

# TEST REPORT



**Dt&C Co., Ltd.**

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Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2303-0028

2. Customer

• Name (FCC) : LG Electronics USA, Inc.

• Address (FCC) : 111 Sylvan Avenue North Building Englewood Cliffs New Jersey United States 07632

3. Use of Report : FCC Original Grant

4. Product Name / Model Name : Telematics / TLVUM3IU-W

FCC ID : BEJTLVUM3IU-W

5. FCC Regulation(s): Part 22

Test Method Used : KDB971168 D01v03, ANSI/TIA-603-E-2016, ANSI C63.26-2015

6. Date of Test : 2023.01.27 ~ 2023.02.21

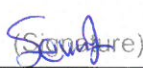

7. Location of Test :  Permanent Testing Lab  On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

This test report is not related to KOLAS accreditation.

|             |   |  |
|-------------|---|--|
| Affirmation | Tested by   | Technical Manager  |
|             | Name : SeungMin Gil  | Name : JaeHyeok Bang  |

2023 . 03 . 20 .

**Dt&C Co., Ltd.**

If this report is required to confirmation of authenticity, please contact to [report@dtnc.net](mailto:report@dtnc.net)

## Test Report Version

| Test Report No. | Date          | Description   | Revised by   | Reviewed by   |
|-----------------|---------------|---------------|--------------|---------------|
| DRTFCC2303-0028 | Mar. 20, 2023 | Initial issue | SeungMin Gil | JaeHyeok Bang |
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## 1. GENERAL INFORMATION

|   |   |
|---|---|
| <b>Equipment Class</b>                              | PCS Licensed Transmitter (PCB)  |
| <b>Product Name</b>                                 | Telematics  |
| <b>Model Name</b>                                   | TLVUM3IU-W  |
| <b>Add Model Name</b>                               | -   |
| <b>FVIN(Firmware Version Identification Number)</b> | X500  |
| <b>EUT Serial Number</b>                            | 212VIFW326331   |
| <b>Power Supply</b>                                 | DC 12 V   |
| <b>Antenna Information</b>                          | Antenna Type: Datenblatt Antenna (Model : 5Q0.035.507.AH)<br>Antenna gain(including connected cable loss between transmitter and antenna):<br>-0.91 dBi<br>Antenna gain: 3.44dBi<br>Cable loss: 4.35 dB |

| Mode     | Tx Frequency (MHz) | Emission Designator | Conducted output power |               | ERP             |               |
|----------|--------------------|---------------------|------------------------|---------------|-----------------|---------------|
|          |                    |                     | Max power (dBm)        | Max power (W) | Max power (dBm) | Max power (W) |
| WCDMA850 | 826.4 ~ 846.6      | 4M16F9W             | 22.57                  | 0.181         | 15.76           | 0.038         |

## 2. INTRODUCTION

### 2.1. EUT DESCRIPTION

The Equipment Under Test (EUT) supports 850 WCDMA and multi band LTE.

### 2.2. TESTING ENVIRONMENT

| Ambient Condition   |                 |
|---------------------|-----------------|
| ▪ Temperature       | +21 °C ~ +23 °C |
| ▪ Relative Humidity | 40 % ~ 44 %     |

### 2.3. 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.

### 2.4. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with 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.

| Parameter                             | Measurement uncertainty                               |
|---------------------------------------|---|
| Radiated Disturbance (Below 1 GHz)    | 4.8 dB (The confidence level is about 95 %, $k = 2$ ) |
| Radiated Disturbance (1 GHz ~ 18 GHz) | 5.0 dB (The confidence level is about 95 %, $k = 2$ ) |
| Radiated Disturbance (Above 18 GHz)   | 5.2 dB (The confidence level is about 95 %, $k = 2$ ) |

