

TEST REPORT

FCC Sub6 n5 Test for SM-F741U Certification

APPLICANT SAMSUNG Electronics Co., Ltd.

REPORT NO. HCT-RF-2404-FC024-R1

DATE OF ISSUE May 3, 2024

> **Tested by** Jae Ryang Do

Technical Manager Jong Seok Lee



F-TP22-03(Rev.06)

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| T E S T R E P O R T | REPORT NO. HCT-RF-2404-FC024-R1 DATE OF ISSUE May 03, 2024 Additional Model SM-F741U1 |
|----------------------------|---|
| Applicant | SAMSUNG Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea |
| Product Name Model Name | Mobile Phone SM-F741U |
| Date of Test | February 27, 2024 ~ April 19, 2024 |
| FCC ID | A3LSMF741U |
| Location of Test | ■ Permanent Testing Lab □ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi- do, 17383 Republic of Korea) |
| FCC Classification: | PCS Licensed Transmitter Held to Ear (PCE) |
| FCC Rule Part(s): | § 22 |



REVISION HISTORY

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

| Revision No. | Date of Issue | Description |
|--------------|----------------|------------------------------------|
| 0 | April 26, 2024 | Initial Release |
| 1 | May 03, 2024 | Revised the date of test (Page 2.) |

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).

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: | A3LSMF741U |
| Application Type: | Certification |
| FCC Classification: | PCS Licensed Transmitter Held to Ear (PCE) |
| FCC Rule Part(s): | § 22 |
| EUT Type: | Mobile phone |
| Model(s): | SM-F741U |
| Additional Model(s) | SM-F741U1 |
| SCS(kHz): | 15 |
| Bandwidth(MHz): | 5, 10, 15, 20 |
| Waveform: | CP-OFDM, DFT-S-OFDM |
| Modulation: | DFT-S-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM |
| | 826.5 MHz – 846.5 MHz (Sub6 n5(5 MHz)) |
| | 829.0 MHz – 844.0 MHz (Sub6 n5(10 MHz)) |
| Tx Frequency: | 831.5 MHz – 841.5 MHz (Sub6 n5(15 MHz)) |
| | 834.0 MHz – 839.0 MHz (Sub6 n5(20 MHz)) |
| Date(s) of Tests: | February 27, 2024 ~ April 19, 2024 |
| Carial numbers | Radiated : R3CX20KJSJW |
| Serial number: | Conducted : 7B5599BDA3507ECE |



1.1. MAXIMUM OUTPUT POWER

| Mode | | Tx Frequency Emission | | EF | RP |
|--------------|-----------------------|-----------------------|------------|-------------------|---------------------|
| (MHz) | Tx Frequency (MHz) | Designator | Modulation | Max. Power (W) | Max. Power (dBm) |
| | | 4M50G7D | PI/2 BPSK | 0.112 | 20.49 |
| | | 4M52G7D | QPSK | 0.110 | 20.43 |
| Sub6 n5 (5) | 826.5 - 846.5 | 4M52W7D | 16QAM | 0.086 | 19.33 |
| | | 4M52W7D | 64QAM | 0.063 | 17.97 |
| | | 4M51W7D | 256QAM | 0.034 | 15.34 |
| | | 8M98G7D | PI/2 BPSK | 0.108 | 20.33 |
| | | 9M00G7D | QPSK | 0.107 | 20.28 |
| Sub6 n5 (10) | 829.0 - 844.0 | 8M98W7D | 16QAM | 0.085 | 19.28 |
| | | 8M96W7D | 64QAM | 0.061 | 17.83 |
| | 8M99W7D | 256QAM | 0.033 | 15.16 | |
| | | 13M5G7D | PI/2 BPSK | 0.108 | 20.32 |
| | | 13M5G7D | QPSK | 0.105 | 20.20 |
| Sub6 n5 (15) | 831.5 - 841.5 | 13M5W7D | 16QAM | 0.082 | 19.13 |
| | | 13M4W7D | 64QAM | 0.060 | 17.77 |
| | | 13M5W7D | 256QAM | 0.033 | 15.18 |
| | | 18M0G7D | PI/2 BPSK | 0.107 | 20.30 |
| | | 18M0G7D | QPSK | 0.105 | 20.20 |
| Sub6 n5 (20) | 834.0 - 839.0 | 17M9W7D | 16QAM | 0.081 | 19.08 |
| | | 18M0W7D | 64QAM | 0.059 | 17.73 |
| | | 18M0W7D | 256QAM | 0.033 | 15.15 |





2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub 6, mmWave. It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160 MHz), Bluetooth(iPA, ePA), BT LE(iPA, ePA), NFC, WPT, WIFI 6E.

