methods of Measurement

During the process of the testing, The EUT was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

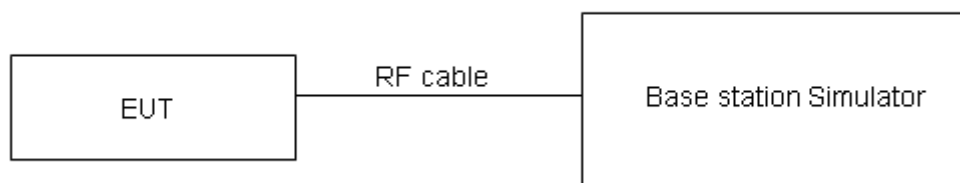
ERP can then be calculated as follows:

$$\text{EIRP (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBi)}$$

where:dBd refers to gain relative to an ideal dipole.

$$\text{EIRP (dBm)} = \text{ERP (dBm)} + 2.15 \text{ (dB)}.$$

#### Test Setup



#### Limits

No specific RF power output requirements in part 2.1046.

Rule Part 22.913(a)(5) specifies that "Mobile/portable stations are limited to 7 watts ERP".

| Limit | $\leq 7 \text{ W}$ (38.45 dBm) |
|-------|--------------------------------|
|-------|--------------------------------|

#### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U = 0.4 \text{ dB}$  for RF power output,  $k = 2$ ,  $U = 1.19 \text{ dB}$  for ERP .

## Test Results

| GSM 850     |          | Maximum Output Power (dBm) |             |             | ERP (dBm)   |             |             |
|-------------|----------|----------------------------|-------------|-------------|-------------|-------------|-------------|
|             |          | Channel 128                | Channel 190 | Channel 251 | Channel 128 | Channel 190 | Channel 251 |
|             |          | 824.2 (MHz)                | 836.6 (MHz) | 848.8 (MHz) | 824.2 (MHz) | 836.6 (MHz) | 848.8 (MHz) |
| GSM(GMSK)   | Results  | 32.95                      | 33.12       | 33.16       | 33.33       | 32.86       | 33.30       |
| GPRS (GMSK) | 1TXslot  | 32.92                      | 33.10       | 33.11       | 33.30       | 32.84       | 33.25       |
|             | 2TXslots | 32.84                      | 33.05       | 33.07       | 33.22       | 32.79       | 33.21       |
|             | 3TXslots | 31.40                      | 31.62       | 31.68       | 31.78       | 31.36       | 31.82       |
|             | 4TXslots | 29.28                      | 29.52       | 29.59       | 29.66       | 29.26       | 29.73       |
| EGPRS       | 1TXslot  | 27.07                      | 27.35       | 27.83       | 27.45       | 27.09       | 27.97       |
|             | 2TXslots | 26.98                      | 27.26       | 27.81       | 27.36       | 27.00       | 27.95       |
|             | 3TXslots | 25.30                      | 25.64       | 26.25       | 25.68       | 25.38       | 26.39       |
|             | 4TXslots | 23.24                      | 23.78       | 24.28       | 23.62       | 23.52       | 24.42       |

## 5.2. Occupied Bandwidth

### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

### Method of Measurement

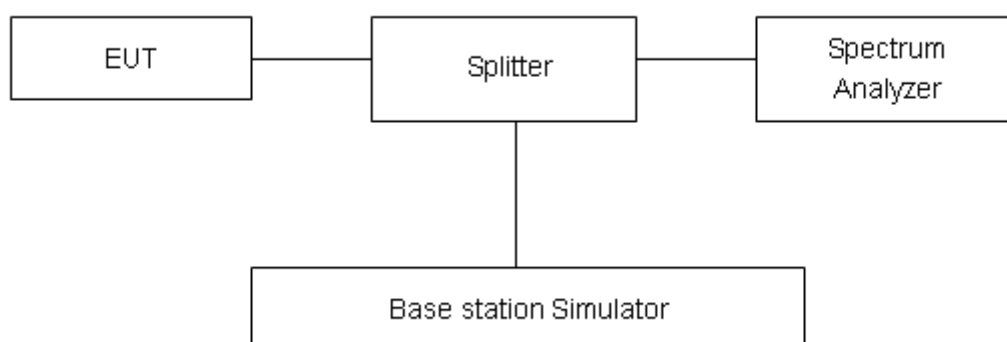
The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 3kHz, VBW is set to 10kHz for GSM 850,

RBW is set to 10kHz, VBW is set to 30kHz for GPRS 850/EGPRS 850,

99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

### Test Setup



### Limits

No specific occupied bandwidth requirements in part 2.1049.

### Measurement Uncertainty

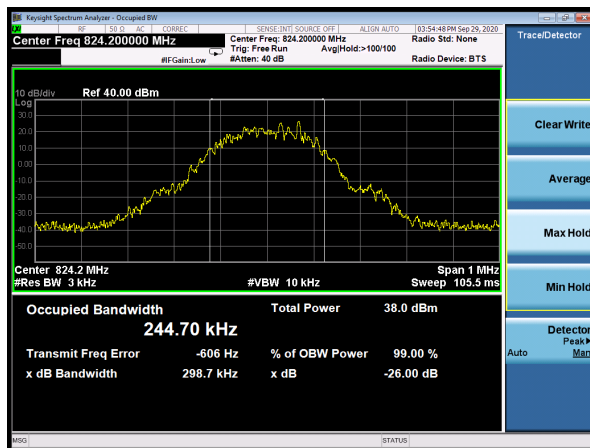
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U = 624\text{Hz}$ .