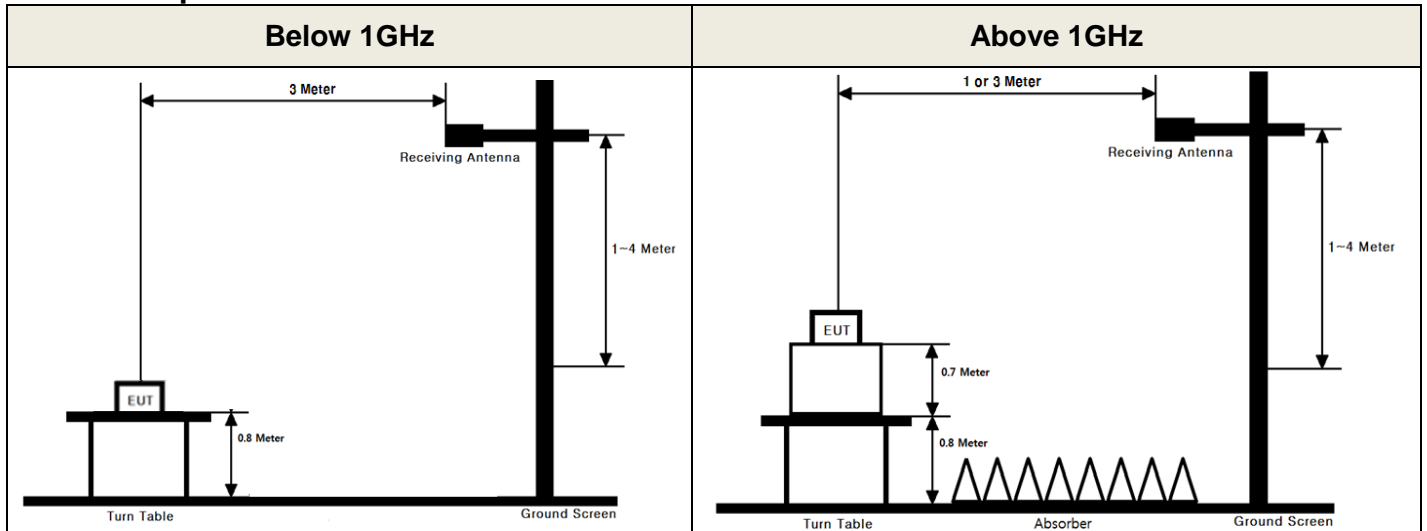
### 2.5. TEST FACILITY

|  |   |                  |
|--|---|------------------|
| <b>Dt&amp;C Co., Ltd.</b>  |   |                  |
| The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. |   |                  |
| The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014.   |   |                  |
| - FCC & IC MRA Designation No. : KR0034  |   |                  |
| - ISED#: 5740A   |   |                  |
| <a href="http://www.dtnc.net">www.dtnc.net</a>   |   |                  |
| Telephone  | : | + 82-31-321-2664 |
| FAX  | : | + 82-31-321-1664 |

### 3. DESCRIPTION OF TESTS

#### 3.1. ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

##### Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

##### Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.17
- KDB971168 D01v03 - Section 5.2.2
- ANSI 63.26-2015 – Section 5.2.4.4.1

##### Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1 % to 5 % of the OBW.
3. Set VBW  $\geq$  3 x RBW.
4. Set number of points in sweep  $\geq$  2 x span / RBW.
5. Sweep time:
  - 1) Set = auto-couple, or
  - 2) Set  $\geq$   $[10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$  for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. If the EUT can be configured to transmit continuously, then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

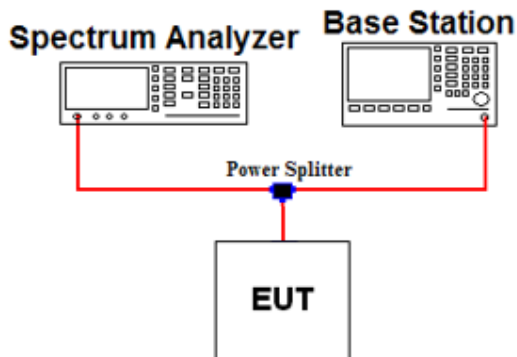
The ERP/EIRP is calculated using the following formula:

**ERP/EIRP = The conducted power at the substitute antenna's terminal [dBm] + Substitute Antenna gain [dBd for ERP, dBi for EIRP]**

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.

### 3.2. OCCUPIED BANDWIDTH (99 % Bandwidth)

#### Test set-up



#### Offset value information

| Frequency(MHz) | Offset Value(dB) |
|----------------|------------------|
| 826.4          | 6.78             |
| 836.6          | 6.79             |
| 846.6          | 6.79             |

Note. 1: The offset values from EUT to Spectrum analyzer were measured and used for test.

#### Test Procedure

- KDB971168 D01v03 - Section 4.3
- ANSI C63.26-2015 – Section 5.4.4

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

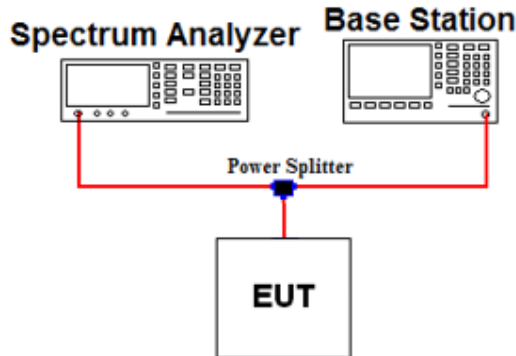
#### Test setting

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.  $RBW = 1 \% \sim 5 \%$  of the expected OBW &  $VBW \geq 3 \times RBW$
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 % ~ 5 % of the 99 % occupied bandwidth observed in step 6.



### 3.3. SPURIOUS EMISSIONS AT ANTENNA TERMINAL

#### Test set-up



#### Offset value information

| Frequency(MHz) | Offset Value(dB) | Frequency(MHz) | Offset Value(dB) |
|----------------|------------------|----------------|------------------|
| 10 000         | 7.32             | -              | -                |
| -              | -                | -              | -                |

Note. 1: The offset value from EUT to Spectrum analyzer was measured and used for test.

#### Test Procedure

- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 - Section 5.7

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths. The spectrum is scanned from 9 kHz up to a frequency including its 10<sup>th</sup> harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB, where P is the transmitter power in Watts.

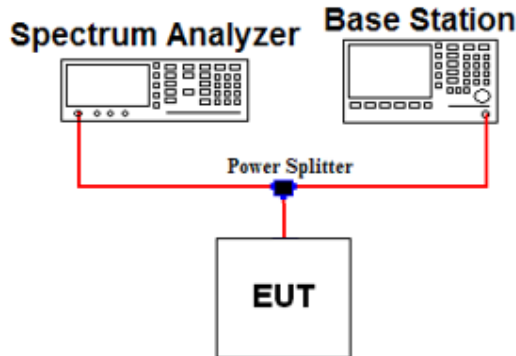
#### Test setting

1. RBW = 100 kHz(Below 1 GHz) or 1 MHz(Above 1 GHz) & VBW  $\geq 3 \times$  RBW ( Refer to Note 1)
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point  $\geq 2 \times$  span / RBW
5. The trace was allowed to stabilize

Note 1: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22 and 1 MHz or greater for Part 24, 27

### 3.4. BAND EDGE EMISSIONS AT ANTENNA TERMINAL

#### Test set-up



#### Offset value information

| Frequency Range(MHz) | Offset Value (dB) |
|----------------------|-------------------|
| 819 - 823            | 6.78              |
| 819 - 829            | 6.78              |
| 844 - 854            | 6.80              |
| 850 - 854            | 6.80              |

Note. 1: The offset value from EUT to Spectrum analyzer was measured and used for test.