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**, **17383**, **Rep. of KOREA**.





3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

| Test Description | Test Procedure Used |
|---|---|
| Occupied Bandwidth | - KDB 971168 D01 v03r01 – Section 4.3 - ANSI C63.26-2015 – Section 5.4.4 |
| Band Edge | - KDB 971168 D01 v03r01 – Section 6.0 - ANSI C63.26-2015 – Section 5.7 |
| Spurious and Harmonic Emissions at Antenna Terminal | - KDB 971168 D01 v03r01 – Section 6.0 - 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 - ANSI C63.26-2015 – Section 5.2.3.4 |
| Frequency stability | - ANSI C63.26-2015 – Section 5.6 |
| Effective Radiated Power/ Effective Isotropic Radiated Power | - KDB 971168 D01 v03r01 – Section 5.2 & 5.8 - ANSI/TIA-603-E-2016 – Section 2.2.17 |
| Radiated Spurious and Harmonic Emissions | - KDB 971168 D01 v03r01 – Section 6.2 - ANSI/TIA-603-E-2016 – Section 2.2.12 |



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 in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

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;

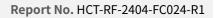
 P_{d} (dBm) = Pg (dBm) - cable loss (dB) + antenna gain (dB)

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.





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 according to ANSI/TIA-603-E-2016.

Test Settings

- 1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
- 2. VBW \geq 3 x 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

- 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)

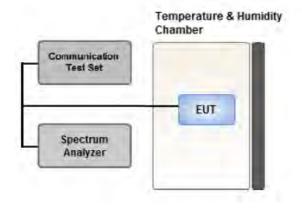
Where: P_{g} is the generator output power into the substitution antenna.

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

EIRP (dBm) = ERP (dBm) + 2.15



3.4 PEAK- TO- AVERAGE RATIO



Test setup

① CCDF Procedure for PAPR

Test Settings

- 1. Set resolution/measurement bandwidth \geq 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 %.

② Alternate Procedure for PAPR

Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{Pk} .

Use one of the applicable procedures presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{Avg} . Determine the P.A.R. from:

P.A.R (dB) = P_{Pk} (dBm) - P_{Avg} (dBm) (P_{Avg} = Average Power + Duty cycle Factor)



Test Settings(Peak Power)

The measurement instrument must have a RBW that is greater than or equal to the OBW of the signal to be measured and a VBW $\geq 3 \times$ RBW.

- 1. Set the RBW \geq OBW.
- 2. Set VBW \geq 3 × RBW.
- 3. Set span $\geq 2 \times OBW$.
- 4. Sweep time $\geq 10 \times$ (number of points in sweep) \times (transmission symbol period).
- 5. Detector = peak.
- 6. Trace mode = max hold.
- 7. Allow trace to fully stabilize.
- 8. Use the peak marker function to determine the peak amplitude level.

Test Settings(Average Power)

- 1. Set span to 2 × to 3 × the OBW.
- 2. Set RBW \geq OBW.
- 3. Set VBW \geq 3 × RBW.
- 4. Set number of measurement points in sweep $\geq 2 \times \text{span} / \text{RBW}$.
- 5. Sweep time:

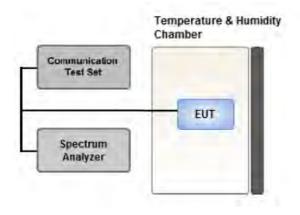
Set \geq [10 × (number of points in sweep) × (transmission period)] for single sweep

(automation-compatible) measurement. The transmission period is the (on + off) time.

