

# **TEST REPORT**

FCC LTE B26(Part22) Test for SM-A266M/DS

Certification

**APPLICANT** SAMSUNG Electronics Co., Ltd.

REPORT NO. HCT-RF-2501-FC043

**DATE OF ISSUE** January 22, 2025

> Tested by Jae Ryang Do

**Technical Manager** Jong Seok Lee

BongJai Huh



# HCT CO.,LTD.

2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea Tel. +82 31 645 6300 Fax. +82 31 645 6401

# TEST REPORT

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Additional Model SM-A266M

| Applicant           | SAMSUNG Electronics Co., Ltd.<br>129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of<br>Korea                            |
|---------------------|---|
| Product Name        | Mobile Phone  |
| Model Name          | SM-A266M/DS   |
| Date of Test        | December 09, 2024~ January 17, 2025   |
| FCC ID              | A3LSMA266M  |
| Location of Test    | ■ Permanent Testing Lab □ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggido, Republic of Korea) |
| FCC Classification: | PCS Licensed Transmitter Held to Ear (PCE)  |
| Test Standard Used  | FCC Rule Part: § 22   |
| Test Results        | PASS  |

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## **REVISION HISTORY**

The revision history for this test report is shown in table.

| Revision No. | Date of Issue    | Description     |
|--------------|------------------|-----------------|
| 0            | January 22, 2025 | Initial Release |

#### **Notice**

#### Content

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated

The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked \*.

Information provided by the applicant is marked \*\*.

Test results provided by external providers are marked \*\*\*.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

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# **MEASUREMENT REPORT**

# 1. GENERAL INFORMATION

| Applicant Name:     | SAMSUNG Electronics Co., Ltd.  |
|---------------------|--|
| Address:            | 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea                     |
| FCC ID:             | A3LSMA266M   |
| Application Type:   | Certification  |
| FCC Classification: | PCS Licensed Transmitter Held to Ear (PCE)   |
| FCC Rule Part(s):   | § 22   |
| EUT Type:           | Mobile phone   |
| Model(s):           | SM-A266M/DS  |
| Additional Model(s) | SM-A266M   |
|                     | 824.7 MHz – 848.3 MHz (LTE – Band 26 (1.4 MHz))  |
| Tx Frequency:       | 825.5 MHz – 847.5 MHz (LTE – Band 26 (3 MHz))<br>826.5 MHz – 846.5 MHz (LTE – Band 26 (5 MHz)) |
| TXTTequency.        | 829.0 MHz – 844.0 MHz (LTE – Band 26 (10 MHz))   |
|                     | 831.5 MHz – 841.5 MHz (LTE – Band 26 (15 MHz))   |
| Date(s) of Tests:   | December 09, 2024~ January 17, 2025  |
| Carial mumban       | Radiated : R3CXB0V4KLT   |
| Serial number:      | Conducted: 855de5dce5297ece  |

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# 1.1 MAXIMUM OUTPUT POWER

| Mode                | Ty Fraguency          | Tx Frequency Emission |            | ERP               |                     |  |
|---------------------|-----------------------|-----------------------|------------|-------------------|---------------------|--|
| (MHz)               | Tx Frequency<br>(MHz) | Designator            | Modulation | Max. Power<br>(W) | Max. Power<br>(dBm) |  |
|                     |                       | 1M10G7D               | QPSK       | 0.070             | 18.48               |  |
| LTE David 20 (1.4)  | 0247 0402             | 1M10W7D               | 16QAM      | 0.061             | 17.82               |  |
| LTE – Band 26 (1.4) | 824.7 – 848.3         | 1M10W7D               | 64QAM      | 0.048             | 16.77               |  |
|                     |                       | 1M10W7D               | 256QAM     | 0.023             | 13.68               |  |
|                     |                       | 2M72G7D               | QPSK       | 0.066             | 18.18               |  |
| LTE Donad 2C/2\     | 025 5 047 5           | 2M72W7D               | 16QAM      | 0.057             | 17.57               |  |
| LTE – Band 26 (3)   | 825.5 – 847.5         | 2M71W7D               | 64QAM      | 0.044             | 16.47               |  |
|                     |                       | 2M71W7D               | 256QAM     | 0.022             | 13.46               |  |
|                     |                       | 4M53G7D               | QPSK       | 0.067             | 18.28               |  |
| LTE   Band 26 /E)   | 826.5 – 846.5         | 4M52W7D               | 16QAM      | 0.061             | 17.84               |  |
| LTE – Band 26 (5)   | 820.5 - 840.5         | 4M52W7D               | 64QAM      | 0.050             | 17.00               |  |
|                     |                       | 4M52W7D               | 256QAM     | 0.024             | 13.82               |  |
|                     |                       | 9M02G7D               | QPSK       | 0.069             | 18.41               |  |
| LTE – Band 26 (10)  | 829.0 – 844.0         | 9M00W7D               | 16QAM      | 0.059             | 17.69               |  |
| LTE - Dalla 20 (10) | 829.0 - 844.0         | 9M02W7D               | 64QAM      | 0.046             | 16.67               |  |
|                     |                       | 8M99W7D               | 256QAM     | 0.024             | 13.75               |  |
|                     |                       | 13M5G7D               | QPSK       | 0.067             | 18.27               |  |
| LTE   Band 26 (15)  | 021 5 041 5           | 13M4W7D               | 16QAM      | 0.057             | 17.55               |  |
| LTE – Band 26 (15)  | 831.5 – 841.5         | 13M5W7D               | 64QAM      | 0.047             | 16.76               |  |
|                     |                       | 13M5W7D               | 256QAM     | 0.023             | 13.53               |  |

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#### 2. INTRODUCTION

## 2.1 DESCRIPTION OF EUT

Please refer to the [2G3G] Test Report.

## 2.2 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

#### 2.3 TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74**, **Seoicheon-ro 578beon-gil**, **Majang-myeon**, **Icheon-si**, **Gyeonggi-do**, **Republic of Korea** 

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# 3. DESCRIPTION OF TESTS

# **3.1 TEST PROCEDURE**

| Test Description                                    | Test Procedure Used   |
|---|---|
| Occupied Bandwidth                                  | - KDB 971168 D01 v03r01 - Section 4.3<br>- ANSI C63.26-2015 - Section 5.4.4   |
| Band Edge   | - KDB 971168 D01 v03r01 - Section 6.0<br>- ANSI C63.26-2015 - Section 5.7     |
| Spurious and Harmonic Emissions at Antenna Terminal | - KDB 971168 D01 v03r01 - Section 6.0<br>- ANSI C63.26-2015 - Section 5.7     |
| Conducted Output Power                              | - N/A (See SAR Report)  |
| Peak- to- Average Ratio                             | - KDB 971168 D01 v03r01 - Section 5.7<br>- ANSI C63.26-2015 - Section 5.2.3.4 |
| Frequency stability                                 | - ANSI C63.26-2015 – Section 5.6  |
| Radiated Power                                      | - ANSI C63.26-2015 - Section 5.2.4.4<br>- KDB 971168 D01 v03r01 - Section 5.8 |
| Radiated Spurious and Harmonic Emissions            | - ANSI C63.26-2015 - Section 5.5.3<br>- KDB 971168 D01 v03r01 - Section 5.8   |

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#### 3.2 RADIATED POWER

### **Test Overview**

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna.

#### **Test Settings**

- 1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
- 2. RBW = 1 5% of the expected OBW, not to exceed 1 MHz
- 3. VBW  $\geq$  3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points > 2 x span / RBW
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

#### **Test Note**

- 1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
- 2. A half wave dipole is then substituted in place of the EUT. For emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

$$P_{d (dBm)} = Pg_{(dBm)} - cable loss_{(dB)} + antenna gain_{(dB)}$$

Where:  $P_d$  is the dipole equivalent power and  $P_g$  is the generator output power into the substitution antenna.

- 3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value.
  - These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
- 4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- 5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

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#### 3.3 RADIATED SPURIOUS EMISSIONS

#### **Test Overview**

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method.

#### **Test Settings**

- 1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
- $2. VBW \ge 3 \times RBW$
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = Peak
- 6. Trace mode = Max Hold
- 7. The trace was allowed to stabilize
- 8. Test channel: Low/ Middle/ High
- 9. Frequency range: We are performed all frequency to 10th harmonics from 9 kHz.

#### **Test Note**

- 1. Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data
- 3. For spurious emissions above 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The spurious emissions is calculated by the following formula;

Result (dBm) = Pg (dBm) - cable loss (dB) + antenna gain (dBi)

Where: Pg is the generator output power into the substitution antenna.

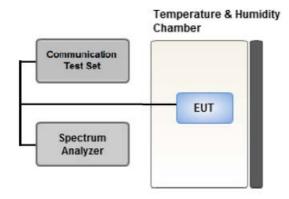
If the fundamental frequency is below 1 GHz, RF output power has been converted to EIRP.

EIRP (dBm) = ERP (dBm) + 2.15

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#### 3.4 PEAK- TO- AVERAGE RATIO



**Test setup** 

#### ① CCDF Procedure for PAPR

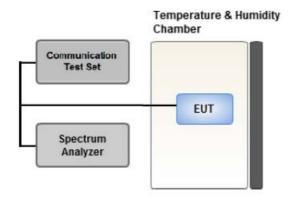
## **Test Settings**

- 1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
- 2. Set the number of counts to a value that stabilizes the measured CCDF curve;
- 3. Set the measurement interval as follows:
  - .- for continuous transmissions, set to 1 ms,  $\,$
  - .- or burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- 4. Record the maximum PAPR level associated with a probability of 0.1 %.

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#### 3.5 OCCUPIED BANDWIDTH.



#### Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

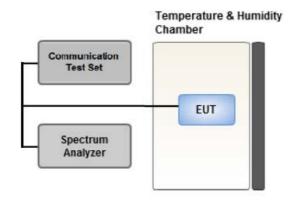
#### **Test Settings**

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5 % of the expected OBW
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
  - 1 5 % of the 99 % occupied bandwidth observed in Step 7

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#### 3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



**Test setup** 

#### **Test Overview**

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic.

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

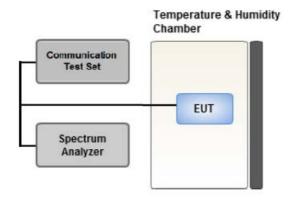
## **Test Settings**

- 1. RBW = 1 MHz
- 2. VBW  $\geq$  3 MHz
- 3. Detector = Peak
- 4. Trace Mode = Max Hold
- 5. Sweep time = auto
- 6. Number of points in sweep ≥ 2 x Span / RBW

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#### 3.7 BAND EDGE



**Test setup** 

## **Test Overview**

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

### **Test Settings**

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW > 1 % of the emission bandwidth
- 4.  $VBW > 3 \times RBW$
- 5. Detector = RMS
- 6. Number of sweep points  $\geq$  2 x Span/RBW
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

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#### **Test Notes**

According to FCC 22.917, 24.238, 27.53 specified that 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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels(low and high operational frequency range.)

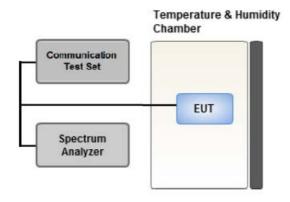
The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.

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#### 3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



#### Test setup

#### **Test Overview**

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.

The frequency stability of the transmitter is measured by:

1. Temperature:

The temperature is varied from -30 °C to +50 °C in 10 °C increments using an environmental chamber.

- 2. Primary Supply Voltage:
  - .- Unless otherwise specified, vary primary supply voltage from 85 % to 115 % of the nominal value for other than hand carried battery equipment.
  - .- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

## **Test Settings**

- 1. The carrier frequency of the transmitter is measured at room temperature (20 °C to provide a reference).
- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

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## 3.9 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.

Mode: Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)

Worst case: Stand alone

- All simultaneous transmission scenarios of operation were investigated, and the test results showed no additional significant emissions relative to the least restrictive limit were observed.

Therefore, only the worst case(stand-alone) results were reported.

- In the case of radiated spurious emissions, all bandwidth of operation were investigated and the worst case bandwidth results are reported. (Worst case: 1.4 MHz)
- The worst case is reported with the EUT positioning, modulations, and paging service configurations shown in the test data
- Please refer to the table below.
- SM-A266M/DS & additional models were tested and the worst case results are reported.

(Worst case: SM-A266M/DS)

#### [Worst case]

| Test Description                         | Modulation | RB size         | RB offset | Axis |
|--|------------|-----------------|-----------|------|
|  | QPSK,      |                 |           |      |
| Effective Radiated Power                 | 16QAM,     | See Section 8.1 |           | Υ    |
|  | 64QAM,     |                 |           |      |
|  | 256QAM     |                 |           |      |
| Radiated Spurious and Harmonic Emissions | QPSK       | See Se          | ction 8.2 | Х    |

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# 3.10 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.
- SM-A266M/DS & additional models were tested and the worst case results are reported.