#### Test Procedure

- **KDB971168 D01v03 - Section 6**
- **ANSI C63.26-2015 - Section 5.7**

All out of band emissions are measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its lowest and highest channel with all modulations.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB, where P is the transmitter power in Watts.

#### Test setting

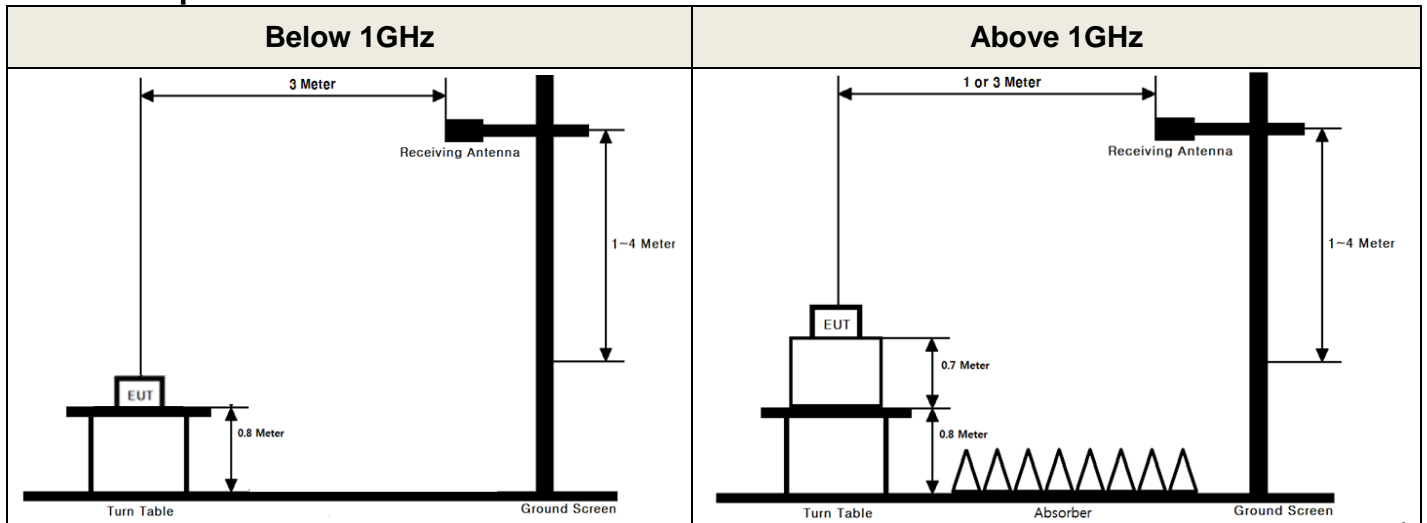
1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW  $\geq 1\%$  of the emission
4. VBW  $\geq 3 \times$  RBW
5. Detector = RMS & Trace mode = Max hold
6. Sweep time = Auto couple or 1 s for band edge
7. Number of sweep point  $\geq 2 \times$  span / RBW
8. The trace was allowed to stabilize

Note 1: 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 to demonstrate compliance with the out-of-band emissions limit.

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

### 3.5. RADIATED SPURIOUS EMISSIONS

#### Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

#### Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.12
- KDB971168 D01v03 - Section 5.8
- ANSI C63.26-2015 - Section 5.5

#### Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW  $\geq$  3 X RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point  $\geq$  2 X span / RBW
5. The trace was allowed to stabilize

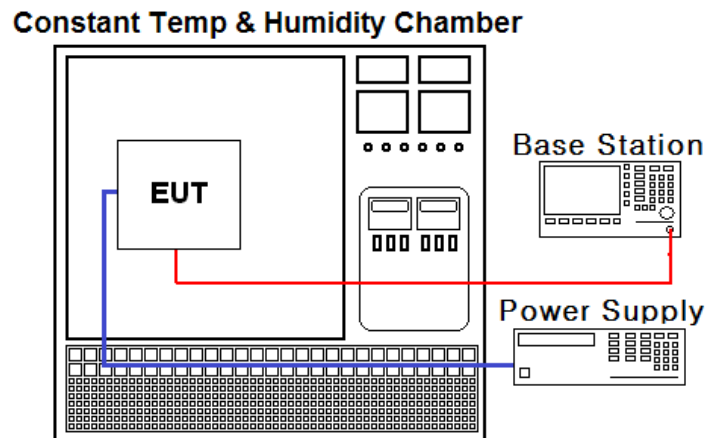
The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

For radiated spurious emission measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated spurious emission measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.

### 3.6. FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

#### Test Set-up



#### Test Procedure

- ANSI/TIA-603-E-2016
- KDB971168 D01v03 - Section 9

The frequency stability of the transmitter is measured by:

a.) **Temperature:**

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

b.) **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.

#### Specification:

The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency for Part 22.

#### Time Period and Procedure:

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 one minute 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.