- 6. Detector = power averaging (rms).
- 7. Set sweep trigger to "free run."
- 8. 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 the on and off period of the transmitter, 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.)
- 9. Use the peak marker function to determine the maximum amplitude level.
- 10. Add [10 log (1/duty cycle)] to the measured maximum power level to compute the average power during continuous transmission. For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is a constant 25 %.



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



Communication Test Set EUT Spectrum Analyzer

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

Test setup

Test Overview

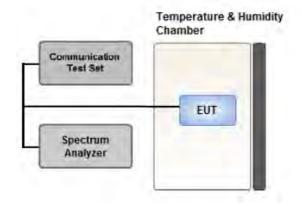
The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured 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 = RMS
- 4. Trace Mode = trace average
- 5. Sweep time = auto
- 6. Number of points in sweep $\geq 2 \times \text{Span} / \text{RBW}$



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 x RBW
- 5. Detector = RMS
- 6. Number of sweep points $\geq 2 \times \text{Span/RBW}$
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize



Test Notes

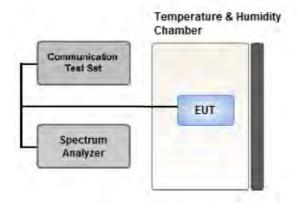
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a 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.



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.



3.9 WORST CASE(RADIATED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.

(Worst case: DFT-S-OFDM)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- The EUT was tested in three modes(Open, Half-open, Closed), the worst case configuration results are reported. (Worst case: Open mode)
- All modes of operation were investigated and the worst case configuration results are reported. Mode: NSA, SA
- Worst case: SA
- Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc) Worst case : Stand alone
- We were performed the RSE test in condition of co-location.
- Mode : Stand alone, Simultaneous transmission scenarios
- Worst case : Stand alone
- Radiated Spurious emissions are measured while operating in EN-DC mode with Sub 6 NR carrier as well as an LTE carrier (anchor).
- All EN-DC mode of operation (=anchor) were investigated and the test results were measured No Peak Found.
- The test results which are attenuated more than 20 dB below the permissible value, so it was not reported.
- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.
- Please refer to the table below.
- In the case of radiated spurious emissions, all bandwidth of operation was investigated and the worst case bandwidth results are reported. (Worst case : 5 MHz)
- SM-F741U & additional models were tested and the worst case results are reported.
- (Worst case : SM-F741U)

| [Worst case] | | | | | |
|--|------------|-----------------|-----------|------|--|
| Test Description | Modulation | RB size | RB offset | Axis | |
| | PI/2 BPSK, | | | | |
| Effective Radiated Power | QPSK, | See Section 8.1 | | х | |
| | 16QAM, | | | | |
| | 64QAM, | | | | |
| | 256QAM | | | | |
| Radiated Spurious and Harmonic Emissions | PI/2 BPSK | See Se | ction 8.1 | Х | |



3.10 WORST CASE(CONDUCTED TEST)

- Waveform : All Waveform of operation were investigated and the worst case configuration results are reported.
- (Worst case: DFT-S-OFDM)
- Modulation : All Modulation of operation were investigated and the worst case configuration results are reported.

(Worst case: PI/2 BPSK)

- All modes of operation were investigated and the worst case configuration results are reported. Mode: NSA, SA
- Worst case: SA
- All RB sizes, offsets of operation were investigated and the worst case configuration results are reported.
- Please refer to the table below.
- SM-F741U & additional models were tested and the worst case results are reported.

(Worst case : SM-F741U)

| Test Description | Modulation | Bandwidth (MHz) | Frequency | RB size | RB offset | | | | | | | | | |
|--|---|--------------------|----------------------|-----------|-----------|---|-----|----|-----|---|----|------|---|----|
| Occupied Bandwidth Peak- to- Average Ratio | PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM | 5, 10, 15, 20 | Mid | Full RB | 0 | | | | | | | | | |
| | | 5 | Low | 1 | 0 | | | | | | | | | |
| | | | High | 1 | 24 | | | | | | | | | |
| | PI/2 BPSK | 10 | Low | 1 | 0 | | | | | | | | | |
| | | אצסק ל/ום | | PI/2 RPSK | PI/2 RPSK | | | | | | 10 | High | 1 | 51 |
| Band Edge | | | | | | | | 15 | Low | 1 | 0 | | | |
| Dana Lage | | 15 | High | 1 | 78 | | | | | | | | | |
| | | 20 | Low | 1 | 0 | | | | | | | | | |
| | | | | 20 | High | 1 | 105 | | | | | | | |
| | | 5, 10, 15, 20 | Low, High | Full RB | 0 | | | | | | | | | |
| Spurious and Harmonic Emissions at Antenna Terminal | PI/2 BPSK | 5, 10, 15, 20 | Low, Mid, High | 1 | 1 | | | | | | | | | |