# Test Result

| Mode             | Channel | Frequency (MHz) | 99% Power Bandwidth (MHz) | -26dBc Bandwidth(MHz) |
|------------------|---------|-----------------|---------------------------|-----------------------|
| GSM 850 (GMSK)   | 128     | 824.2           | 0.2447                    | 0.2987                |
|                  | 190     | 836.6           | 0.2455                    | 0.2997                |
|                  | 251     | 848.8           | 0.2459                    | 0.2984                |
| GPRS 850 (GMSK)  | 128     | 824.2           | 0.2429                    | 0.3158                |
|                  | 190     | 836.6           | 0.2451                    | 0.3172                |
|                  | 251     | 848.8           | 0.2447                    | 0.3114                |
| EGPRS 850 (8PSK) | 128     | 824.2           | 0.2456                    | 0.3216                |
|                  | 190     | 836.6           | 0.2439                    | 0.3113                |
|                  | 251     | 848.8           | 0.2437                    | 0.3141                |



## GSM 850 CH-Low



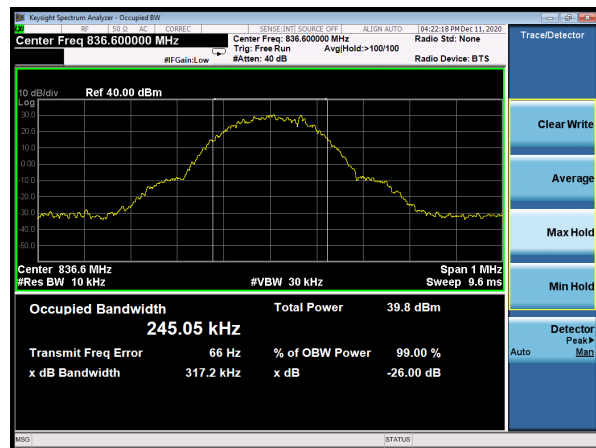
## GSM 850 GPRS CH-Low



## GSM 850 CH-Middle



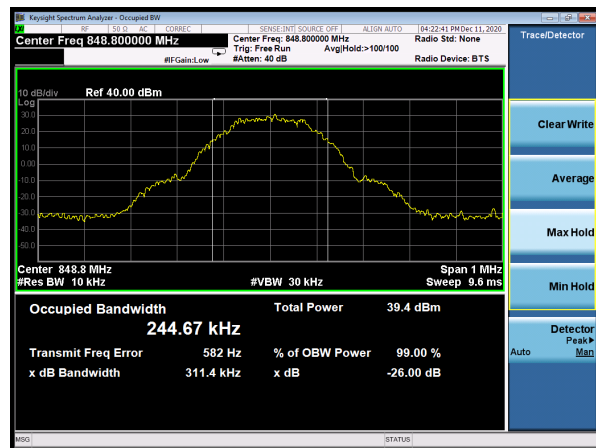
## GSM 850 GPRS CH-Middle



## GSM 850 CH-High

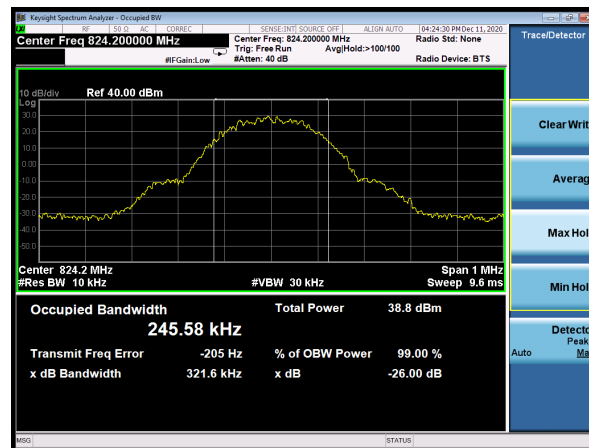


## GSM 850 GPRS CH-High

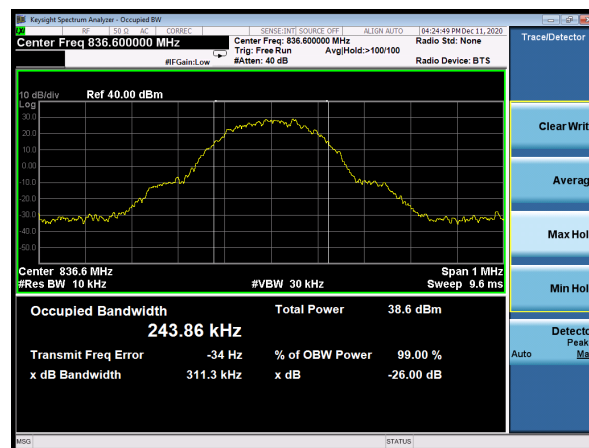