#### 4. LIST OF TEST EQUIPMENT

| Type                         | Manufacturer           | Model                       | Cal.Date<br>(yy/mm/dd) | Next.Cal. Date<br>(yy/mm/dd) | S/N        |
|------------------------------|------------------------|-----------------------------|------------------------|------------------------------|------------|
| Spectrum Analyzer            | Agilent Technologies   | N9020A                      | 22/06/24               | 23/06/24                     | US47360812 |
| Spectrum Analyzer            | Agilent Technologies   | N9020A                      | 22/12/16               | 23/12/16                     | MY48010133 |
| DC power supply              | Agilent Technologies   | 66332A                      | 22/06/24               | 23/06/24                     | US37473422 |
| Multimeter                   | FLUKE                  | 17B+                        | 22/12/16               | 23/12/16                     | 36390701WS |
| Power Splitter               | Anritsu                | K241B                       | 22/12/16               | 23/12/16                     | 1301184    |
| Temp & Humi                  | SJ Science             | SJ-TH-S50                   | 22/03/08               | 23/03/08                     | U5542113   |
| Radio Communication Analyzer | Agilent Technologies   | E5515C                      | 22/12/16               | 23/12/16                     | MY48360842 |
| Thermohygrometer             | BODYCOM                | BJ5478                      | 22/12/16               | 23/12/16                     | 120612-1   |
| Thermohygrometer             | BODYCOM                | BJ5478                      | 22/12/16               | 23/12/16                     | 120612-2   |
| Signal Generator             | Rohde Schwarz          | SMBV100A                    | 22/12/16               | 23/12/16                     | 255571     |
| Signal Generator             | ANRITSU                | MG3695C                     | 22/12/16               | 23/12/16                     | 173501     |
| Loop Antenna                 | ETS-Lindgren           | 6502                        | 22/12/16               | 24/12/16                     | 00226186   |
| BILOG ANTENNA                | Schwarzbeck            | VULB9160                    | 22/12/16               | 23/12/16                     | 3362       |
| Dipole Antenna               | Schwarzbeck            | UHA9105                     | 22/12/16               | 24/12/16                     | 2262       |
| HORN ANT                     | ETS                    | 3117                        | 22/12/16               | 23/12/16                     | 00140394   |
| PreAmplifier                 | H.P                    | 8447D                       | 22/12/16               | 23/12/16                     | 2944A07774 |
| PreAmplifier                 | Agilent                | 8449B                       | 22/06/24               | 23/06/24                     | 3008A02108 |
| High Pass Filter             | Wainwright Instruments | WHKX12-935-1000-15000-40SS  | 22/06/24               | 23/06/24                     | 7          |
| High Pass Filter             | Wainwright Instruments | WHKX10-2838-3300-18000-60SS | 22/06/24               | 23/06/24                     | 2          |
| High Pass Filter             | Wainwright Instruments | WHKX6-6320-8000-26500-40CC  | 22/06/24               | 23/06/24                     | 2          |
| Cable                        | HUBER+SUHNER           | SUCOFLEX100                 | 23/01/04               | 24/01/04                     | M-01       |
| Cable                        | HUBER+SUHNER           | SUCOFLEX100                 | 23/01/04               | 24/01/04                     | M-02       |
| Cable                        | JUNKOSHA               | MWX241/B                    | 23/01/04               | 24/01/04                     | M-03       |
| Cable                        | JUNKOSHA               | MWX221                      | 23/01/04               | 24/01/04                     | M-04       |
| Cable                        | JUNKOSHA               | MWX221                      | 23/01/04               | 24/01/04                     | M-05       |
| Cable                        | DTNC                   | Cable                       | 23/01/04               | 24/01/04                     | M-06       |
| Cable                        | JUNFLON                | J12J101757-00               | 23/01/04               | 24/01/04                     | M-07       |
| Cable                        | HUBER+SUHNER           | SUCOFLEX104                 | 23/01/04               | 24/01/04                     | M-08       |
| Cable                        | HUBER+SUHNER           | SUCOFLEX106                 | 23/01/04               | 24/01/04                     | M-09       |
| Cable                        | Dt&C                   | Cable                       | 23/01/04               | 24/01/04                     | RFC-44     |

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

## 5. SUMMARY OF TEST RESULTS

| FCC Part Section(s)  | Parameter   | Status<br>Note 1   |
|--|---|--------------------|
| 2.1046   | Conducted Output Power  | C                  |
| 22.913(a)  | Effective Radiated Power<br>Equivalent Isotropic Radiated Power                   | C <sup>Note2</sup> |
| 2.1049   | Occupied Bandwidth  | C                  |
| 2.1051<br>22.917(a)  | Band Edge Emissions at Antenna Terminal<br>Spurious Emissions at Antenna Terminal | C                  |
| 2.1053<br>22.917(a)  | Radiated Spurious and Harmonic Emissions  | C <sup>Note2</sup> |
| 2.1055<br>22.355   | Frequency Stability   | C                  |
| Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable<br>Note 2: This test item was performed in three orthogonal EUT positions and the worst case data was reported. |   |                    |

## 6. EMISSION DESIGNATOR AND SAMPLE CALCULATION

### A. Emission Designator

#### WCDMA850 Emission Designator

Emission Designator = **4M16F9W**

WCDMA OBW = 4 163 MHz

F = Frequency Modulation

9 = Composite Digital Information

W = Combination (Audio/Data)

### B. For substitution method

- 1) The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1 GHz respectively above ground.
- 2) The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
- 3) During the test, the turn table is rotated until the maximum signal is found.
- 4) Record the field strength meter's level. (ex. Spectrum reading level is -8.5 dBm)
- 5) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 6) Increase the signal generator output till the field strength meter's level is equal to the item (4).  
(ex. Signal generator level is -18.04 dBm)
- 7) The gain of the cable and amplifier between the signal generator and terminals of substituted antenna is 46.92 dB at test frequency.
- 8) Record the level at substituted antenna terminal. (ex. 28.88dBm)
- 9) The result is calculated as below;