[Worst case]



4. LIST OF TEST EQUIPMENT

| Equipment | Model | Manufacture | Serial No. | Due to Calibration | Calibration Interval |
|---|-------------------------|---------------------|-------------|-----------------------|-------------------------|
| Precision Dipole Antenna | UHAP | Schwarzbeck | 01273 | 03/10/2026 | Biennial |
| Precision Dipole Antenna | UHAP | Schwarzbeck | 01274 | 03/10/2026 | Biennial |
| Horn Antenna(1~18 GHz) | BBHA 9120D | Schwarzbeck | 02289 | 02/14/2026 | Biennial |
| Horn Antenna(1~18 GHz) | BBHA 9120D | Schwarzbeck | 9120D-1299 | 04/27/2025 | Biennial |
| Horn Antenna(15~40 GHz) | BBHA 9170 | Schwarzbeck | BBHA9170342 | 09/29/2024 | Biennial |
| Horn Antenna(15~40 GHz) | BBHA 9170 | Schwarzbeck | BBHA9170124 | 03/28/2025 | Biennial |
| Loop Antenna(9 kHz~30 MHz) | FMZB1513 | Rohde & Schwarz | 1513-175 | 01/16/2025 | Biennial |
| Bilog Antenna | VULB9160 | Schwarzbeck | 3150 | 03/09/2025 | Biennial |
| Hybrid Antenna | VULB9160 | Schwarzbeck | 760 | 02/24/2025 | Biennial |
| RF Switching System | FBSR-06B (1G HPF + LNA) | T&M SYSTEM | F3L1 | 05/22/2024 | Annual |
| RF Switching System | FBSR-06B (3G HPF + LNA) | T&M SYSTEM | F3L2 | 05/22/2024 | Annual |
| RF Switching System | FBSR-06B (6G HPF + LNA) | T&M SYSTEM | F3L3 | 05/22/2024 | Annual |
| RF Switching System | FBSR-06B (LNA) | T&M SYSTEM | F3L4 | 05/22/2024 | Annual |
| Power Amplifier | CBL18265035 | CERNEX | 22966 | 11/17/2024 | Annual |
| Power Amplifier | CBL26405040 | CERNEX | 25956 | 02/26/2025 | Annual |
| DC Power Supply | E3632A | Hewlett Packard | MY40004427 | 08/25/2024 | Annual |
| Power Splitter(DC~26.5 GHz) | 11667B | Hewlett Packard | 11275 | 02/29/2025 | Annual |
| Chamber | SU-642 | ESPEC | 93008124 | 02/19/2025 | Annual |
| Signal Analyzer(10 Hz~26.5 GHz) | N9020A | Agilent | MY51110063 | 04/04/2025 | Annual |
| ATTENUATOR(20 dB) | 8493C | Hewlett Packard | 17280 | 04/17/2025 | Annual |
| Spectrum Analyzer(10 Hz~40 GHz) | FSV40 | REOHDE & SCHWARZ | 101436 | 02/13/2025 | Annual |
| Base Station | 8960 (E5515C) | Agilent | MY48360800 | 08/10/2024 | Annual |
| Wideband Radio Communication Tester | MT8821C | Anritsu Corp. | 6262287701 | 05/22/2024 | Annual |
| Wideband Radio Communication Tester | MT8000A | Anritsu Corp. | 6262302511 | 05/23/2024 | Annual |
| SIGNAL GENERATOR (100 kHz~40 GHz) | SMB100A | REOHDE & SCHWARZ | 177633 | 06/22/2024 | Annual |
| Signal Analyzer(5 Hz~40.0 GHz) | N9030B | KEYSIGHT | MY55480167 | 05/24/2024 | Annual |
| 4-Way Divider | ZC4PD-K1844+ | Mini-Circuits | 942907 | 09/19/2024 | Annual |
| FCC LTE Mobile Conducted RF 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).