(Worst case: SM-A266M/DS)

## [Worst case]

| Test Description                                    | Modulation                          | Bandwidth<br>(MHz)   | Frequency            | RB size | RB offset |
|---|-------------------------------------|----------------------|----------------------|---------|-----------|
| Occupied Bandwidth                                  | QPSK,<br>16QAM,<br>64QAM,<br>256QAM | 1.4, 3, 5, 10,<br>15 | Mid                  | Full RB | 0         |
| Peak-To-Average Ratio                               | QPSK,<br>16QAM,<br>64QAM,<br>256QAM | 1.4, 3, 5, 10,<br>15 | Mid                  | Full RB | 0         |
|   |                                     | 1.4                  | Low                  | 1       | 0         |
|   |                                     | 1.4                  | High                 | 1       | 5         |
|   |                                     | 3                    | Low                  | 1       | 0         |
|   |                                     |                      | High                 | 1       | 14        |
|   |                                     | 5                    | Low                  | 1       | 0         |
| Band Edge   | QPSK                                |                      | High                 | 1       | 24        |
| Danu Luge   | QPSK                                | 10                   | Low                  | 1       | 0         |
|   |                                     |                      | High                 | 1       | 49        |
|   |                                     | 15                   | Low                  | 1       | 0         |
|   |                                     |                      | High                 | 1       | 74        |
|   |                                     | 1.4, 3, 5, 10,       | Low,                 | Full RB | 0         |
|   |                                     | 15                   | High                 | FUILND  | U         |
| Spurious and Harmonic Emissions at Antenna Terminal | QPSK                                | 1.4, 3, 5, 10,       | Low,<br>Mid,<br>High | 1       | 0         |

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# 4. LIST OF TEST EQUIPMENT

| Equipment   | Model                     | Manufacture         | Serial No.  | Due to<br>Calibration | Calibration<br>Interval |
|---|---------------------------|---------------------|-------------|-----------------------|-------------------------|
| RF Switching System                                     | Switch box(1.2 G HPF+LNA) | HCT CO., LTD.,      | F1L1        | 11/11/2025            | Annual                  |
| RF Switching System                                     | Switch box(3.3 G HPF+LNA) | HCT CO., LTD.,      | F1L2        | 11/11/2025            | Annual                  |
| RF Switching System                                     | Switch box(LNA)           | HCT CO., LTD.,      | F1L4        | 11/11/2025            | Annual                  |
| RF Switching System                                     | Switch box(6 G HPF+LNA)   | HCT CO., LTD.,      | F1L7        | 11/11/2025            | Annual                  |
| Power Splitter(DC ~ 26.5 GHz)                           | 11667B                    | Hewlett Packard     | 5001        | 04/17/2025            | Annual                  |
| DC Power Supply   | E3632A                    | Agilent             | MY40010147  | 08/06/2025            | Annual                  |
| Dipole Antenna  | UHAP                      | Schwarzbeck         | 01274       | 03/10/2026            | Biennial                |
| Dipole Antenna  | UHAP                      | Schwarzbeck         | 01288       | 08/07/2026            | Biennial                |
| Chamber   | SU-642                    | ESPEC               | 93008124    | 02/19/2025            | Annual                  |
| Horn Antenna(1 ~ 18 GHz)                                | BBHA 9120D                | Schwarzbeck         | 147         | 08/17/2025            | Biennial                |
| Horn Antenna(1 ~ 18 GHz)                                | BBHA 9120D                | Schwarzbeck         | 9120D-1298  | 09/11/2025            | Biennial                |
| Horn Antenna(15 ~ 40 GHz)                               | BBHA 9170                 | Schwarzbeck         | BBHA9170342 | 09/20/2026            | Biennial                |
| Horn Antenna(15 ~ 40 GHz)                               | BBHA 9170                 | Schwarzbeck         | BBHA9170124 | 03/28/2025            | Biennial                |
| Signal Analyzer(10 Hz ~ 26.5 GHz)                       | N9020A                    | Agilent             | MY52090906  | 04/19/2025            | Annual                  |
| ATTENUATOR(20 dB)                                       | 8493C                     | Hewlett Packard     | 17280       | 04/17/2025            | Annual                  |
| Spectrum Analyzer(10 Hz ~ 40 GHz)                       | FSV40                     | REOHDE &<br>SCHWARZ | 100931      | 08/06/2025            | Annual                  |
| Base Station  | 8960 (E5515C)             | Agilent             | MY48360800  | 08/05/2025            | Annual                  |
| Loop Antenna(9 kHz ~ 30 MHz)                            | FMZB1513                  | Schwarzbeck         | 1513-333    | 03/07/2026            | Biennial                |
| Trilog Broadband Antenna                                | VULB9168                  | Schwarzbeck         | 895         | 08/28/2026            | Biennial                |
| Trilog Broadband Antenna                                | VULB9168                  | Schwarzbeck         | 1135        | 08/19/2026            | Biennial                |
| Wideband Radio Communication<br>Tester                  | MT8821C                   | Anritsu Corp.       | 6262094331  | 11/13/2025            | Annual                  |
| Wideband Radio Communication<br>Tester                  | MT8820C                   | Anritsu Corp.       | 6201026545  | 11/20/2025            | Annual                  |
| SIGNAL GENERATOR<br>(100 kHz ~ 40 GHz)                  | SMB100A                   | REOHDE &<br>SCHWARZ | 177633      | 07/26/2025            | Annual                  |
| Signal Analyzer(5 Hz ~ 40.0 GHz)                        | N9030B                    | KEYSIGHT            | MY55480167  | 05/17/2025            | Annual                  |
| FCC LTE Mobile Conducted RF<br>Automation Test Software | -                         | HCT CO., LTD.,      | -           | -                     | -                       |

#### Note:

- 1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
- 2. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

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## 5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Parameter                              | Expanded Uncertainty (±kHz)                     |
|--|---|
| Occupied Bandwidth                     | 95 (Confidence level about 95 %, <i>k</i> =2)   |
| Frequency stability                    | 28 (Confidence level about 95 %, <i>k</i> =2)   |
|  |   |
| Parameter                              | Expanded Uncertainty (±dB)                      |
| Block Edge                             | 0.70 (Confidence level about 95 %, <i>k</i> =2) |
| Conducted Spurious Emissions           | 1.18 (Confidence level about 95 %, <i>k</i> =2) |
| Peak- to- Average Ratio                | 0.68 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Power                         | 4.74 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Disturbance (9 kHz ~ 30 MHz)  | 4.36 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Disturbance (30 MHz ~ 1 GHz)  | 5.70 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Disturbance (1 GHz ~ 18 GHz)  | 5.52 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Disturbance (18 GHz ~ 40 GHz) | 5.66 (Confidence level about 95 %, <i>k</i> =2) |
| Radiated Disturbance (Above 40 GHz)    | 5.58 (Confidence level about 95 %, <i>k</i> =2) |

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# **6. SUMMARY OF TEST RESULTS**

6.1 Test Condition: Conducted Test

| Test Description  | FCC Part<br>Section(s)   | Test Limit  | Test Result |
|---|--------------------------|---|-------------|
| Occupied Bandwidth  | § 2.1049                 | N/A   | PASS        |
| Band Edge / Spurious and Harmonic<br>Emissions at Antenna Terminal. | § 2.1051,<br>§ 22.917(a) | < 43 + 10log10 (P[Watts]) at Band Edge and<br>for all out-of-band emissions | PASS        |
| Conducted Output Power  | § 2.1046                 | N/A   | See Note1   |
| Peak- to- Average Ratio   | § 22.913(d)              | < 13 dB   | PASS        |
| Frequency stability / variation of ambient temperature              | § 2.1055,<br>§ 22.355    | < 2.5 ppm   | PASS        |

## Note:

1. See SAR Report

6.2 Test Condition: Radiated Test

| Test Description               | FCC Part<br>Section(s)                  | Test Limit                | Test Result |
|--------------------------------|---|---------------------------|-------------|
| Effective Radiated Power       | § 22.913(a)(5)                          | < 7 Watts max. ERP        | PASS        |
| Radiated Spurious and Harmonic | § 2.1053, < 43 + 10log10 (P[Watts]) for |                           | DACC        |
| Emissions                      | § 22.917(a)                             | all out-of band emissions | PASS        |

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#### 7. SAMPLE CALCULATION

#### 7.1 ERP Sample Calculation

| Ch.     | Ch./ Freq. |             | Substitute  | Ant. Gain | CI   | Pol. | ERP   |       |  |
|---------|------------|-------------|-------------|-----------|------|------|-------|-------|--|
| channel | Freq.(MHz) | Level (dBm) | Level (dBm) | (dBd)     | C.L  | POI. | w     | dBm   |  |
| 128     | 824.20     | -21.37      | 38.40       | -10.61    | 0.95 | Н    | 0.483 | 26.84 |  |

#### ERP = Substitute LEVEL(dBm) + Ant. Gain - CL(Cable Loss)

- 1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
- 2) During the test, the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

#### 7.2 EIRP Sample Calculation

| Ch.     | / Freq.    | Measured    | Substitute  | Ant. Gain | CI   | Dol  | EIRP  |       |  |
|---------|------------|-------------|-------------|-----------|------|------|-------|-------|--|
| channel | Freq.(MHz) | Level (dBm) | Level (dBm) | (dBi)     | C.L  | Pol. | W     | dBm   |  |
| 20175   | 1,732.50   | -15.75      | 18.45       | 9.90      | 1.76 | Н    | 0.456 | 26.59 |  |

## EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

- 1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
- 2) During the test, the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

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## 7.3. Emission Designator

## **GSM Emission Designator**

Emission Designator = 249KGXW

GSM BW = 249 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

## WCDMA Emission Designator

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

## **QAM Modulation**

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

## **EDGE Emission Designator**

Emission Designator = 249KG7W

GSM BW = 249 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

#### **QPSK Modulation**

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

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# 8. TEST DATA

# **8.1 EFFECTIVE RADIATED POWER**

| Freq   | Mod/      | N4 - d. d - 4: | Measured    | Substitute  | Ant. Gain | 6.1  | D-1 | Limit | El    | RP    | F    | RB     |  |
|--------|-----------|----------------|-------------|-------------|-----------|------|-----|-------|-------|-------|------|--------|--|
| (MHz)  | Bandwidth | Modulation     | Level (dBm) | Level (dBm) | (dBd)     | C.L  | Pol | W     | W     | dBm   | Size | Offset |  |
|        |           | QPSK           | -33.89      | 28.42       | -9.95     | 1.44 | V   |       | 0.050 | 17.03 |      |        |  |
| 0247   |           | 16-QAM         | -34.56      | 27.75       | -9.95     | 1.44 | V   |       | 0.043 | 16.36 | •    | _      |  |
| 824.7  |           | 64-QAM         | -35.61      | 26.70       | -9.95     | 1.44 | V   |       | 0.034 | 15.31 | 1    | 5      |  |
|        |           | 256-QAM        | -38.72      | 23.59       | -9.95     | 1.44 | V   |       | 0.017 | 12.20 |      |        |  |
|        |           | QPSK           | -33.37      | 29.04       | -9.95     | 1.45 | V   |       | 0.058 | 17.64 |      |        |  |
| 026.5  | LTE 26    | 16-QAM         | -34.04      | 28.37       | -9.95     | 1.45 | V   | <     | 0.050 | 16.97 | •    |        |  |
| 836.5  | (1.4 MHz) | 64-QAM         | -35.02      | 27.39       | -9.95     | 1.45 | V   | 7.00  | 0.040 | 15.99 | 1    | 0      |  |
|        |           | 256-QAM        | -38.13      | 24.28       | -9.95     | 1.45 | V   |       | 0.019 | 12.88 |      |        |  |
|        |           | QPSK           | -32.94      | 29.78       | -9.85     | 1.45 | V   |       | 0.070 | 18.48 |      |        |  |
| 0.40.0 |           | 16-QAM         | -33.60      | 29.12       | -9.85     | 1.45 | V   |       | 0.061 | 17.82 |      | _      |  |
| 848.3  | 8.3       | 64-QAM         | -34.65      | 28.07       | -9.85     | 1.45 | V   |       | 0.048 | 16.77 | 1    | 5      |  |
|        |           | 256-QAM        | -37.74      | 24.98       | -9.85     | 1.45 | V   |       | 0.023 |       |      |        |  |