**EIRP(dBm) = LEVLE@ANTENNA TERMINAL + TX Antenna Gain (dBi)**

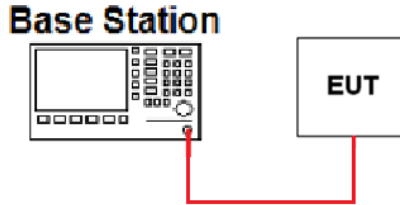
**ERP(dBm) = LEVLE@ANTENNA TERMINAL + TX Antenna Gain (dBd)**

**Where, TX Antenna Gain (dBd) = TX Antenna Gain (dBi) - 2.15 dB**

## 7. TEST DATA

### 7.1. CONDUCTED OUTPUT POWER

A base station simulator was used to establish communication with the EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Note 1: The conducted output power was measured using the Agilent E5515C

| Mode  |               | Cellular Band (dBm) |       |       |
|-------|---------------|---------------------|-------|-------|
|       |               | 4132                | 4183  | 4233  |
| WCDMA | 12.2 kbps RMC | 22.46               | 22.57 | 22.48 |
|       | 12.2 kbps AMR | -                   | -     | -     |
| HSDPA | Subtest 1     | 21.42               | 21.51 | 21.48 |
|       | Subtest 2     | 21.42               | 21.52 | 21.45 |
|       | Subtest 3     | 20.93               | 20.94 | 20.92 |
|       | Subtest 4     | 20.94               | 20.93 | 20.89 |
| HSUPA | Subtest 1     | 21.43               | 21.51 | 21.37 |
|       | Subtest 2     | 19.41               | 19.49 | 19.45 |
|       | Subtest 3     | 20.38               | 20.47 | 20.43 |
|       | Subtest 4     | 19.40               | 19.46 | 19.44 |
|       | Subtest 5     | 21.39               | 21.47 | 21.41 |



## 7.2. OCCUPIED BANDWIDTH (99 % Bandwidth)

| Mode     | Channel      | Frequency (MHz) | Test Result (kHz) |
|----------|--------------|-----------------|-------------------|
| WCDMA850 | 4 132        | 826.40          | 4 121.90          |
|          | 4 183        | 836.60          | 4 121.30          |
|          | <b>4 233</b> | <b>846.60</b>   | <b>4 163.00</b>   |

## 7.3. SPURIOUS EMISSIONS AT ANTENNA TERMINAL

- Plots of the EUT's Conducted Spurious Emissions are shown in Clause 8.3

## 7.4. BAND EDGE EMISSIONS AT ANTENNA TERMINAL

- Plots of the EUT's Band Edge are shown in Clause 8.4

## 7.5. EFFECTIVE RADIATED POWER

### - Test Notes

This EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1". We have done x, y, z planes in EUT and horizontal and vertical polarization of detecting antenna. The worst case data is reported.

### - WCDMA850 data

| Mode            | Frequency (MHz) | Ant Pol(H/V) | Level at Antenna Terminal (dBm) | Substitute Antenna Gain(dBd) | ERP (dBm)    | ERP (W)      | Note. |
|-----------------|-----------------|--------------|---------------------------------|------------------------------|--------------|--------------|-------|
| WCDMA850        | 826.4           | H            | 15.34                           | -0.61                        | 14.73        | 0.030        | -     |
| <b>WCDMA850</b> | <b>836.6</b>    | <b>H</b>     | <b>16.41</b>                    | <b>-0.65</b>                 | <b>15.76</b> | <b>0.038</b> | -     |
| WCDMA850        | 846.6           | H            | 15.31                           | -0.69                        | 14.62        | 0.029        | -     |

## 7.6. RADIATED SPURIOUS EMISSIONS

### - Test Notes

1. This EUT was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA inactive at 12.2 kbps RMC and TPC bits set to "1". We have don x,y,z planes in EUT and horizontal and vertical polarization of detecting antenna. The worst case data is reported.
2. No other spurious and harmonic emissions were reported greater than listed emissions.
3. Limit = -13dBm

### - WCDMA850 data

| Tx Freq. (MHz) | Freq. (MHz) | Ant Pol (H/V) | Level at Antenna Terminal(dBm) | Substitute Antenna Gain(dBd) | Correct Generator Level(dBm) | Limit (dBm) | Margin (dB) | Note |
|----------------|-------------|---------------|--------------------------------|------------------------------|------------------------------|-------------|-------------|------|
| 826.4          | 1 650.59    | V             | -56.48                         | 4.04                         | -52.44                       | -13.00      | 39.44       | -    |
|                | 2 475.48    | V             | -48.83                         | 3.68                         | -45.15                       | -13.00      | 32.15       | -    |
| 836.6          | 1 675.42    | V             | -53.90                         | 3.97                         | -49.93                       | -13.00      | 36.93       | -    |
|                | 2 513.35    | V             | -49.88                         | 3.60                         | -46.28                       | -13.00      | 33.28       | -    |
| 846.6          | 1 695.73    | V             | -55.43                         | 3.91                         | -51.52                       | -13.00      | 38.52       | -    |
|                | 2 542.39    | V             | -51.46                         | 3.83                         | -47.63                       | -13.00      | 34.63       | -    |