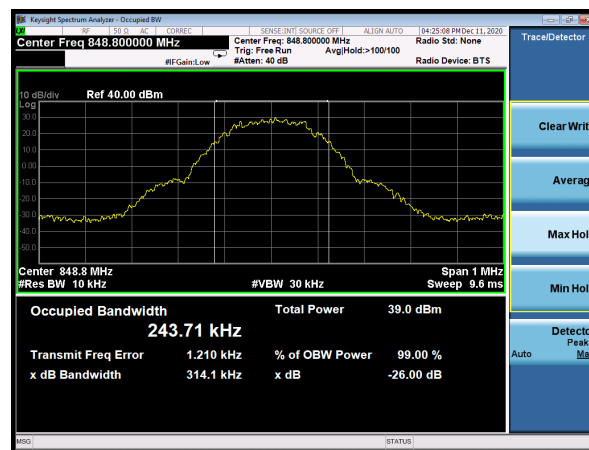
## GSM 850 EGPRS CH-Low



## GSM 850 EGPRS CH-Middle



## GSM 850 EGPRS CH-High



### 5.3. Band Edge Compliance

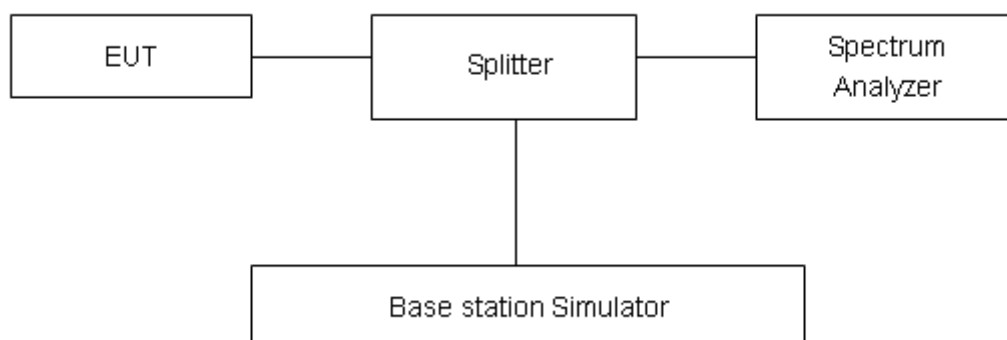
#### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

#### Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The average detector is used. RBW is set to 6.2kHz, VBW is set to 3x RBW for GSM 850, Spectrum analyzer plots are included on the following pages.

#### Test Setup



#### Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.”

| Limit | -13 dBm |
|-------|---------|
|-------|---------|

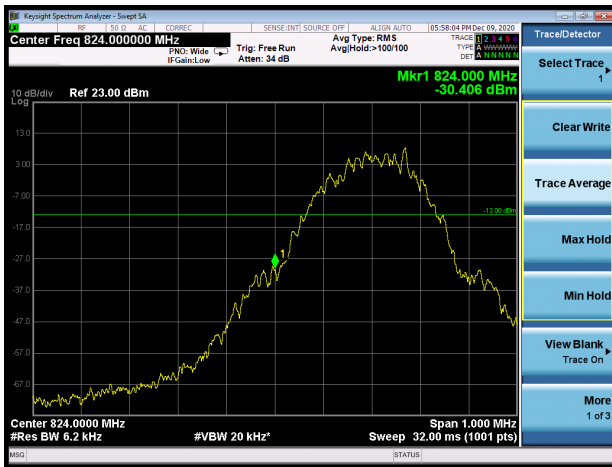
#### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ ,  $U=0.684$ dB.



## Test Result:

GSM 850 CH-Low



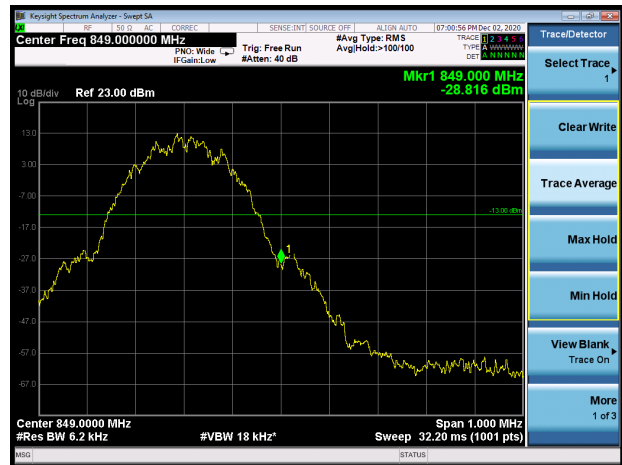
GSM 850 CH-High



GSM 850 GPRS CH-Low



GSM 850 GPRS CH-High



GSM 850 EGPRS CH-Low



GSM 850 EGPRS CH-High



## 5.4. Peak-to-Average Power Ratio (PAPR)

### Ambient condition

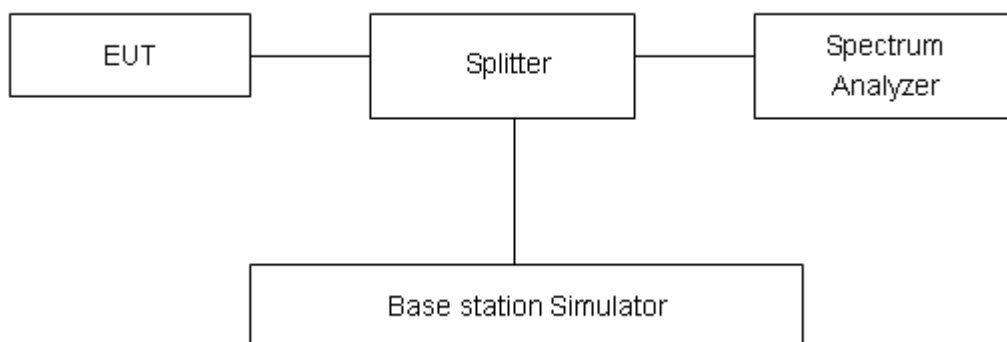
| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

### Methods of Measurement

Measure the total peak power and record as  $P_{Pk}$ . And measure the total average power and record as  $P_{Avg}$ . Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).$$

### Test Setup



### Limits

According to the Sec. 22.913(d), The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U = 0.4$  dB.