| Freq   | Mod/      | Ma dulati  | Measured    | Substitute  | Ant. Gain | 6.1  | Dal | Limit | ERP   |       | RB   |        |
|--------|-----------|------------|-------------|-------------|-----------|------|-----|-------|-------|-------|------|--------|
| (MHz)  | Bandwidth | Modulation | Level (dBm) | Level (dBm) | (dBd)     | C.L  | Pol | W     | W     | dBm   | Size | Offset |
|        |           | QPSK       | -33.96      | 28.40       | -9.95     | 1.44 | ٧   |       | 0.050 | 17.01 |      |        |
| 025.5  |           | 16-QAM     | -34.55      | 27.81       | -9.95     | 1.44 | ٧   |       | 0.044 | 16.42 |      | 24     |
| 825.5  |           | 64-QAM     | -35.47      | 26.89       | -9.95     | 1.44 | ٧   |       | 0.035 | 15.50 | 1    | 24     |
|        |           | 256-QAM    | -38.57      | 23.79       | -9.95     | 1.44 | ٧   |       | 0.017 | 12.40 |      |        |
|        |           | QPSK       | -33.35      | 29.06       | -9.95     | 1.45 | ٧   |       | 0.058 | 17.66 |      |        |
| 026 5  | LTE 26    | 16-QAM     | -34.00      | 28.41       | -9.95     | 1.45 | ٧   | <     | 0.050 | 17.01 |      |        |
| 836.5  | (3 MHz)   | 64-QAM     | -34.94      | 27.47       | -9.95     | 1.45 | ٧   | 7.00  | 0.040 | 16.07 | 1    | 0      |
|        |           | 256-QAM    | -38.09      | 24.32       | -9.95     | 1.45 | ٧   |       | 0.020 | 12.92 |      |        |
|        |           | QPSK       | -33.25      | 29.48       | -9.85     | 1.45 | ٧   |       | 0.066 | 18.18 |      |        |
| 0.47.5 | 347.5     | 16-QAM     | -33.86      | 28.87       | -9.85     | 1.45 | ٧   | -     | 0.057 | 17.57 |      | 2.4    |
| 847.5  |           | 64-QAM     | -34.96      | 27.77       | -9.85     | 1.45 | V   |       | 0.044 | 16.47 | .47  | 24     |
|        |           | 256-QAM    | -37.97      | 24.76       | -9.85     | 1.45 | V   |       | 0.022 | 13.46 |      |        |

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| Freq   | Mod/      |            | Measured    | Substitute  | Ant. Gain |      |     | Limit | EI    | RP    | RB   |        |
|--------|-----------|------------|-------------|-------------|-----------|------|-----|-------|-------|-------|------|--------|
| (MHz)  | Bandwidth | Modulation | Level (dBm) | Level (dBm) | (dBd)     | C.L  | Pol | W     | w     | dBm   | Size | Offset |
|        |           | QPSK       | -33.78      | 28.63       | -9.95     | 1.44 | V   |       | 0.053 | 17.24 |      |        |
| 026 5  | 26.5      | 16-QAM     | -34.52      | 27.89       | -9.95     | 1.44 | V   |       | 0.045 | 16.50 |      | 24     |
| 826.5  |           | 64-QAM     | -35.38      | 27.03       | -9.95     | 1.44 | V   |       | 0.037 | 15.64 | 1    | 24     |
|        |           | 256-QAM    | -38.41      | 24.00       | -9.95     | 1.44 | V   |       | 0.018 | 12.61 |      |        |
|        |           | QPSK       | -33.66      | 28.75       | -9.95     | 1.45 | V   |       | 0.054 | 17.35 |      |        |
| 026.5  | LTE 26    | 16-QAM     | -33.98      | 28.43       | -9.95     | 1.45 | V   | <     | 0.050 | 17.03 |      |        |
| 836.5  | (5 MHz)   | 64-QAM     | -34.97      | 27.44       | -9.95     | 1.45 | V   | 7.00  | 0.040 | 16.04 | 1    | 0      |
|        |           | 256-QAM    | -38.31      | 24.10       | -9.95     | 1.45 | V   |       | 0.019 | 12.70 |      |        |
|        |           | QPSK       | -33.18      | 29.58       | -9.85     | 1.45 | V   |       | 0.067 | 18.28 |      |        |
| 0.40.5 |           | 16-QAM     | -33.62      | 29.14       | -9.85     | 1.45 | V   |       | 0.061 | 17.84 | _    |        |
| 846.5  |           | 64-QAM     | -34.46      | 28.30       | -9.85     | 1.45 | V   |       | 0.050 | 17.00 | 1    | 24     |
|        |           | 256-QAM    | -37.64      | 25.12       | -9.85     | 1.45 | V   |       | 0.024 | 13.82 |      |        |

| Freq  | Mod/      | 14 - d. d. d. 44 | Measured    | Substitute  | Ant. Gain | 6.1  | Dal | Limit | E     | RP    | R    | B      |
|-------|-----------|------------------|-------------|-------------|-----------|------|-----|-------|-------|-------|------|--------|
| (MHz) | Bandwidth | Modulation       | Level (dBm) | Level (dBm) | (dBd)     | C.L  | Pol | W     | W     | dBm   | Size | Offset |
|       |           | QPSK             | -33.79      | 28.57       | -9.95     | 1.44 | V   |       | 0.052 | 17.18 |      |        |
| 020.0 |           | 16-QAM           | -34.34      | 28.02       | -9.95     | 1.44 | V   |       | 0.046 | 16.63 |      | 40     |
| 829.0 |           | 64-QAM           | -35.37      | 26.99       | -9.95     | 1.44 | V   |       | 0.036 | 15.60 | 1    | 49     |
|       |           | 256-QAM          | -38.52      | 23.84       | -9.95     | 1.44 | V   |       | 0.018 | 12.45 |      |        |
|       |           | QPSK             | -33.50      | 28.91       | -9.95     | 1.45 | V   |       | 0.056 | 17.51 |      |        |
| 026.5 | LTE 26    | 16-QAM           | -34.17      | 28.24       | -9.95     | 1.45 | V   | <     | 0.048 | 16.84 |      | 0      |
| 836.5 | (10 MHz)  | 64-QAM           | -35.27      | 27.14       | -9.95     | 1.45 | V   | 7.00  | 0.037 | 15.74 | 1    | 0      |
|       |           | 256-QAM          | -38.19      | 24.22       | -9.95     | 1.45 | V   |       | 0.019 | 12.82 |      |        |
|       |           | QPSK             | -32.93      | 29.71       | -9.85     | 1.45 | V   |       | 0.069 | 18.41 |      |        |
| 044.0 | 14.0      | 16-QAM           | -33.65      | 28.99       | -9.85     | 1.45 | V   |       | 0.059 | 17.69 | 1    | 40     |
| 844.0 |           | 64-QAM           | -34.67      | 27.97       | -9.85     | 1.45 | V   |       | 0.046 |       |      | 49     |
|       |           | 256-QAM          | -37.59      | 25.05       | -9.85     | 1.45 | V   |       | 0.024 | 13.75 |      |        |

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| Freq   | Mod/      | 84 - J. J. 42 | Measured    | Substitute  | Ant. Gain | 6.1  | D-I | Limit | El    | RP    | F    | ₹B     |
|--------|-----------|---------------|-------------|-------------|-----------|------|-----|-------|-------|-------|------|--------|
| (MHz)  | Bandwidth | Modulation    | Level (dBm) | Level (dBm) | (dBd)     | C.L  | Pol | W     | W     | dBm   | Size | Offset |
|        |           | QPSK          | -33.57      | 28.78       | -9.95     | 1.45 | V   |       | 0.055 | 17.38 |      |        |
| 021.5  |           | 16-QAM        | -34.18      | 28.17       | -9.95     | 1.45 | V   |       | 0.048 | 16.77 |      | 7.4    |
| 831.5  |           | 64-QAM        | -35.20      | 27.15       | -9.95     | 1.45 | V   |       | 0.038 | 15.75 | 1    | 74     |
|        |           | 256-QAM       | -38.16      | 24.19       | -9.95     | 1.45 | V   |       | 0.019 | 12.79 |      |        |
|        |           | QPSK          | -33.56      | 28.85       | -9.95     | 1.45 | V   |       | 0.056 | 17.45 |      |        |
| 026.5  | LTE 26    | 16-QAM        | -34.22      | 28.19       | -9.95     | 1.45 | V   | <     | 0.048 | 16.79 | . 1  |        |
| 836.5  | (15 MHz)  | 64-QAM        | -35.21      | 27.20       | -9.95     | 1.45 | V   | 7.00  | 0.038 | 15.80 | 1    | 0      |
|        |           | 256-QAM       | -38.11      | 24.30       | -9.95     | 1.45 | V   |       | 0.019 | 12.90 |      |        |
|        |           | QPSK          | -32.90      | 29.57       | -9.85     | 1.45 | V   |       | 0.067 | 18.27 |      |        |
| 0.41 5 | 841.5     |               | -33.62      | 28.85       | -9.85     | 1.45 | V   |       | 0.057 | 17.55 |      | 7.4    |
| 841.5  |           | 64-QAM        | -34.41      | 28.06       | -9.85     | 1.45 | V   |       | 0.047 | 16.76 | 1    | 74     |
|        |           | 256-QAM       | -37.64      | 24.83       | -9.85     | 1.45 | V   |       | 0.023 | 13.53 |      |        |

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## **8.2 RADIATED SPURIOUS EMISSIONS**

■ MODE: <u>LTE 26</u>

■ MODULATION SIGNAL: 1.4 MHz QPSK

■ DISTANCE: 3 meters

|                  |            | /H7\        |       |             |      |     | Result |        | F    | RB     |
|------------------|------------|-------------|-------|-------------|------|-----|--------|--------|------|--------|
| Ch               | Freq (MHz) | Level (dBm) | (dBi) | Level (dBm) | C.L  | Pol | (dBm)  | Limit  | Size | Offset |
|                  | 1 649.40   | -23.44      | 9.58  | -48.12      | 2.02 | Н   | -40.56 | -13.00 |      |        |
| 26797<br>(824.7) | 2 474.10   | -36.41      | 10.30 | -57.20      | 2.57 | V   | -49.47 | -13.00 | 1    | 5      |
| (021.17)         | 3 298.80   | -41.04      | 12.16 | -60.72      | 2.96 | V   | -51.52 | -13.00 |      |        |
|                  | 1 673.00   | -22.28      | 9.72  | -47.24      | 2.05 | Н   | -39.57 | -13.00 |      |        |
| 26915<br>(836.5) | 2 509.50   | -36.32      | 10.59 | -56.85      | 2.51 | Н   | -48.77 | -13.00 | 1    | 0      |
| (030.3)          | 3 346.00   | -37.17      | 12.37 | -57.18      | 2.96 | V   | -47.77 | -13.00 |      |        |
|                  | 1 696.60   | -21.73      | 9.85  | -46.57      | 2.07 | Н   | -38.79 | -13.00 |      |        |
| 27033<br>(848.3) | 2 544.90   | -37.04      | 10.66 | -57.60      | 2.53 | Н   | -49.47 | -13.00 | 1    | 5      |
| (010.5)          | 3 393.20   | -38.48      | 12.50 | -58.45      | 2.98 | V   | -48.93 | -13.00 |      |        |

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## 8.3 PEAK-TO-AVERAGE RATIO

| Band | Band<br>Width | Frequency<br>(MHz) | Modulation | Resource<br>Block Size | Resource<br>Block<br>Offset | Data (dB) |
|------|---------------|--------------------|------------|------------------------|-----------------------------|-----------|
|      |               |                    | QPSK       |                        |                             | 5.98      |
|      | 1 4 14 14     |                    | 16-QAM     |                        |                             | 6.58      |
|      | 1.4 MHz       |                    | 64-QAM     | 6                      |                             | 6.78      |
|      |               |                    | 256-QAM    |                        |                             | 6.92      |
|      |               |                    | QPSK       |                        |                             | 5.98      |
|      | 3 MHz         |                    | 16-QAM     | 15                     |                             | 6.57      |
|      | 3 MHZ         |                    | 64-QAM     | 15                     |                             | 6.65      |
|      |               |                    | 256-QAM    |                        |                             | 6.80      |
|      |               |                    | QPSK       |                        |                             | 5.81      |
| 26   | 5 MHz         | 836.5              | 16-QAM     | 25                     | 0                           | 6.55      |
| 26   | 5 MHZ         | 836.5              | 64-QAM     | 25                     | 0                           | 6.68      |
|      |               |                    | 256-QAM    |                        |                             | 6.77      |
|      |               |                    | QPSK       |                        |                             | 5.92      |
|      | 10 MH-        |                    | 16-QAM     | F0                     |                             | 6.46      |
|      | 10 MHz        |                    | 64-QAM     | 50                     |                             | 6.71      |
|      |               |                    | 256-QAM    |                        |                             | 6.73      |
|      |               |                    | QPSK       |                        |                             | 5.73      |
|      | 15 1411-      |                    | 16-QAM     | 75                     |                             | 6.41      |
|      | 15 MHz        |                    | 64-QAM     | 75                     |                             | 6.61      |
|      |               |                    | 256-QAM    |                        |                             | 6.71      |

# Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 57  $^{\sim}$  76.