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 (±dB) |
|--|---|
| Conducted Disturbance (150 kHz ~ 30 MHz) | 1.98 (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) |



6. SUMMARY OF TEST RESULTS

6.1 Test Condition: Conducted Test

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

Note:

1. See SAR Report

2. Conducted tests were tested using 5G Wireless Tester.

6.2 Test Condition: Radiated Test

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

Note:

1. Radiated tests were tested using 5G Wireless Tester.



7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

| Ch. | / Freq. | Measured | Substitute Ant. Gain | | | | EF | RP |
|---------|------------|----------------|----------------------|--------|------|------|-------|-------|
| channel | Freq.(MHz) | Level (dBm) | Level (dBm) | (dBd) | C.L | Pol. | 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 | | | 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.



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)

EDGE Emission Designator

Emission Designator = 249KG7W GSM BW = 249 kHz G = Phase Modulation 7 = Quantized/Digital Info 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)

QPSK Modulation

Emission Designator = 4M48G7D LTE BW = 4.48 MHz G = Phase Modulation 7 = Quantized/Digital Info D = Data transmission; telemetry; telecommand

<u>QAM Modulation</u> Emission Designator = 4M48W7D LTE BW = 4.48 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission; telemetry; telecommand

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8. TEST DATA

8.1 EFFECTIVE RADIATED POWER

| Freq | Mod/ Bandwidth | Modulation | Measured Level | Substitute Level | Ant. Gain | C.L | Pol | Limit | EI | RP | | RB |
|-------|-------------------|------------|-------------------|---------------------|-----------|------|-----|--------|-------|---------|------|--------|
| (MHz) | [SCS (kHz)] | | (dBm) | (dBm) | (dBd) | | | w | W | dBm | Size | Offset |
| | | PI/2 BPSK | -30.06 | 30.84 | -10.05 | 1.39 | V | | 0.087 | 19.40 | | |
| | | QPSK | -30.13 | 30.77 | -10.05 | 1.39 | V | | 0.086 | 19.33 | | |
| 826.5 | | 16-QAM | -31.28 | 29.62 | -10.05 | 1.39 | V | - | 0.066 | 18.18 | 1 | 12 |
| | | 64-QAM | -32.49 | 28.41 | -10.05 | 1.39 | V | - | 0.050 | 16.97 | | |
| | | 256-QAM | -35.25 | 25.65 | -10.05 | 1.39 | V | | 0.026 | 14.21 | | |
| | | PI/2 BPSK | -29.93 | 31.36 | -10.05 | 1.40 | V | | 0.098 | 19.91 | | |
| | Sub6 n5/ | QPSK | -29.97 | 31.32 | -10.05 | 1.40 | V | | 0.097 | 19.87 | | |
| 836.5 | 5 MHz | 16-QAM | -31.02 | 30.27 | -10.05 | 1.40 | V | < 7.00 | 0.076 | 18.82 | 1 | 23 |
| | [15 kHz] | 64-QAM | -32.38 | 28.91 | -10.05 | 1.40 | V | - | 0.056 | 17.46 | | |
| | | 256-QAM | -35.00 | 26.29 | -10.05 | 1.40 | V | | 0.031 | 14.84 | | |
| | | PI/2 BPSK | -29.73 | 31.95 | -10.05 | 1.41 | V | | 0.112 | 20.49 | | |
| | | QPSK | -29.79 | 31.89 | -10.05 | 1.41 | V | - | 0.110 | 20.43 | | |
| 846.5 | _ | 16-QAM | -30.89 | 30.79 | -10.05 | 1.41 | V | | 0.086 | 19.33 | 1 | 12 |
| | | 64-QAM | -32.25 | 29.43 | -10.05 | 1.41 | V | | 0.063 | 17.97 | | |
| | | 256-QAM | -34.88 | 26.80 | -10.05 | 1.41 | v | | 0.034 | 4 15.34 | | |