## Test Results

| Mode             | Channel | Frequency (MHz) | Peak (dBm) | Avg (dBm) | PAPR (dB) | Limit (dB) | Conclusion |
|------------------|---------|-----------------|------------|-----------|-----------|------------|------------|
| GSM 850 (GMSK)   | 128     | 824.2           | 34.15      | 32.95     | 1.20      | ≤13        | PASS       |
|                  | 190     | 836.6           | 34.37      | 33.12     | 1.25      | ≤13        | PASS       |
|                  | 251     | 848.8           | 34.40      | 33.16     | 1.24      | ≤13        | PASS       |
| GPRS 850 (GMSK)  | 128     | 824.2           | 34.18      | 32.92     | 1.26      | ≤13        | PASS       |
|                  | 190     | 836.6           | 34.39      | 33.10     | 1.29      | ≤13        | PASS       |
|                  | 251     | 848.8           | 34.42      | 33.11     | 1.31      | ≤13        | PASS       |
| EGPRS 850 (8PSK) | 128     | 824.2           | 28.95      | 27.07     | 1.88      | ≤13        | PASS       |
|                  | 190     | 836.6           | 23.23      | 21.35     | 1.88      | ≤13        | PASS       |
|                  | 251     | 848.8           | 29.69      | 27.83     | 1.86      | ≤13        | PASS       |

## 5.5. Frequency Stability

### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

### Method of Measurement

#### Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +50°C in 10°C step size,

(1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

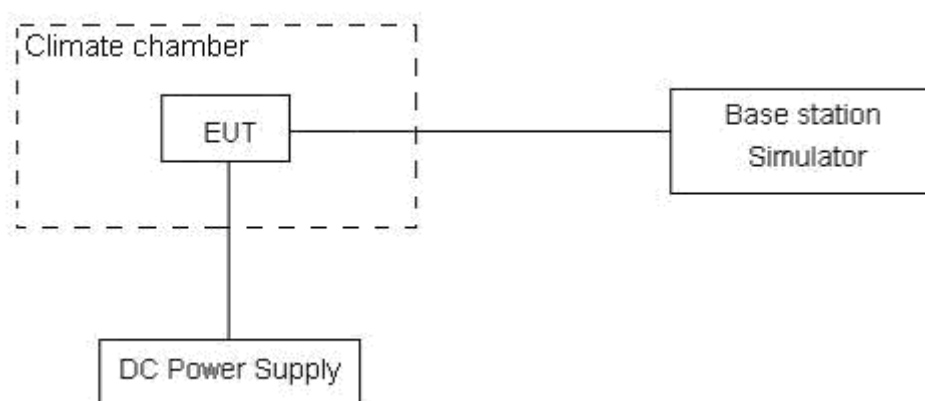
(3) Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements. Frequency Stability (Voltage Variation)

The frequency stability shall be measured with variation of primary supply voltage as follows:

**Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.4 V and 4.5 V, with a nominal voltage of 3.8V.

### Test setup



**Limits**

According to the Sec. 22.355, the frequency stability of the carrier shall be accurate to within 2.5 ppm of the received frequency for mobile stations.

|        |                |
|--------|----------------|
| Limits | $\leq 2.5$ ppm |
|--------|----------------|

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor  $k = 3$ ,  $U = 0.01$  ppm.



## Test Result

| GSM850         |         |                    |                    |                                 |                                 |         |
|----------------|---------|--------------------|--------------------|---------------------------------|---------------------------------|---------|
| Condition      |         | Freq.Error<br>(Hz) | Freq.Error<br>(Hz) | Frequency<br>Stability<br>(ppm) | Frequency<br>Stability<br>(ppm) | Verdict |
| Temperature    | Voltage | GMSK               | 8PSK               | GMSK                            | 8PSK                            |         |
| Normal (25℃)   | Normal  | 13.73              | 13.68              | 0.00730                         | 0.00727                         | PASS    |
| Extreme (50℃)  |         | 10.93              | 5.74               | 0.00581                         | 0.00305                         | PASS    |
| Extreme (40℃)  |         | 17.51              | 4.08               | 0.00931                         | 0.00217                         | PASS    |
| Extreme (30℃)  |         | 16.92              | 16.18              | 0.00900                         | 0.00861                         | PASS    |
| Extreme (20℃)  |         | 1.85               | 4.49               | 0.00098                         | 0.00239                         | PASS    |
| Extreme (10℃)  |         | 9.83               | 2.74               | 0.00523                         | 0.00146                         | PASS    |
| Extreme (0℃)   |         | 17.87              | 15.18              | 0.00950                         | 0.00807                         | PASS    |
| Extreme (-10℃) |         | 3.95               | 3.60               | 0.00210                         | 0.00192                         | PASS    |
| Extreme (-20℃) |         | 3.03               | 3.60               | 0.00161                         | 0.00191                         | PASS    |
| Extreme (-30℃) |         | 5.28               | 8.19               | 0.00281                         | 0.00436                         | PASS    |
| 25℃            | LV      | 8.85               | 17.51              | 0.00471                         | 0.00931                         | PASS    |
|                | HV      | 7.94               | 9.13               | 0.00423                         | 0.00486                         | PASS    |