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# **8.4 OCCUPIED BANDWIDTH**

| Band | Band<br>Width | Frequency<br>(MHz) | Modulation | Resource<br>Block Size | Resource<br>Block<br>Offset | Data (MHz) |
|------|---------------|--------------------|------------|------------------------|-----------------------------|------------|
|      |               |                    | QPSK       |                        |                             | 1.0976     |
|      | 1 4 14 1      |                    | 16-QAM     |                        |                             | 1.0989     |
|      | 1.4 MHz       |                    | 64-QAM     | 6                      |                             | 1.0968     |
|      |               |                    | 256-QAM    |                        |                             | 1.1022     |
|      |               |                    | QPSK       |                        |                             | 2.7156     |
|      | 3 MHz         |                    | 16-QAM     | 15                     |                             | 2.7156     |
|      | 3 1/111/2     |                    | 64-QAM     | 13                     |                             | 2.7073     |
|      |               |                    | 256-QAM    |                        |                             | 2.7101     |
|      |               |                    | QPSK       |                        |                             | 4.5280     |
| 26   | 5 MHz         | 836.5              | 16-QAM     | 25                     | 0                           | 4.5233     |
| 20   | J MITZ        | 030.3              | 64-QAM     | 25                     | 0                           | 4.5205     |
|      |               |                    | 256-QAM    |                        |                             | 4.5227     |
|      |               |                    | QPSK       |                        |                             | 9.0241     |
|      | 10 MHz        |                    | 16-QAM     | 50                     |                             | 9.0020     |
|      | TO MILE       |                    | 64-QAM     | 30                     |                             | 9.0153     |
|      |               |                    | 256-QAM    |                        |                             | 8.9922     |
|      |               |                    | QPSK       |                        |                             | 13.468     |
|      | 15 MHz        |                    | 16-QAM     | 75                     |                             | 13.442     |
|      | ZD IVI IZ     |                    | 64-QAM     | 15                     |                             | 13.523     |
|      |               |                    | 256-QAM    |                        |                             | 13.470     |

# Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 37  $\sim$  56.

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#### **8.5 CONDUCTED SPURIOUS EMISSIONS**

| Band | Band<br>Width<br>(MHz) | Frequency<br>(MHz) | Frequency of<br>Maximum Harmonic<br>(GHz) | Factor<br>(dB) | Measurement<br>Maximum Data<br>(dBm) | Result<br>(dBm) | Limit<br>(dBm) |
|------|------------------------|--------------------|---|----------------|--------------------------------------|-----------------|----------------|
|      |                        | 824.7              | 2.4727                                    | 27.976         | -61.819                              | -33.843         |                |
|      | 1.4                    | 836.5              | 2.5125                                    | 27.976         | -62.285                              | -34.309         |                |
|      |                        | 848.3              | 6.1915                                    | 28.591         | -67.054                              | -38.463         |                |
|      |                        | 826.5              | 2.4727                                    | 27.976         | -66.123                              | -38.147         |                |
|      | 3                      | 836.5              | 2.5026                                    | 27.976         | -66.432                              | -38.456         |                |
|      |                        | 846.5              | 2.5424                                    | 27.976         | -62.281                              | -34.305         |                |
|      |                        | 826.5              | 2.4727                                    | 27.976         | -59.283                              | -31.307         |                |
| 26   | 5                      | 836.5              | 2.5026                                    | 27.976         | -62.081                              | -34.105         | -13.00         |
|      |                        | 846.5              | 2.5424                                    | 27.976         | -65.550                              | -37.574         |                |
|      |                        | 829.0              | 2.4727                                    | 27.976         | -62.793                              | -34.817         |                |
|      | 10                     | 836.5              | 2.4926                                    | 27.976         | -64.102                              | -36.126         |                |
|      |                        | 844.0              | 2.6621                                    | 27.976         | -67.258                              | -39.282         |                |
|      |                        | 831.5              | 2.4727                                    | 27.976         | -65.523                              | -37.547         |                |
|      | 15                     | 836.5              | 2.4926                                    | 27.976         | -65.652                              | -37.676         |                |
|      |                        | 841.5              | 2.5424                                    | 27.976         | -66.818                              | -38.842         |                |

### Note:

- 1. Plots of the EUT's Conducted Spurious Emissions are shown Page 107  $\sim$  121.
- 2. Conducted Spurious Emissions was tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
- 3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)
- 4. Factor (dB) = Cable Loss + Ext. Attenuator + Power Splitter

| Frequency Range (GHz) | Factor [dB] |
|-----------------------|-------------|
| 0.03 - 1              | 25.270      |
| 1 - 5                 | 27.976      |
| 5 - 10                | 28.591      |
| 10 - 15               | 29.116      |
| 15 - 20               | 29.489      |
| Above 20(26.5)        | 30.131      |

## 8.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 77  $^{\sim}$  106.

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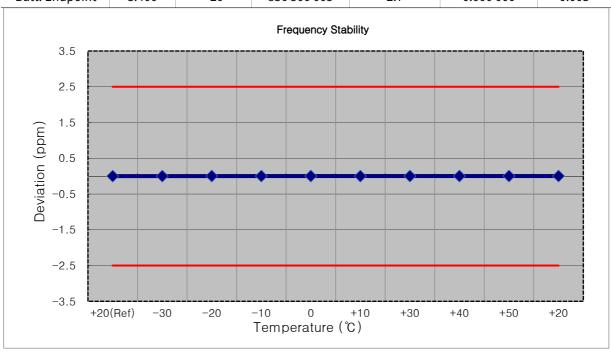
# 8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

■ MODE: LTE 26

■ OPERATING FREQUENCY: 836,500,000 Hz
 ■ CHANNEL: 26915 (1.4 MHz)
 ■ REFERENCE VOLTAGE: 4.200 VDC

lacktriangledown DEVIATION LIMIT:  $\pm$  0.000 25 % or 2.5 ppm

| Voltage        | Power | Temp.    | Frequency   | Frequency  | Deviation | ppm   |
|----------------|-------|----------|-------------|------------|-----------|-------|
| (%)            | (VDC) | (°C)     | (Hz)        | Error (Hz) | (%)       |       |
| 100 %          | 4.200 | +20(Ref) | 836 500 002 | 0.0        | 0.000 000 | 0.000 |
| 100 %          |       | -30      | 836 500 003 | 1.1        | 0.000 000 | 0.001 |
| 100 %          |       | -20      | 836 500 004 | 2.0        | 0.000 000 | 0.002 |
| 100 %          |       | -10      | 836 500 005 | 3.0        | 0.000 000 | 0.004 |
| 100 %          |       | 0        | 836 500 005 | 2.7        | 0.000 000 | 0.003 |
| 100 %          |       | +10      | 836 500 004 | 1.7        | 0.000 000 | 0.002 |
| 100 %          |       | +30      | 836 500 004 | 1.9        | 0.000 000 | 0.002 |
| 100 %          |       | +40      | 836 500 005 | 2.8        | 0.000 000 | 0.003 |
| 100 %          |       | +50      | 836 500 005 | 3.0        | 0.000 000 | 0.004 |
| Batt. Endpoint | 3.400 | +20      | 836 500 005 | 2.7        | 0.000 000 | 0.003 |



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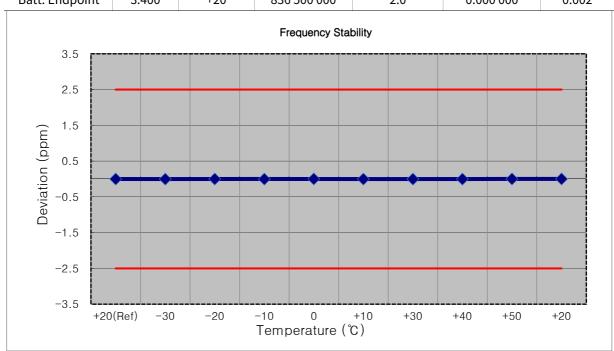
■ OPERATING FREQUENCY: 836,500,000 Hz

■ CHANNEL: <u>26915 (3 MHz)</u>

■ REFERENCE VOLTAGE: 4.200 VDC

■ DEVIATION LIMIT:  $\pm 0.000 25 \%$  or 2.5 ppm

| Voltage        | Power | Temp.    | Frequency   | Frequency  | Deviation | ppm    |
|----------------|-------|----------|-------------|------------|-----------|--------|
| (%)            | (VDC) | (°C)     | (Hz)        | Error (Hz) | (%)       |        |
| 100 %          |       | +20(Ref) | 836 499 998 | 0.0        | 0.000 000 | 0.000  |
| 100 %          |       | -30      | 836 499 996 | -2.3       | 0.000 000 | -0.003 |
| 100 %          |       | -20      | 836 499 997 | -1.3       | 0.000 000 | -0.002 |
| 100 %          |       | -10      | 836 499 996 | -2.4       | 0.000 000 | -0.003 |
| 100 %          | 4.200 | 0        | 836 500 000 | 1.5        | 0.000 000 | 0.002  |
| 100 %          |       | +10      | 836 499 996 | -2.2       | 0.000 000 | -0.003 |
| 100 %          |       | +30      | 836 499 995 | -2.8       | 0.000 000 | -0.003 |
| 100 %          |       | +40      | 836 499 995 | -2.9       | 0.000 000 | -0.003 |
| 100 %          |       | +50      | 836 500 000 | 2.0        | 0.000 000 | 0.002  |
| Batt. Endpoint | 3.400 | +20      | 836 500 000 | 2.0        | 0.000 000 | 0.002  |



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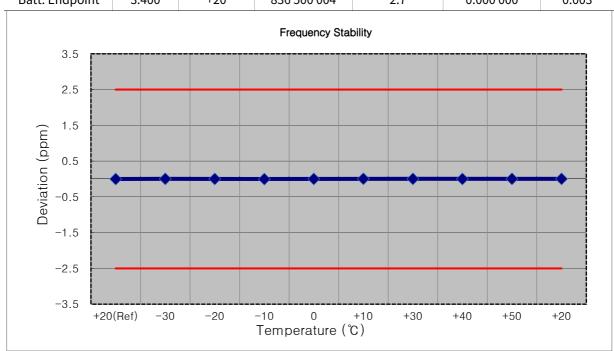
■ OPERATING FREQUENCY: 836,500,000 Hz

■ CHANNEL: <u>26915 (5 MHz)</u>

■ REFERENCE VOLTAGE: 4.200 VDC

■ DEVIATION LIMIT:  $\pm 0.000 25 \%$  or 2.5 ppm

| Voltage<br>(%) | Power<br>(VDC) | Temp. | Frequency<br>(Hz) | Frequency<br>Error (Hz) | Deviation<br>(%) | ppm    |
|----------------|----------------|-------|-------------------|-------------------------|------------------|--------|
|                |                |       |                   |                         |                  |        |
| 100 %          |                | -30   | 836 500 004       | 2.6                     | 0.000 000        | 0.003  |
| 100 %          |                | -20   | 836 500 003       | 1.9                     | 0.000 000        | 0.002  |
| 100 %          |                | -10   | 836 499 999       | -2.7                    | 0.000 000        | -0.003 |
| 100 %          | 4.200          | 0     | 836 500 004       | 2.4                     | 0.000 000        | 0.003  |
| 100 %          |                | +10   | 836 500 006       | 4.3                     | 0.000 001        | 0.005  |
| 100 %          |                | +30   | 836 500 004       | 2.7                     | 0.000 000        | 0.003  |
| 100 %          |                | +40   | 836 500 003       | 2.0                     | 0.000 000        | 0.002  |
| 100 %          |                | +50   | 836 500 004       | 2.9                     | 0.000 000        | 0.003  |
| Batt. Endpoint | 3.400          | +20   | 836 500 004       | 2.7                     | 0.000 000        | 0.003  |



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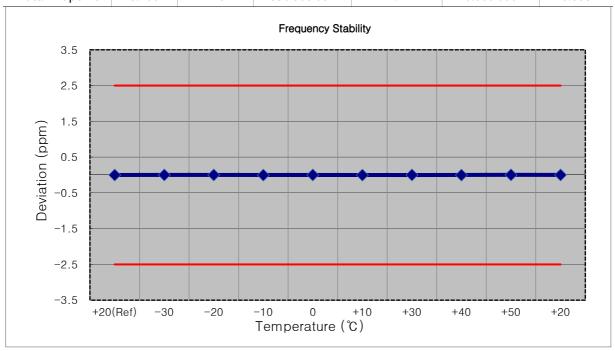
■ OPERATING FREQUENCY: 836,500,000 Hz