## 7.7. FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

### - Test Notes.

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

### 7.7.1. FREQUENCY STABILITY (WCDMA850)

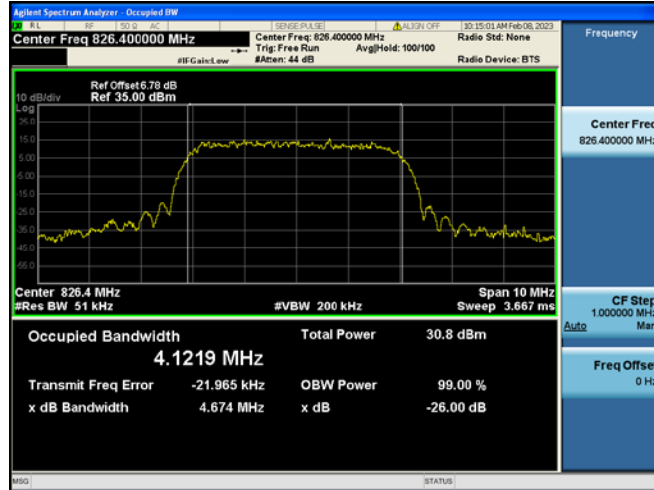
OPERATING FREQUENCY : 836.60 MHz  
 REFERENCE VOLTAGE : 12 V DC  
 LIMIT(FCC) : 2.5 ppm

| VOLTAGE (%) | POWER (V DC) | TEMP (°C) | FREQ (Hz)   | Deviation    |             |
|-------------|--------------|-----------|-------------|--------------|-------------|
|             |              |           |             | (%)          | (ppm)       |
| 100 %       | 12.00        | +20(Ref)  | 836,600,005 | 0.000 000 6  | 0.006       |
| 100 %       |              | -30       | 836,599,993 | -0.000 000 8 | -0.008      |
| 100 %       |              | -20       | 836,599,982 | -0.000 002 2 | -0.022      |
| 100 %       |              | -10       | 836,600,002 | 0.000 000 2  | 0.002       |
| 100 %       |              | 0         | 836,600,011 | 0.000 001 3  | 0.013       |
| 100 %       |              | +10       | 836,599,995 | -0.000 000 6 | -0.006      |
| 100 %       |              | +20       | 836,600,006 | 0.000 000 7  | 0.007       |
| 100 %       |              | +30       | 836,599,994 | -0.000 000 7 | -0.007      |
| 100 %       |              | +40       | 836,600,004 | 0.000 000 5  | 0.005       |
| 100 %       |              | +50       | 836,599,990 | -0.000 001 2 | -0.012      |
| 115 %       |              | 13.80     | +20         | 836,600,007  | 0.000 000 8 |
| 85 %        | 10.20        | +20       | 836,600,001 | 0.000 000 1  | 0.001       |