## 5.6. Spurious Emissions at Antenna Terminals

### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

### Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

RBW is set to 1 kHz (0.009MHz~0.15 MHz),

RBW is set to 10 kHz (0.15 MHz~30 MHz),

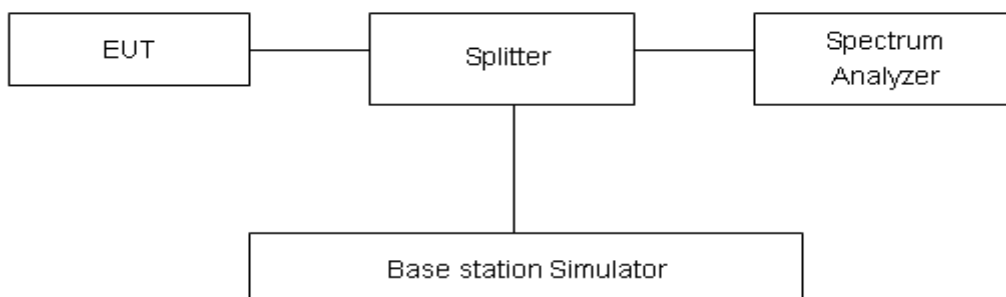
RBW is set to 100 kHz (30MHz~1000 MHz),

RBW is set to 1000 kHz (above 1000MHz),

Sweep is set to ATUO.

The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

### Test setup



### Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.”

| Limit | -13 dBm |
|-------|---------|
|-------|---------|

### Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ .

| Frequency  | Uncertainty |
|------------|-------------|
| 9kHz-1GHz  | 0.684 dB    |
| 1GHz-18GHz | 1.407 dB    |

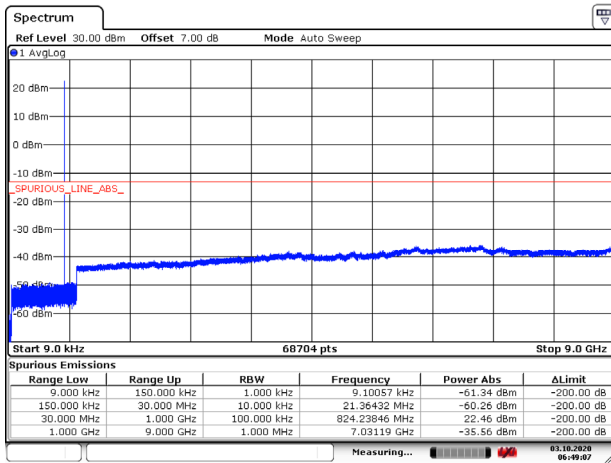


## Test Result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

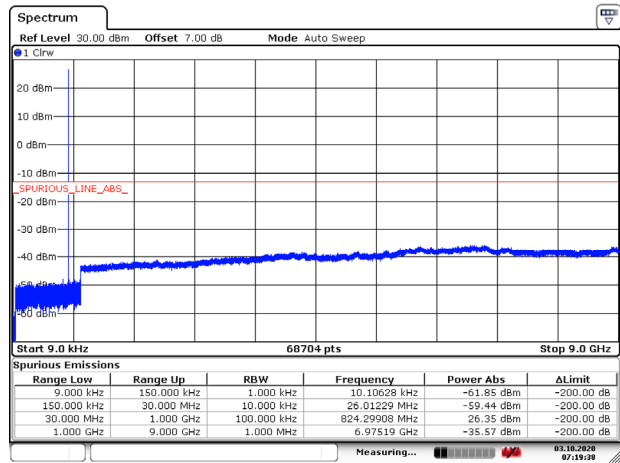
The signal beyond the limit is carrier.