■ CHANNEL: <u>26915 (10 MHz)</u>

■ REFERENCE VOLTAGE: 4.200 VDC

■ DEVIATION LIMIT:  $\pm 0.000 25 \%$  or 2.5 ppm

| Voltage        | Power | Temp.    | Frequency<br>(Hz) | Frequency<br>Error (Hz) | Deviation (%) | ppm    |
|----------------|-------|----------|-------------------|-------------------------|---------------|--------|
| (%)            | (VDC) | (°C)     |                   |                         |               |        |
| 100 %          |       | +20(Ref) | 836 500 001       | 0.0                     | 0.000 000     | 0.000  |
| 100 %          |       | -30      | 836 500 003       | 1.8                     | 0.000 000     | 0.002  |
| 100 %          | 4.200 | -20      | 836 500 003       | 1.9                     | 0.000 000     | 0.002  |
| 100 %          |       | -10      | 836 500 000       | -1.5                    | 0.000 000     | -0.002 |
| 100 %          |       | 0        | 836 500 003       | 1.8                     | 0.000 000     | 0.002  |
| 100 %          |       | +10      | 836 500 000       | -1.4                    | 0.000 000     | -0.002 |
| 100 %          |       | +30      | 836 500 004       | 2.1                     | 0.000 000     | 0.003  |
| 100 %          |       | +40      | 836 499 999       | -2.4                    | 0.000 000     | -0.003 |
| 100 %          |       | +50      | 836 500 004       | 2.5                     | 0.000 000     | 0.003  |
| Batt. Endpoint | 3.400 | +20      | 836 500 004       | 2.1                     | 0.000 000     | 0.003  |



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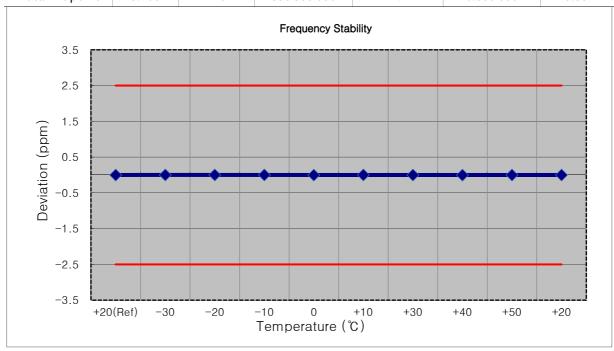
■ OPERATING FREQUENCY: 836,500,000 Hz

■ CHANNEL: <u>26915 (15 MHz)</u>

■ REFERENCE VOLTAGE: 4.200 VDC

■ DEVIATION LIMIT:  $\pm 0.000 25 \%$  or 2.5 ppm

| Voltage        | Power | Temp.    | Frequency<br>(Hz) | Frequency<br>Error (Hz) | Deviation<br>(%) | - ppm  |
|----------------|-------|----------|-------------------|-------------------------|------------------|--------|
| (%)            | (VDC) | (°C)     |                   |                         |                  |        |
| 100 %          |       | +20(Ref) | 836 500 001       | 0.0                     | 0.000 000        | 0.000  |
| 100 %          |       | -30      | 836 500 003       | 1.4                     | 0.000 000        | 0.002  |
| 100 %          |       | -20      | 836 500 003       | 1.6                     | 0.000 000        | 0.002  |
| 100 %          |       | -10      | 836 500 003       | 1.5                     | 0.000 000        | 0.002  |
| 100 %          | 4.200 | 0        | 836 500 000       | -1.8                    | 0.000 000        | -0.002 |
| 100 %          |       | +10      | 836 500 003       | 1.2                     | 0.000 000        | 0.001  |
| 100 %          |       | +30      | 836 500 000       | -1.0                    | 0.000 000        | -0.001 |
| 100 %          |       | +40      | 836 500 000       | -1.4                    | 0.000 000        | -0.002 |
| 100 %          |       | +50      | 836 500 001       | -0.7                    | 0.000 000        | -0.001 |
| Batt. Endpoint | 3.400 | +20      | 836 500 000       | -1.2                    | 0.000 000        | -0.001 |



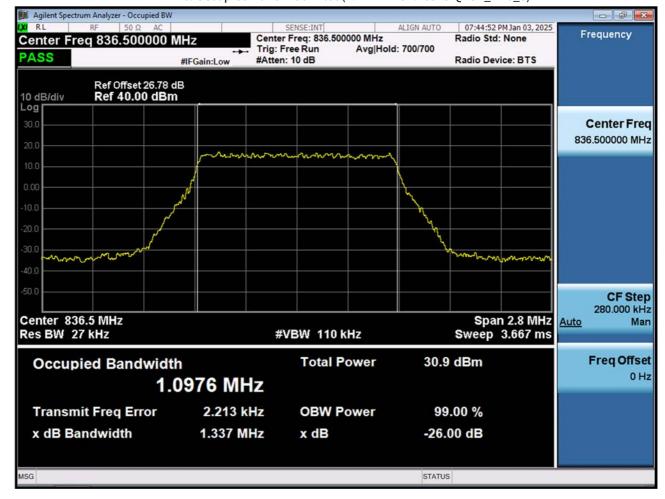
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# 9. TEST PLOTS

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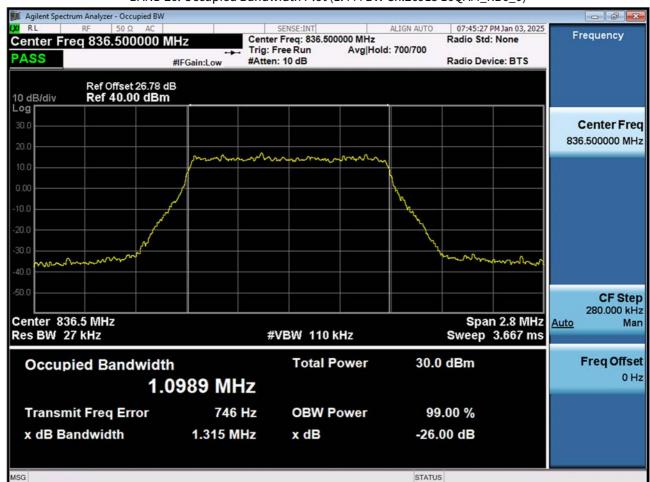




BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26915 QPSK\_RB6\_0)

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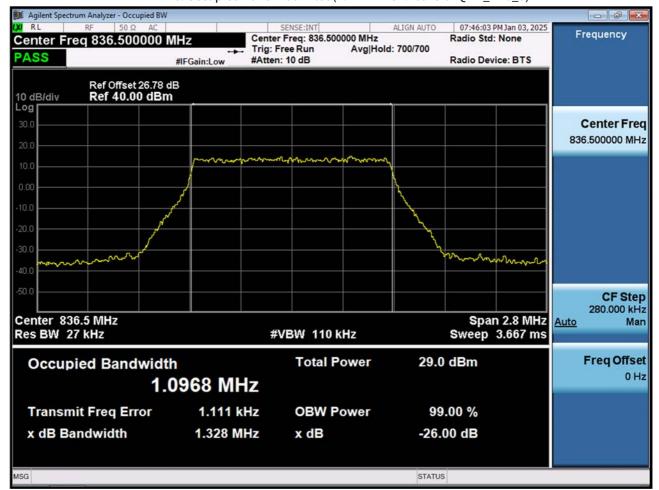




BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26915 16QAM\_RB6\_0)

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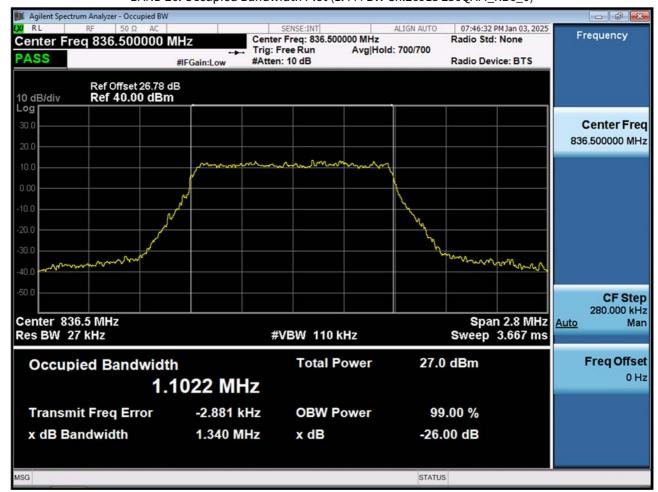




BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26915 64QAM\_RB6\_0)

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BAND 26. Occupied Bandwidth Plot (1.4 M BW Ch.26915 256QAM\_RB6\_0)

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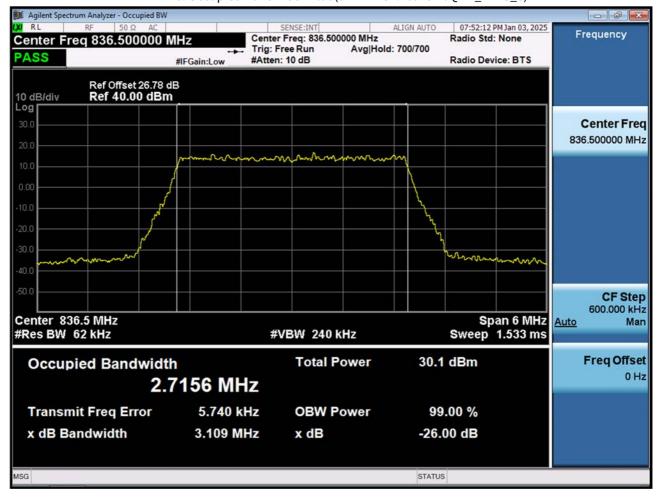




BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26915 QPSK\_RB15\_0)

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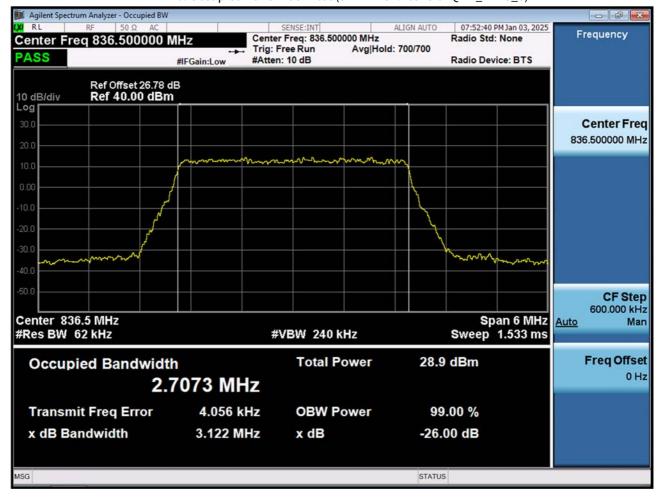




BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26915 16QAM\_RB15\_0)

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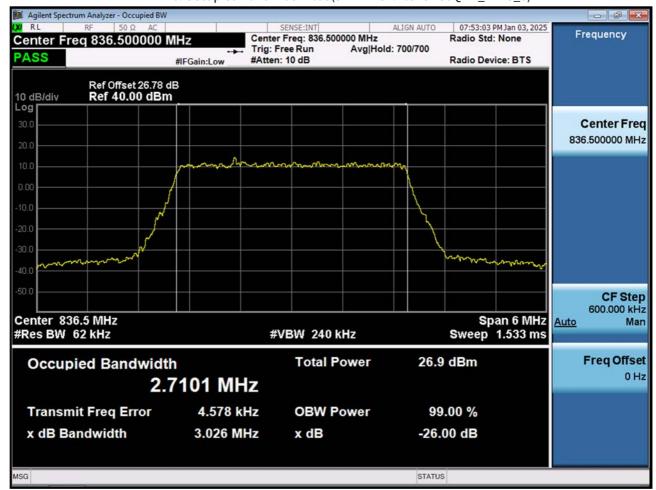




BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26915 64QAM\_RB15\_0)

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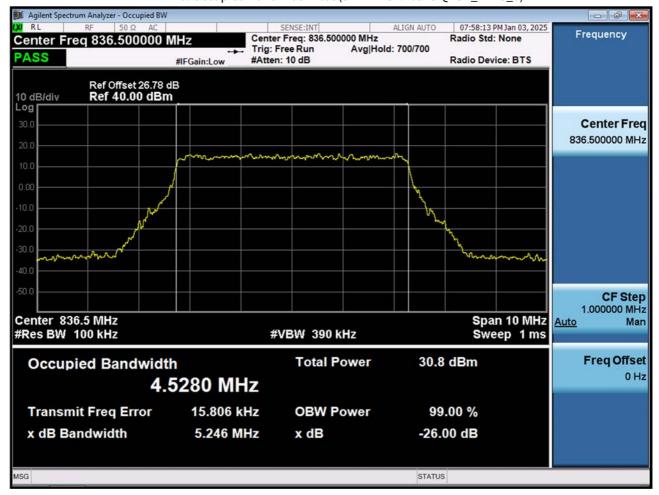