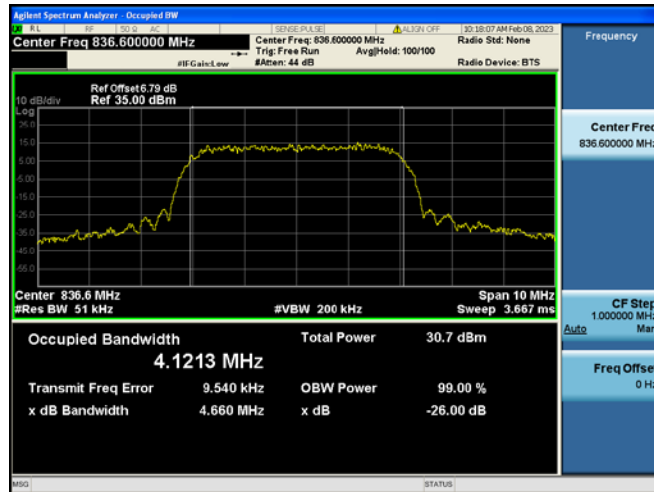
## 8. TEST PLOTS

### 8.1. OCCUPIED BANDWIDTH (99 % Bandwidth)

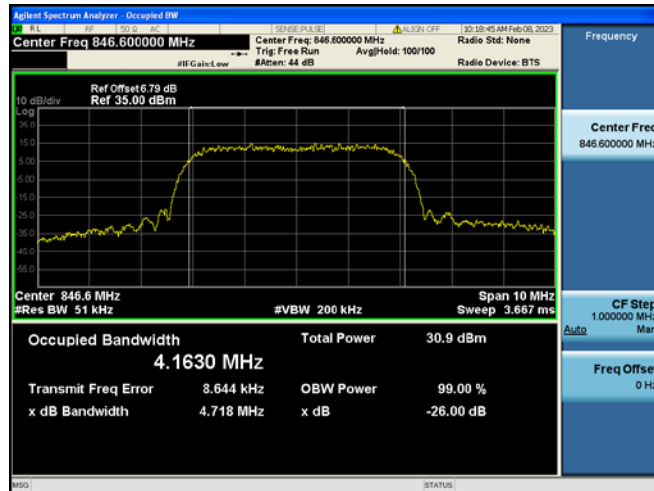
WCDMA850 & Channel: 4 132



WCDMA850 & Channel: 4 183

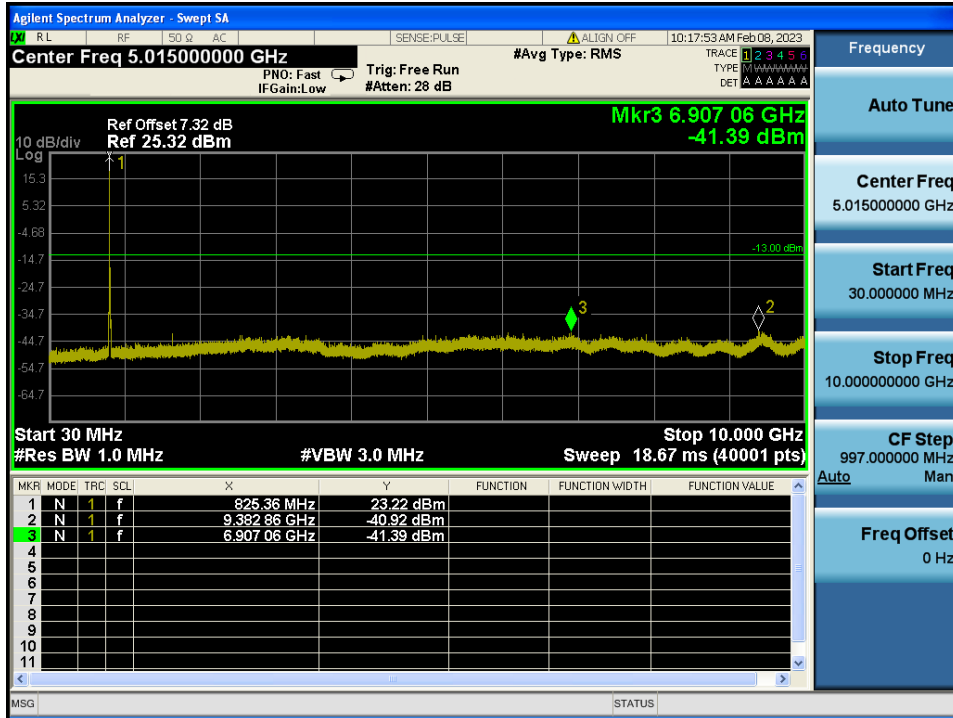


WCDMA850 & Channel: 4 233

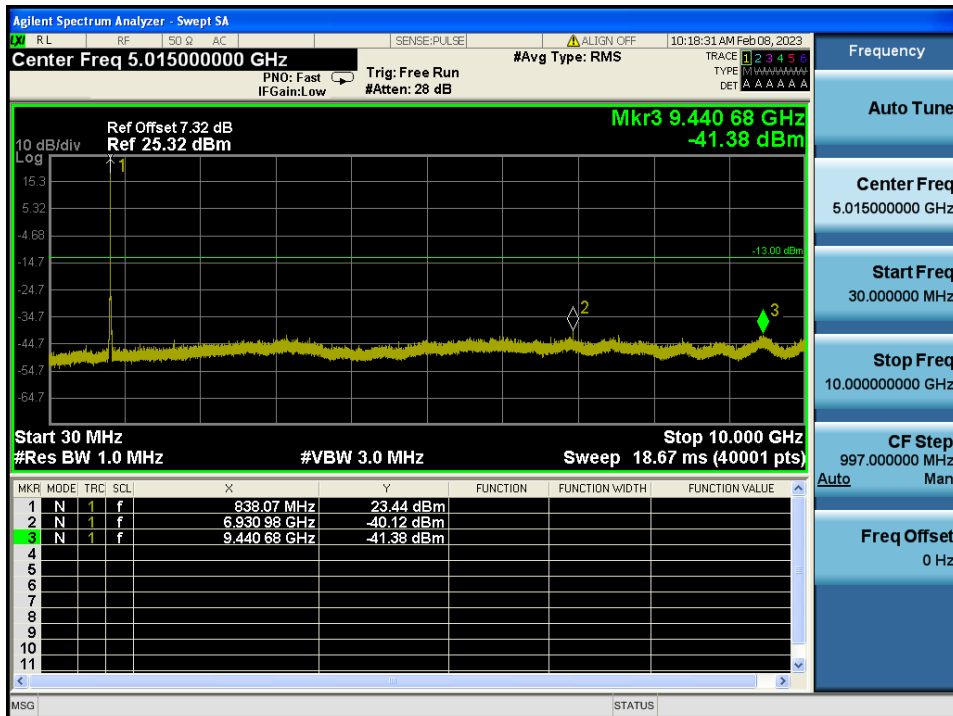


8.2. SPURIOUS EMISSIONS AT ANTENNA TERMINAL