## GSM 850 CH-Low 9kHz ~ 9GHz



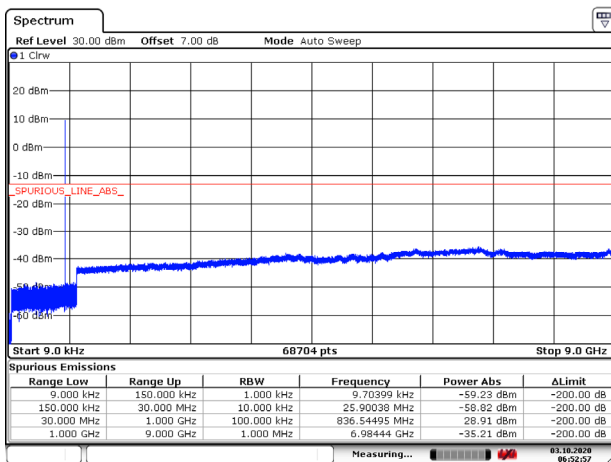
Date: 3.OCT.2020 06:49:08

## GPRS 850 CH-Low 9kHz ~ 9GHz



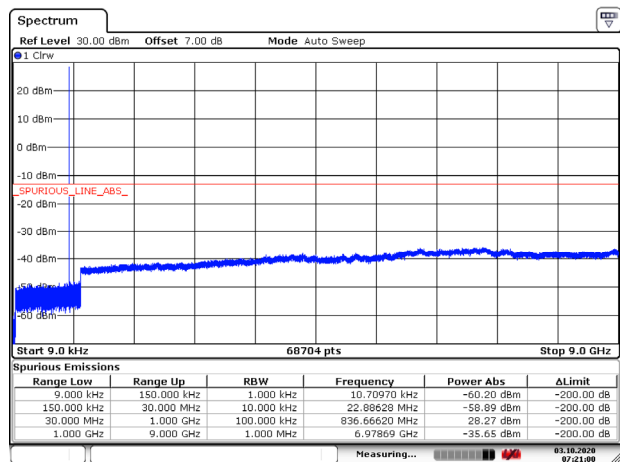
Date: 3.OCT.2020 07:19:38

## GSM 850 CH-Middle 9kHz ~ 9GHz



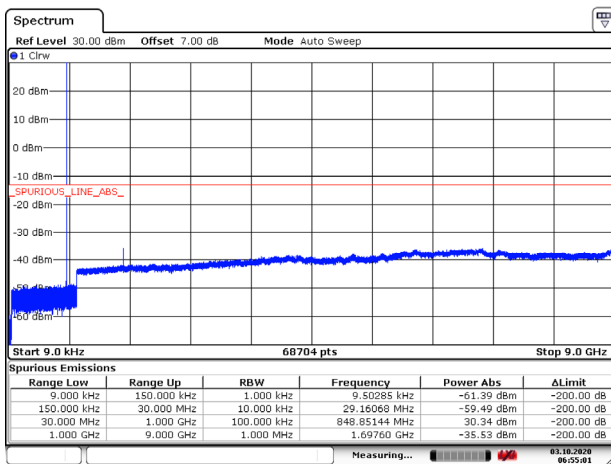
Date: 3.OCT.2020 06:52:57

## GPRS 850 CH-Middle 9kHz ~ 9GHz



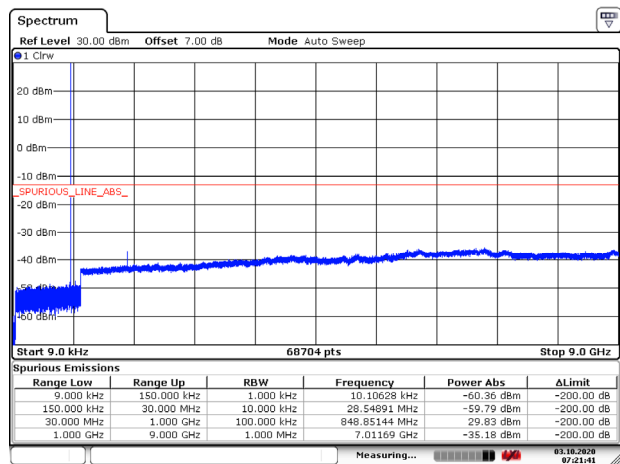
Date: 3.OCT.2020 07:21:00

## GSM 850 CH-High 9kHz ~ 9GHz



Date: 3.OCT.2020 06:55:01

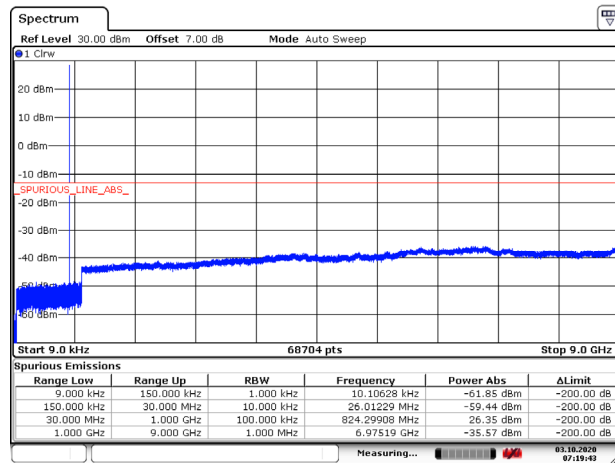
## GPRS 850 CH-High 9kHz ~ 9GHz



Date: 3.OCT.2020 07:21:42

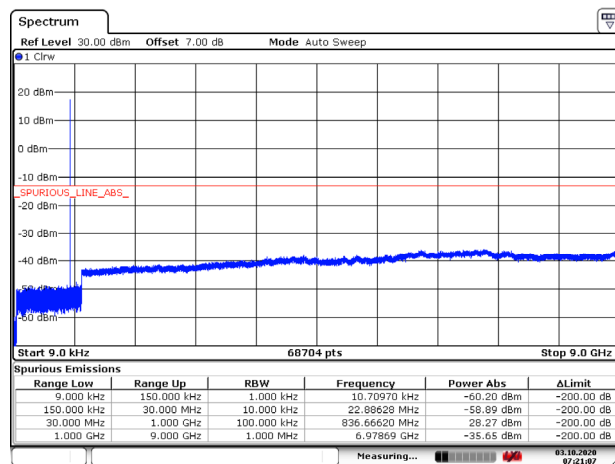


## EGPRS 850 CH-Low 9kHz ~ 9GHz



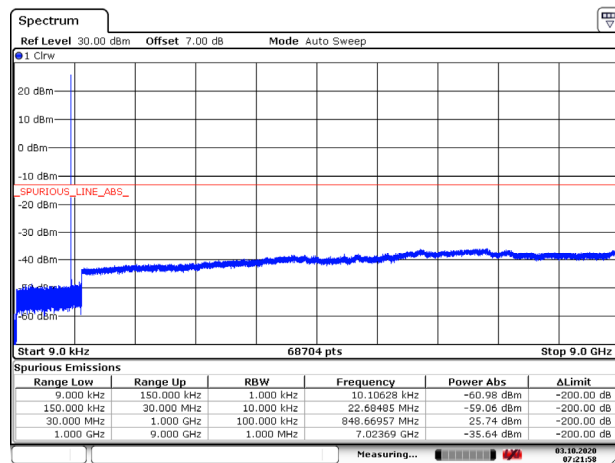
Date: 3.OCT.2020 07:19:43

## EGPRS 850 CH-Middle 9kHz ~ 9GHz



Date: 3.OCT.2020 07:21:06

## EGPRS 850 CH-High 9kHz ~ 9GHz



Date: 3.OCT.2020 07:21:58

## 5.7. Radiates Spurious Emission

### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

### Method of Measurement

1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A loop antenna, A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=200Hz,VBW=600Hz for 9kHz-150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz , RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 1GHz, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAG) should be recorded after test.
7. The measurement results are obtained as described below:  

$$\text{Power(EIRP)} = \text{PMea} - \text{PAG} - \text{Pcl} + \text{Ga}$$
The measurement results are amend as described below:  