BAND 26. Occupied Bandwidth Plot (3 M BW Ch.26915 256QAM\_RB15\_0)

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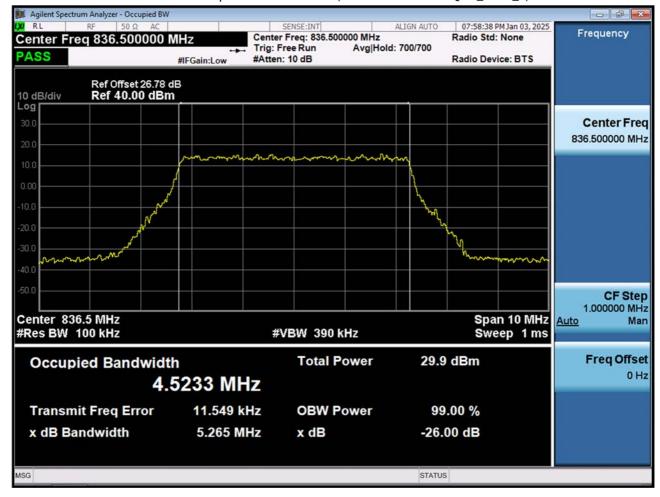




BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26915 QPSK\_RB25\_0)

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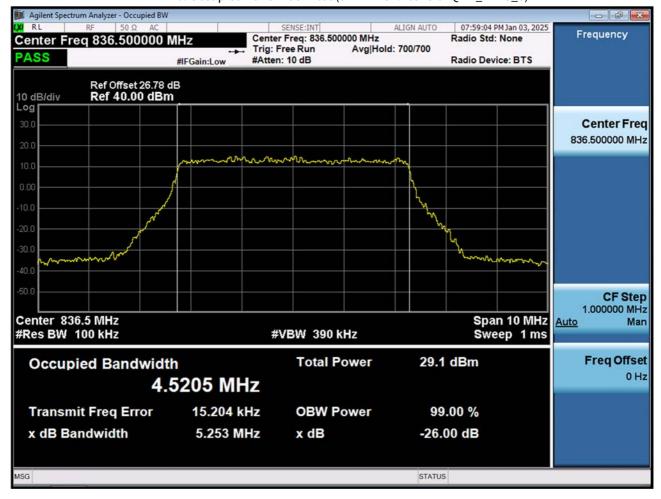




BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26915 16QAM\_RB25\_0)

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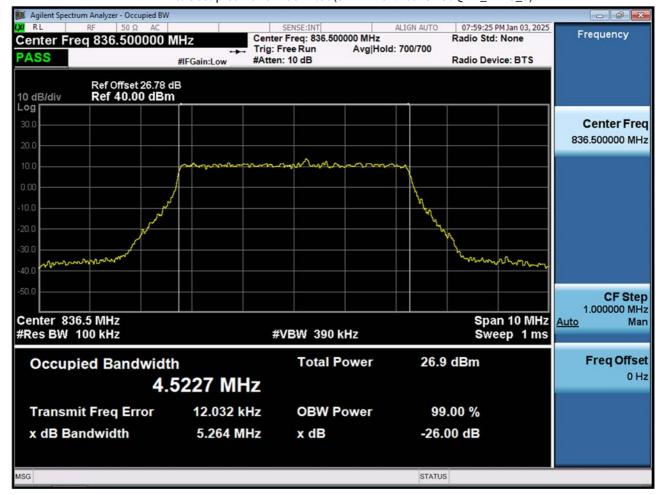




BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26915 64QAM\_RB25\_0)

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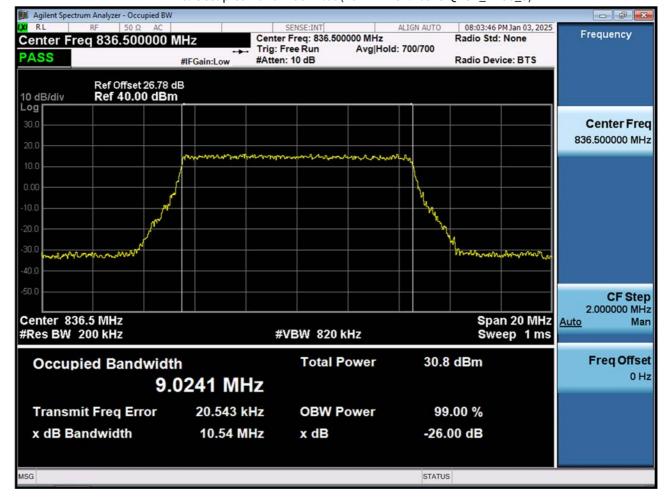




BAND 26. Occupied Bandwidth Plot (5 M BW Ch.26915 256QAM\_RB25\_0)

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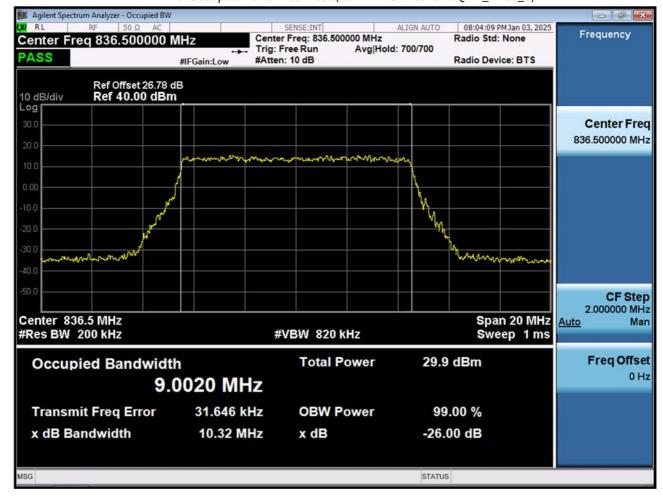




BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26915 QPSK\_RB50\_0)

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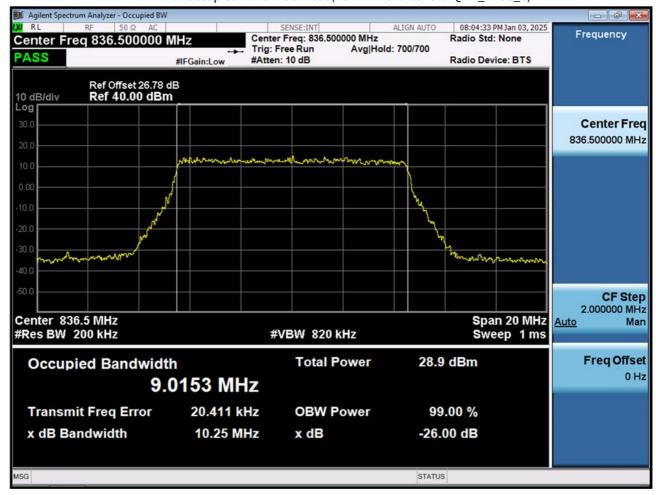




BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26915 16QAM\_RB50\_0)

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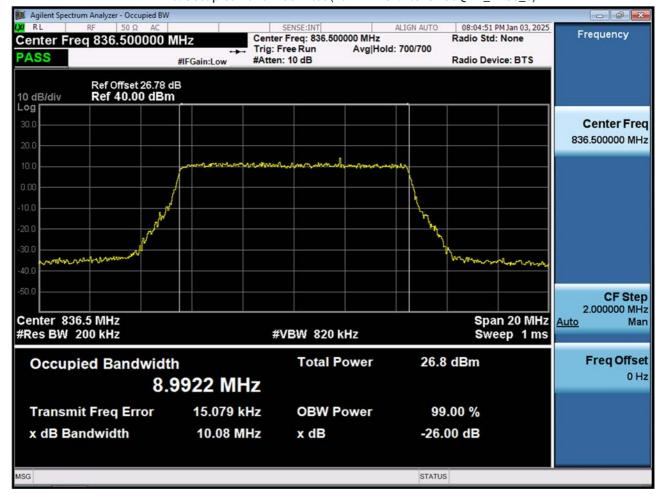




BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26915 64QAM\_RB50\_0)

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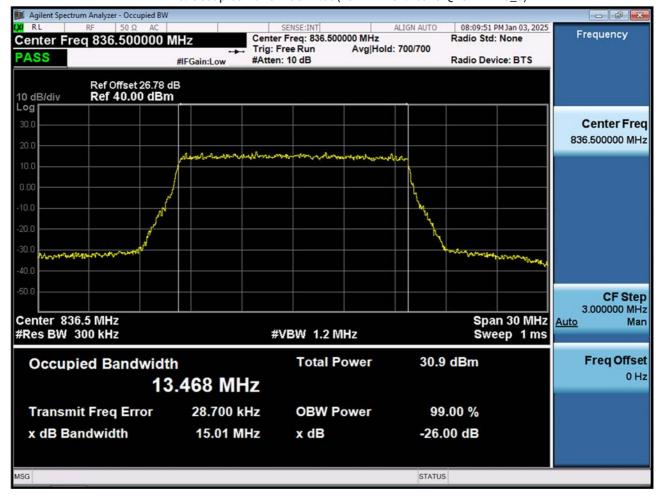




BAND 26. Occupied Bandwidth Plot (10 M BW Ch.26915 256QAM\_RB50\_0)

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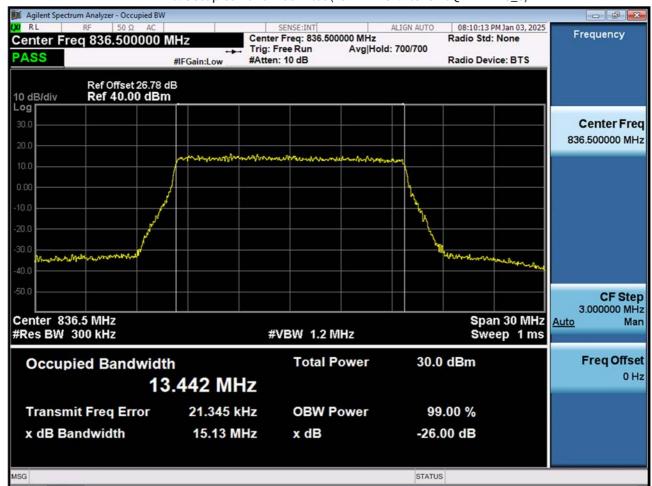




BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26915 QPSK RB 75\_0)

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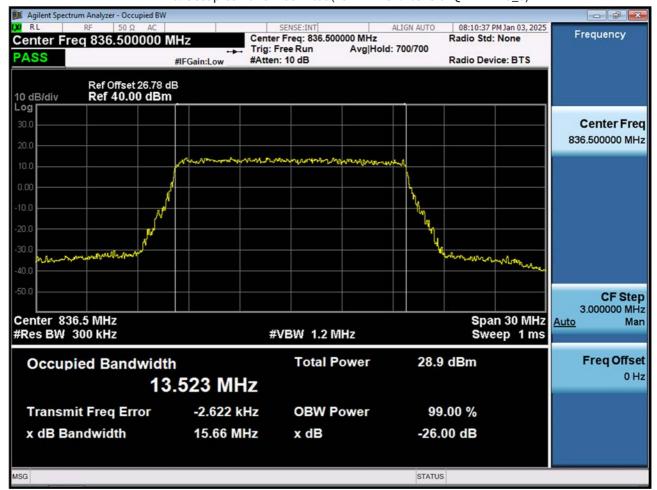




BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26915 16QAM RB 75\_0)

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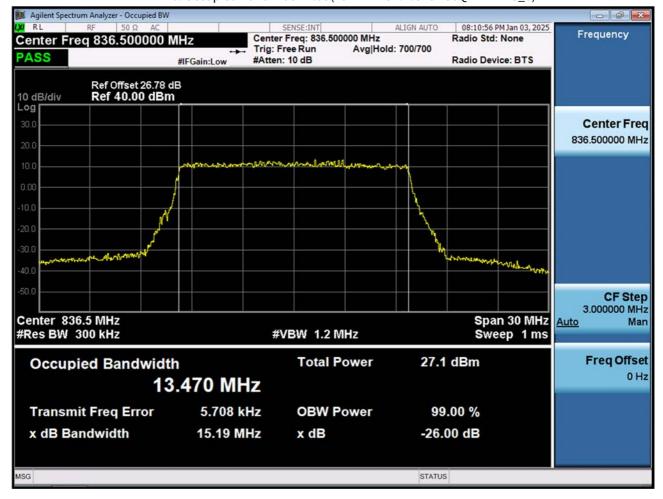




BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26915 64QAM RB 75\_0)

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BAND 26. Occupied Bandwidth Plot (15 M BW Ch.26915 256QAM RB 75\_0)

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## BAND 26. PAR Plot (1.4 M BW Ch.26915 QPSK\_RB6\_0)



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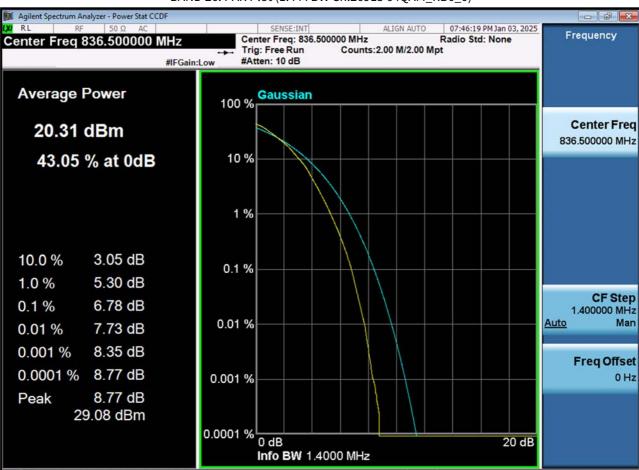




BAND 26. PAR Plot (1.4 M BW Ch.26915 16QAM\_RB6\_0)

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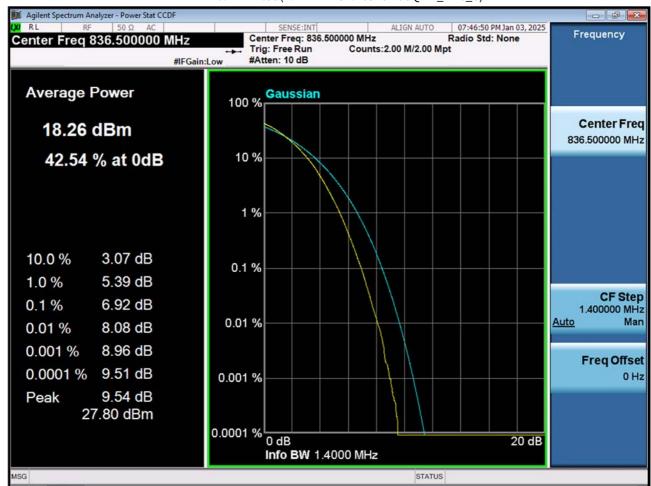




BAND 26. PAR Plot (1.4 M BW Ch.26915 64QAM\_RB6\_0)

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BAND 26. PAR Plot (1.4 M BW Ch.26915 256QAM\_RB6\_0)

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0 Hz

20 dB



## Agilent Spectrum Analyzer - Power Stat CCDF 07:51:55 PM Jan 03, 2025 ALIGN AUTO Frequency Center Freq: 836.500000 MHz Radio Std: None Center Freq 836.500000 MHz Trig: Free Run Counts: 2.00 M/2.00 Mpt #IFGain:Low #Atten: 10 dB 100 % Gaussian **Average Power** Center Freq 22.24 dBm 836.500000 MHz 45.62 % at 0dB 10 % 1 % 10.0 % 2.41 dB 0.1 % 1.0 % 4.69 dB **CF Step** 0.1% 5.98 dB 1,400000 MHz 0.01 % Auto Man 0.01 % 6.75 dB 0.001 % 7.16 dB Freq Offset 0.0001 % 7.38 dB

Info BW 3.0000 MHz

0.001 %

0.0001 % 0 dB

7.40 dB

29.64 dBm

Peak

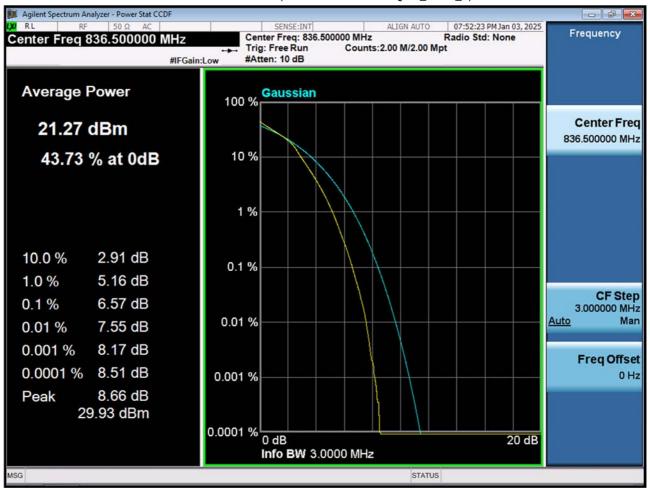
MSG

BAND 26. PAR Plot (3 M BW Ch.26915 QPSK\_RB15\_0)

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## BAND 26 PAR Plot (3 M BW Ch.26915 16QAM\_RB15\_0)



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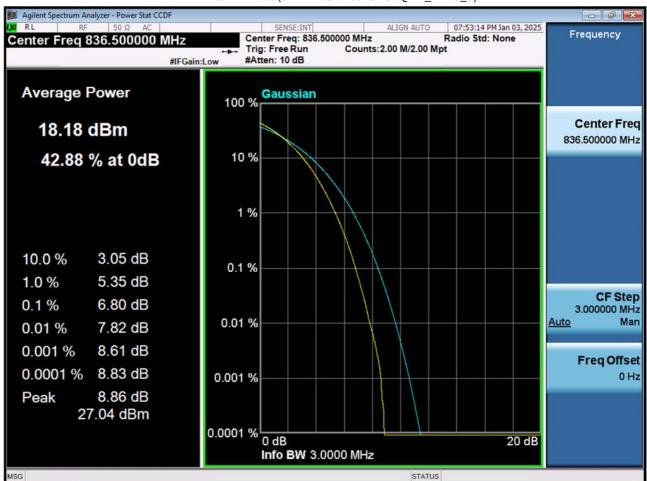




BAND 26. PAR Plot (3 M BW Ch.26915 64QAM\_RB15\_0)

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BAND 26. PAR Plot (3 M BW Ch.26915 256QAM\_RB15\_0)

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20 dB



7.64 dB

29.88 dBm

Peak

MSG

## Agilent Spectrum Analyzer - Power Stat CCDF 07:58:22 PM Jan 03, 2025 ALIGN AUTO Frequency Center Freq: 836.500000 MHz Radio Std: None Center Freq 836.500000 MHz Trig: Free Run Counts: 2.00 M/2.00 Mpt #IFGain:Low #Atten: 10 dB 100 % Gaussian **Average Power** Center Freq 22.24 dBm 836.500000 MHz 45.24 % at 0dB 10 % 1 % 10.0 % 2.41 dB 0.1 % 1.0 % 4.58 dB **CF Step** 0.1% 5.81 dB 3.000000 MHz 0.01 % Auto Man 0.01 % 6.66 dB 0.001 % 7.18 dB Freq Offset 0.0001 % 7.44 dB 0.001 % 0 Hz

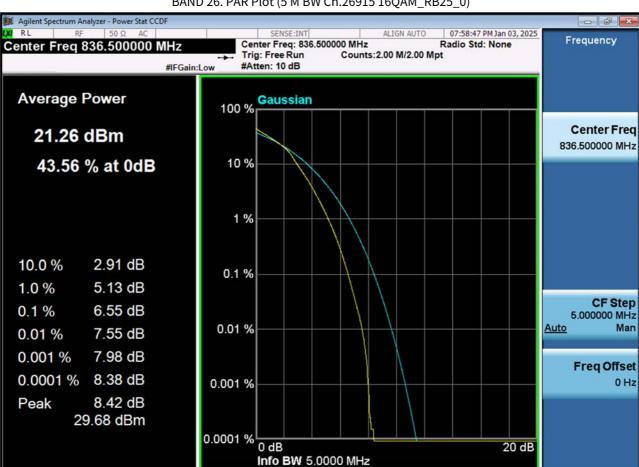
Info BW 5.0000 MHz

0.0001 % 0 dB

BAND 26. PAR Plot (5 M BW Ch.26915 QPSK\_RB25\_0)

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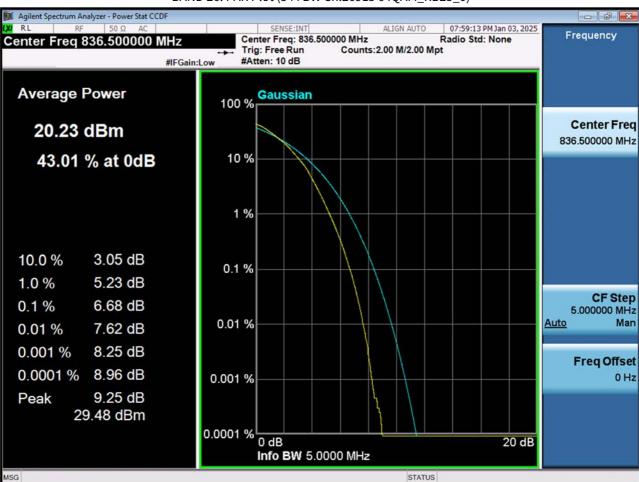




BAND 26. PAR Plot (5 M BW Ch.26915 16QAM\_RB25\_0)

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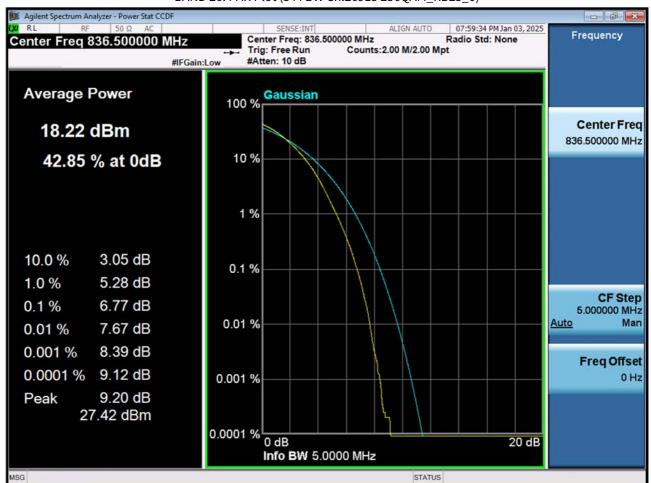




BAND 26. PAR Plot (5 M BW Ch.26915 64QAM\_RB25\_0)

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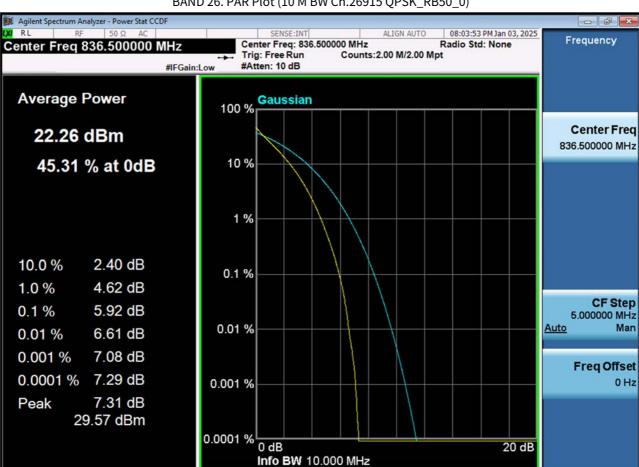




BAND 26. PAR Plot (5 M BW Ch.26915 256QAM\_RB25\_0)

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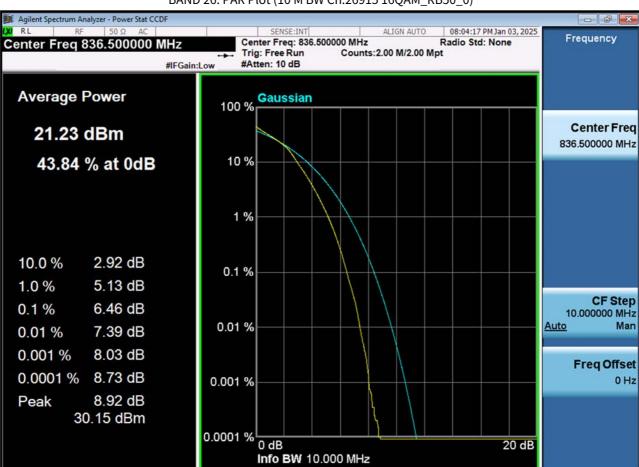




BAND 26. PAR Plot (10 M BW Ch.26915 QPSK\_RB50\_0)

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BAND 26. PAR Plot (10 M BW Ch.26915 16QAM\_RB50\_0)