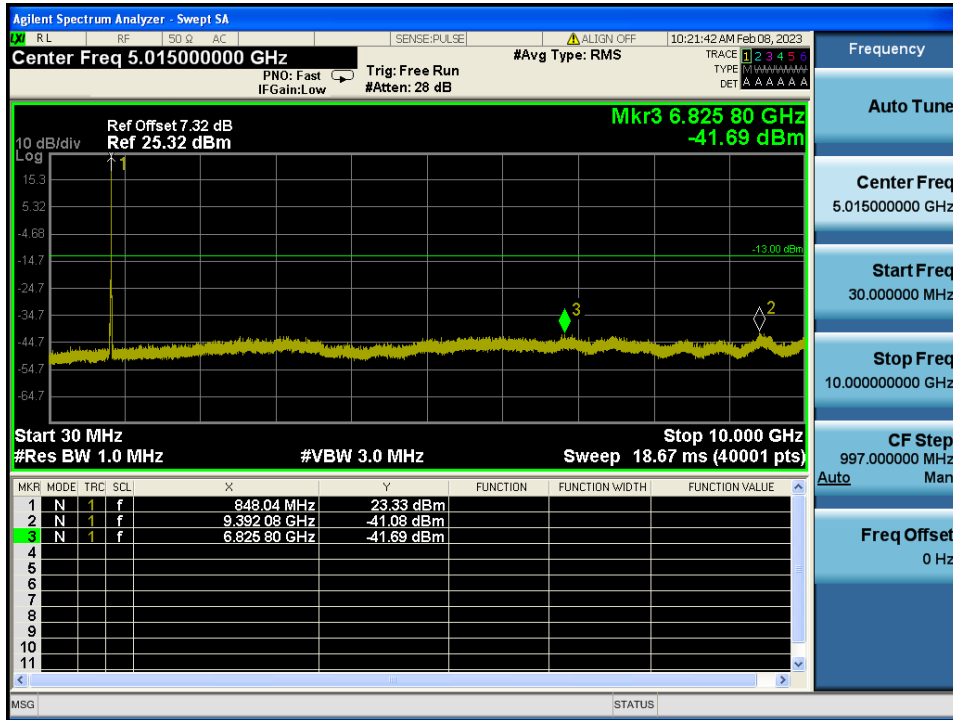
WCDMA850 & Channel: 4 132



WCDMA850 & Channel: 4 183

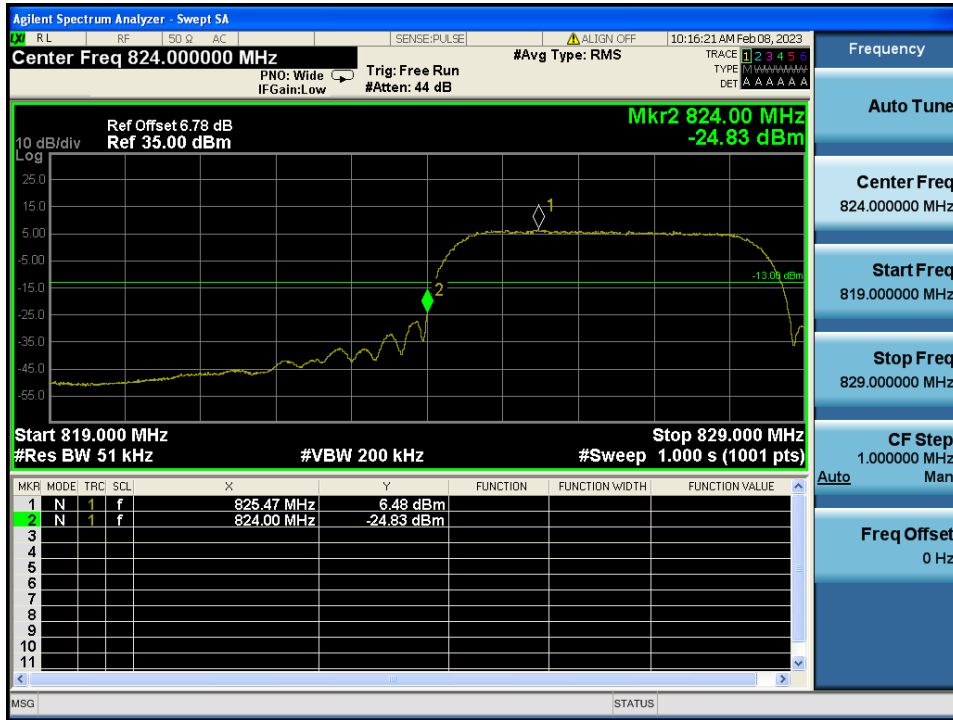


WCDMA850 & Channel: 4 233

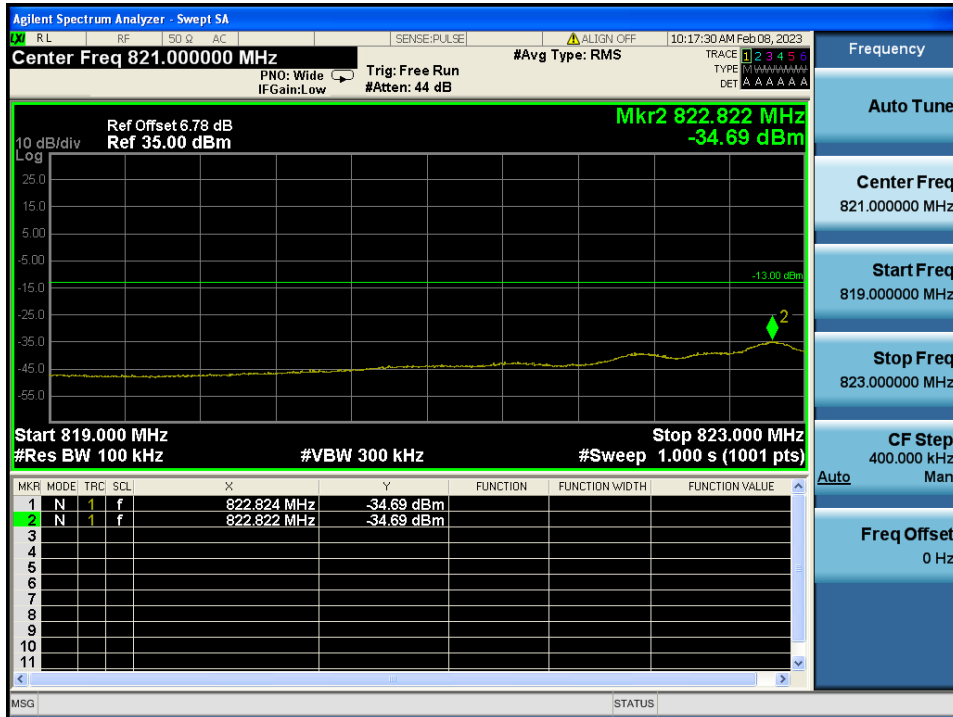


8.3. BAND EDGE EMISSIONS AT ANTENNA TERMINAL

WCDMA850 & Channel: 4 132



WCDMA850 & Channel: 4 132





WCDMA850 & Channel: 4 233



WCDMA850 & Channel: 4 233