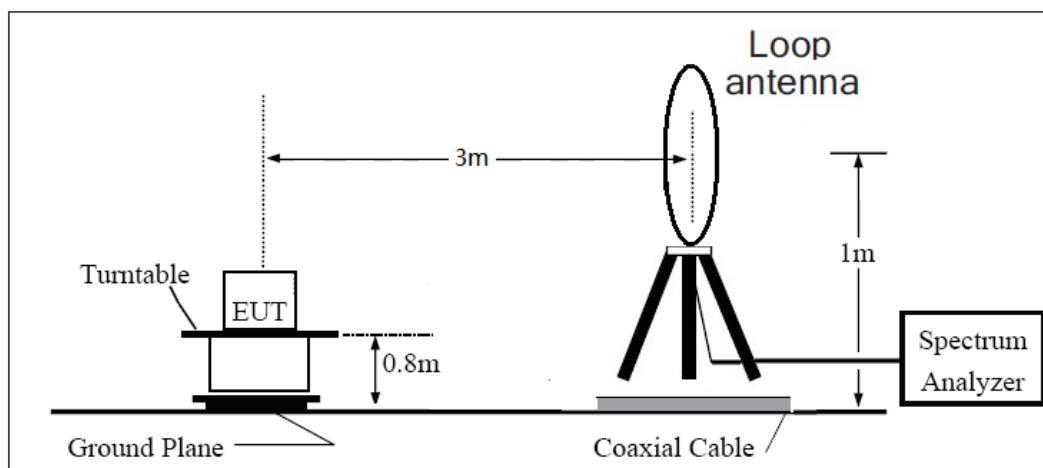
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

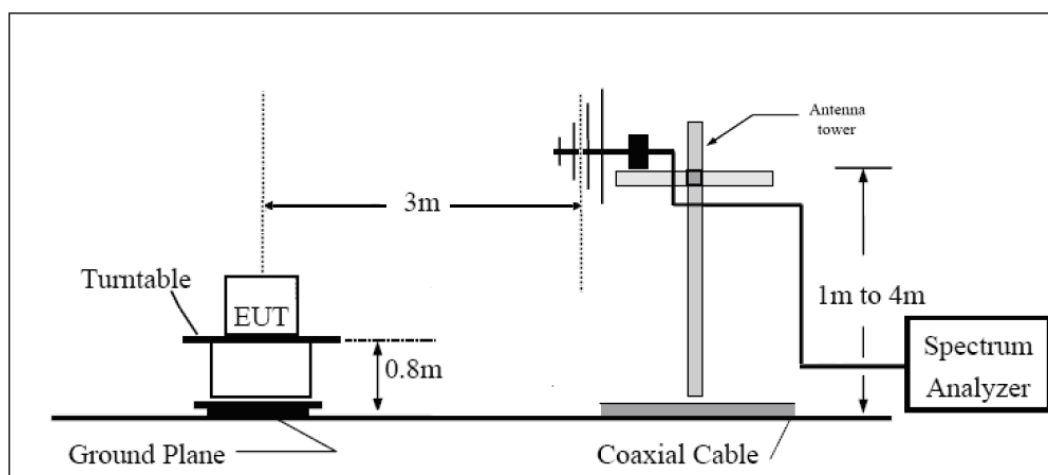
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

## Test setup

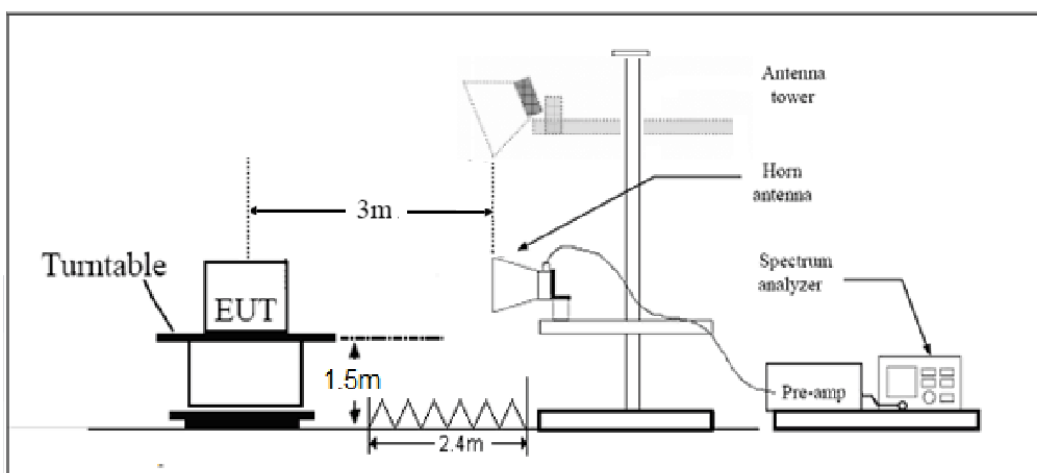
### 9KHz ~ 30MHz



### 30MHz ~ 1GHz



### Above 1GHz





Note: Area side:2.4mX3.6m

### Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.”

|       |         |
|-------|---------|
| Limit | -13 dBm |
|-------|---------|

### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ ,  $U = 3.55$  dB.