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BAND 26. PAR Plot (10 M BW Ch.26915 64QAM\_RB50\_0)

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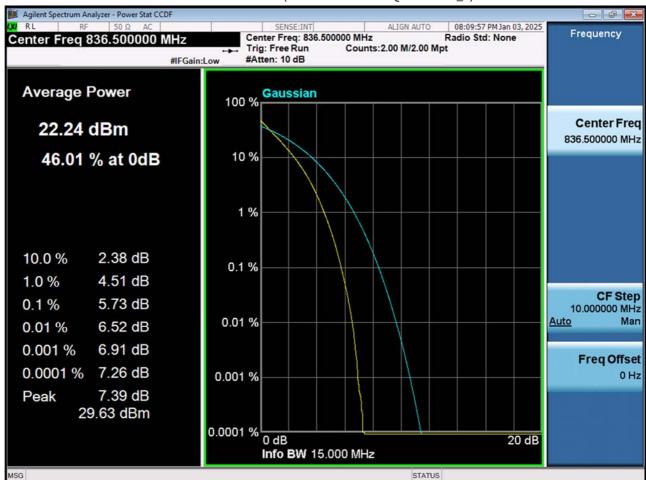




BAND 26. PAR Plot (10 M BW Ch. 26915 256QAM\_RB50\_0)

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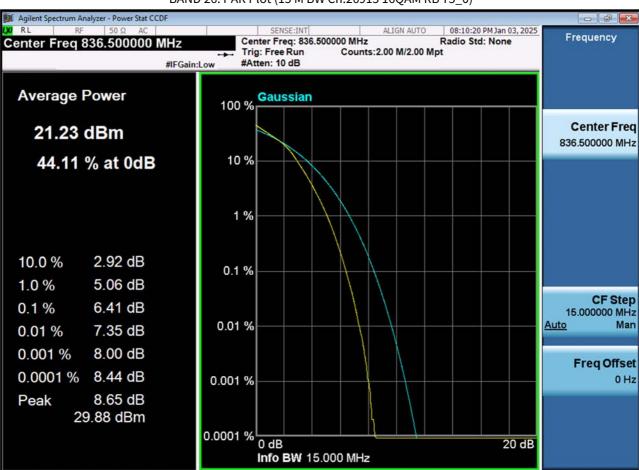


BAND 26. PAR Plot (15 M BW Ch.26915 QPSK RB 75\_0)

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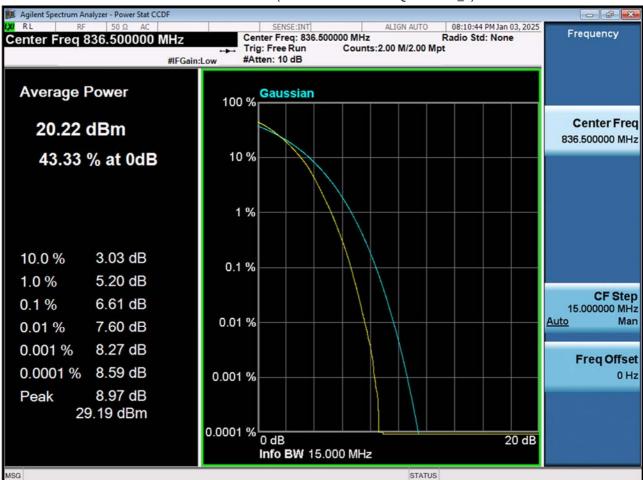
MSG



BAND 26. PAR Plot (15 M BW Ch.26915 16QAM RB 75\_0)

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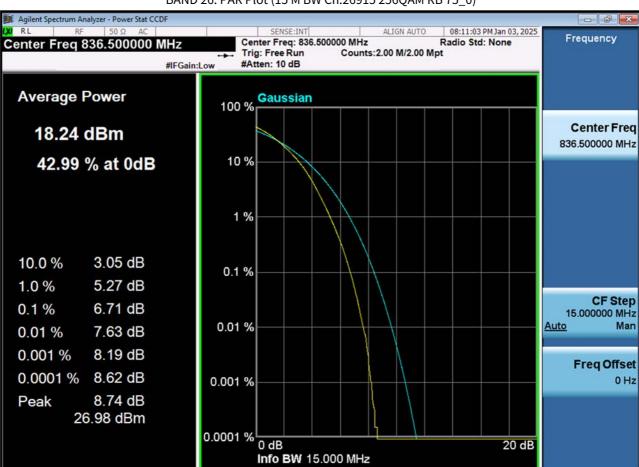


BAND 26. PAR Plot (15 M BW Ch.26915 64QAM RB 75\_0)

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MSG



BAND 26. PAR Plot (15 M BW Ch.26915 256QAM RB 75\_0)

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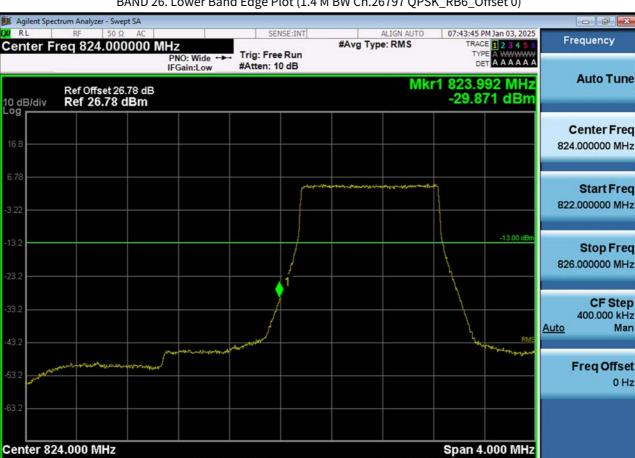




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#Res BW 15 kHz



#Sweep 2.000 s (1001 pts)

**#VBW 47 kHz** 

BAND 26. Lower Band Edge Plot (1.4 M BW Ch.26797 QPSK\_RB6\_Offset 0)

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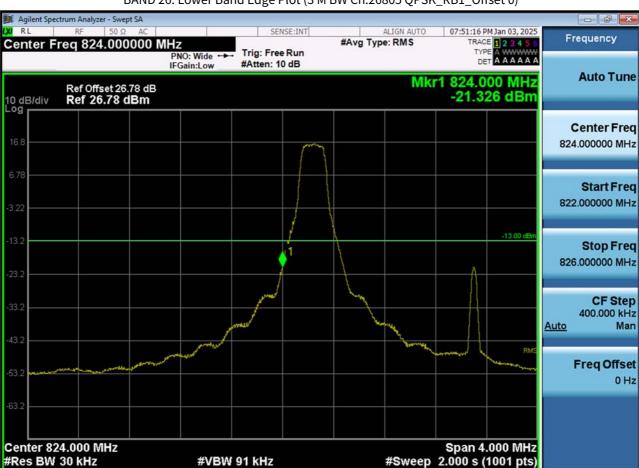


## BAND 26. Lower Extended Band Edge Plot (1.4 M BW Ch.26797 QPSK\_RB6\_0)



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BAND 26. Lower Band Edge Plot (3 M BW Ch.26805 QPSK\_RB1\_Offset 0)

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## BAND 26. Lower Band Edge Plot (3 M BW Ch.26805 QPSK\_RB15\_Offset 0) Agilent Spectrum Analyzer - Swept SA SENSE:INT #Avg Type: RMS



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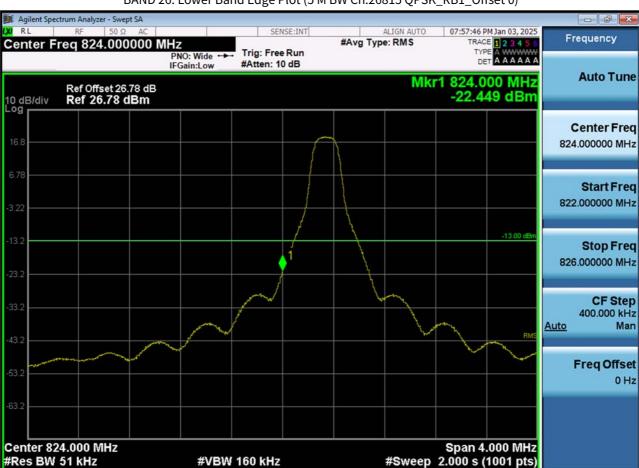




BAND 26. Lower Extended Band Edge Plot (3 M BW Ch.26805 QPSK\_RB15\_0)

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BAND 26. Lower Band Edge Plot (5 M BW Ch.26815 QPSK\_RB1\_Offset 0)

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Span 4.000 MHz

#Sweep 2.000 s (1001 pts)



Center 824.000 MHz

#Res BW 51 kHz



**#VBW 160 kHz** 

BAND 26. Lower Band Edge Plot (5 M BW Ch.26815 QPSK\_RB25\_Offset 0)

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BAND 26. Lower Extended Band Edge Plot (5 M BW Ch.26815 QPSK\_RB25\_0)

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#Res BW 100 kHz



#Sweep 2.000 s (1001 pts)

**#VBW 300 kHz** 

BAND 26. Lower Band Edge Plot (10 M BW Ch.26840 QPSK\_RB1\_Offset 0)

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BAND 26. Lower Band Edge Plot (10 M BW Ch.26840 QPSK\_RB50\_Offset 0)

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0 Hz

Span 4.000 MHz

#Sweep 2.000 s (1001 pts)



Center 821.000 MHz #Res BW 100 kHz



**#VBW 300 kHz** 

BAND 26. Lower Extended Band Edge Plot (10 M BW Ch.26840 QPSK\_RB50\_0)

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Span 4.000 MHz

#Sweep 2.000 s (1001 pts)



Center 824.000 MHz #Res BW 150 kHz



**#VBW 470 kHz** 

BAND 26. Lower Band Edge Plot (15 M BW Ch.26865 QPSK\_RB1\_Offset 0)

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BAND 26. Lower Band Edge Plot (15 M BW Ch.26865 QPSK\_RB75\_Offset 0)

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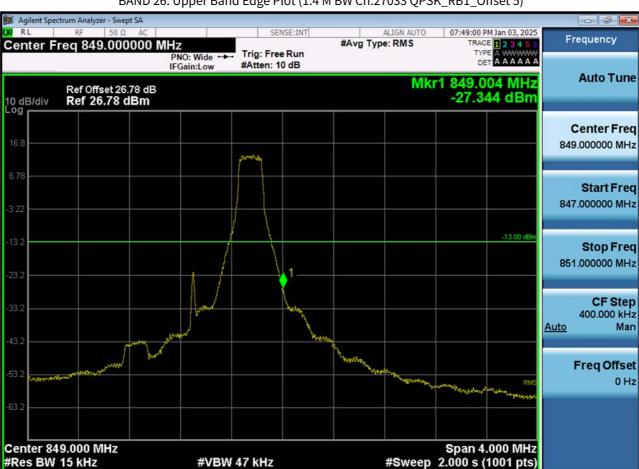


## BAND 26. Lower Extended Band Edge Plot (15 M BW Ch.26865 QPSK\_RB75\_0)



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BAND 26. Upper Band Edge Plot (1.4 M BW Ch.27033 QPSK\_RB1\_Offset 5)

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BAND 26. Upper Band Edge Plot (1.4 M BW Ch.27033 QPSK\_RB6\_Offset 0)

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#Res BW 100 kHz



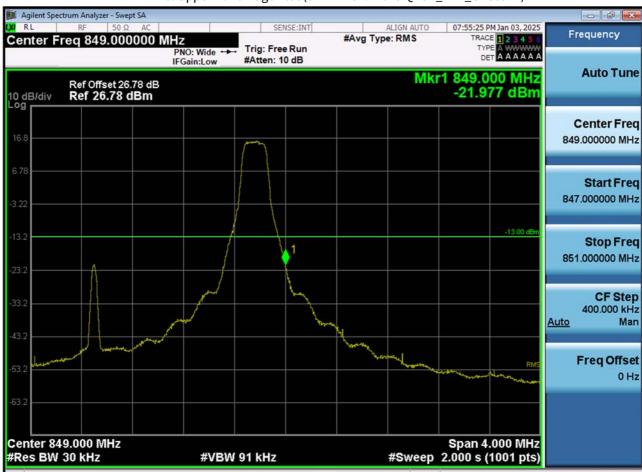
#Sweep 2.000 s (1001 pts)

**#VBW 300 kHz** 

BAND 26. Upper Extended Band Edge Plot (1.4 M BW Ch.27033 QPSK\_RB6\_0)

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BAND 26. Upper Band Edge Plot (3 M BW Ch.27025 QPSK\_RB1\_Offset 14)

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BAND 26. Upper Band Edge Plot (3 M BW Ch.27025 QPSK\_RB15\_Offset 0)

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