**Test Result**

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

**EC200T-AU**

GSM 850 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|----------|-----------------|----------|-----------------|------------|----------------------|-----------------|-------------|-------------|---------------|
| 2        | 1673.1          | -51.59   | 2.00            | 10.75      | Horizontal           | -44.99          | -13.00      | 31.99       | 180           |
| 3        | 2509.7          | -39.80   | 2.51            | 11.05      | Horizontal           | -33.41          | -13.00      | 20.41       | 180           |
| 4        | 3346.4          | -52.80   | 4.20            | 11.15      | Horizontal           | -48.00          | -13.00      | 35.00       | 225           |
| 5        | 4183.0          | -47.30   | 5.20            | 11.15      | Horizontal           | -43.50          | -13.00      | 30.50       | 90            |
| 6        | 5019.6          | -54.40   | 5.50            | 11.95      | Horizontal           | -50.10          | -13.00      | 37.10       | 135           |
| 7        | 5856.2          | -51.00   | 5.70            | 13.55      | Horizontal           | -45.30          | -13.00      | 32.30       | 270           |
| 8        | 6692.8          | -56.50   | 6.30            | 13.75      | Horizontal           | -51.20          | -13.00      | 38.20       | 0             |
| 9        | 7529.4          | -54.20   | 6.80            | 13.85      | Horizontal           | -49.30          | -13.00      | 36.30       | 225           |
| 10       | 8366.0          | -55.50   | 6.90            | 14.25      | Horizontal           | -50.30          | -13.00      | 37.30       | 270           |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.

**EC200T-AU MINIPCIE**

GSM 850 CH-Middle

| Harmonic | Frequency (MHz) | SG (dBm) | Cable Loss (dB) | Gain (dBi) | Antenna Polarization | ERP Level (dBm) | Limit (dBm) | Margin (dB) | Azimuth (deg) |
|----------|-----------------|----------|-----------------|------------|----------------------|-----------------|-------------|-------------|---------------|
| 2        | 1673.3          | -44.20   | 2.00            | 10.75      | Horizontal           | -37.60          | -13.00      | 24.60       | 180           |
| 3        | 2509.5          | -37.02   | 2.51            | 11.05      | Horizontal           | -30.63          | -13.00      | 17.63       | 45            |
| 4        | 3346.4          | -52.71   | 4.20            | 11.15      | Horizontal           | -47.91          | -13.00      | 34.91       | 225           |
| 5        | 4183.0          | -55.53   | 5.20            | 11.15      | Horizontal           | -51.73          | -13.00      | 38.73       | 135           |
| 6        | 5019.6          | -53.71   | 5.50            | 11.95      | Horizontal           | -49.41          | -13.00      | 36.41       | 135           |
| 7        | 5856.2          | -49.62   | 5.70            | 13.55      | Horizontal           | -43.92          | -13.00      | 30.92       | 0             |
| 8        | 6692.8          | -56.98   | 6.30            | 13.75      | Horizontal           | -51.68          | -13.00      | 38.68       | 45            |
| 9        | 7529.4          | -53.68   | 6.80            | 13.85      | Horizontal           | -48.78          | -13.00      | 35.78       | 225           |
| 10       | 8366.0          | -53.83   | 6.90            | 14.25      | Horizontal           | -48.63          | -13.00      | 35.63       | 90            |

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2.The worst emission was found in the antenna is Horizontal position.

## 6. Main Test Instruments

| Name                                 | Manufacturer | Type         | Serial Number | Calibration Date | Expiration Date |
|--------------------------------------|--------------|--------------|---------------|------------------|-----------------|
| Base Station Simulator               | R&S          | CMW500       | 113824        | 2020-05-18       | 2021-05-17      |
| Power Splitter                       | Hua Xiang    | SHX-GF2-2-13 | 10120101      | /                | /               |
| Spectrum Analyzer                    | Key sight    | N9010A       | MY50210259    | 2020-05-18       | 2021-05-17      |
| Universal Radio Communication Tester | Key sight    | E5515C       | MY48367192    | 2020-05-27       | 2021-05-26      |
| Signal Analyzer                      | R&S          | FSV30        | 100815        | 2019-12-15       | 2020-12-14      |
| Loop Antenna                         | SCHWARZBECK  | FMZB1519     | 1519-047      | 2020-04-02       | 2023-04-01      |
| Trilog Antenna                       | SCHWARZBECK  | VUBL 9163    | 9163-201      | 2017-11-18       | 2020-11-17      |
| Horn Antenna                         | R&S          | HF907        | 102723        | 2018-08-11       | 2021-08-10      |
| Horn Antenna                         | ETS-Lindgren | 3160-09      | 00102643      | 2018-06-20       | 2021-06-19      |
| Signal generator                     | R&S          | SMB 100A     | 102594        | 2020-05-18       | 2021-05-17      |
| Climatic Chamber                     | ESPEC        | SU-242       | 93000506      | 2017-12-17       | 2020-12-16      |
| Preamplifier                         | R&S          | SCU18        | 102327        | 2020-05-18       | 2021-05-17      |
| MOB COMMS DC SUPPLY                  | Keysight     | 66319D       | MY43004105    | 2020-05-18       | 2021-05-17      |
| RF Cable                             | Agilent      | SMA 15cm     | 0001          | 2020-06-12       | 2020-12-11      |
| Software                             | R&S          | EMC32        | 9.26.0        | /                | /               |

\*\*\*\*\*END OF REPORT \*\*\*\*\*



## **ANNEX A: The EUT Appearance**

The EUT Appearance are submitted separately.



## **ANNEX B: Test Setup Photos**

The Test Setup Photos are submitted separately.