| Freq | Mod/ Bandwidth | Modulation | Measured Level | Substitute Level | Ant. Gain | C.L | Pol | Limit | Ef | RP | | RB |
|-------|-------------------|------------|-------------------|---------------------|-----------|------|-----|--------|-------|-------|------|--------|
| (MHz) | [SCS (kHz)] | | (dBm) | (dBm) | (dBd) | | | w | W | dBm | Size | Offset |
| | | PI/2 BPSK | -29.89 | 31.13 | -10.05 | 1.39 | V | | 0.093 | 19.69 | | |
| | | QPSK | -30.12 | 30.90 | -10.05 | 1.39 | V | | 0.088 | 19.46 | | |
| 829.0 | | 16-QAM | -31.18 | 29.84 | -10.05 | 1.39 | V | | 0.069 | 18.40 | 1 | 50 |
| | | 64-QAM | -32.32 | 28.70 | -10.05 | 1.39 | V | | 0.053 | 17.26 | | |
| | | 256-QAM | -35.04 | 25.98 | -10.05 | 1.39 | V | | 0.029 | 14.54 | | |
| | | PI/2 BPSK | -29.76 | 31.53 | -10.05 | 1.40 | V | | 0.102 | 20.08 | | |
| | Sub6 n5/ | QPSK | -29.82 | 31.47 | -10.05 | 1.40 | V | | 0.101 | 20.02 | | |
| 836.5 | 10 MHz | 16-QAM | -31.00 | 30.29 | -10.05 | 1.40 | V | < 7.00 | 0.077 | 18.84 | 1 | 50 |
| | [15 kHz] | 64-QAM | -32.14 | 29.15 | -10.05 | 1.40 | V | | 0.059 | 17.70 | | |
| | | 256-QAM | -34.89 | 26.40 | -10.05 | 1.40 | V | | 0.031 | 14.95 | | |
| | | PI/2 BPSK | -29.69 | 31.79 | -10.05 | 1.41 | V | | 0.108 | 20.33 | | |
| | | QPSK | -29.74 | 31.74 | -10.05 | 1.41 | V | | 0.107 | 20.28 | | |
| 844.0 | | 16-QAM | -30.74 | 30.74 | -10.05 | 1.41 | V | | 0.085 | 19.28 | 1 | 50 |
| | | 64-QAM | -32.19 | 29.29 | -10.05 | 1.41 | V | | 17.83 | - | | |
| | | 256-QAM | -34.86 | 26.62 | -10.05 | 1.41 | V | | 0.033 | 15.16 | | |



| Freq | Mod/ Bandwidth | Modulation | Measured Level | Substitute Level | Ant. Gain | C.L | Pol | Limit | El | RP | | RB |
|-------|-------------------|------------|-------------------|---------------------|-----------|------|-----|--------|-------|--|------|--------|
| (MHz) | [SCS (kHz)] | | (dBm) | (dBm) | (dBd) | | | w | W | dBm | Size | Offset |
| | | PI/2 BPSK | -29.80 | 31.33 | -10.05 | 1.39 | V | | 0.098 | 19.89 | | |
| | | QPSK | -29.85 | 31.28 | -10.05 | 1.39 | V | | 0.096 | 19.84 | | |
| 831.5 | | 16-QAM | -31.06 | 30.07 | -10.05 | 1.39 | V | | 0.073 | 18.63 | 1 | 77 |
| | | 64-QAM | -32.36 | 28.77 | -10.05 | 1.39 | V | | 0.054 | 17.33 | | |
| | | 256-QAM | -35.03 | 26.10 | -10.05 | 1.39 | V | | 0.029 | 14.66 | | |
| | | PI/2 BPSK | -29.62 | 31.67 | -10.05 | 1.40 | V | | 0.105 | 20.22 | | |
| | Sub6 n5/ | QPSK | -29.64 | 31.65 | -10.05 | 1.40 | V | | 0.105 | 20.20 | | |
| 836.5 | 15 MHz | 16-QAM | -30.85 | 30.44 | -10.05 | 1.40 | V | < 7.00 | 0.079 | 18.99 | 1 | 77 |
| | [15 kHz] | 64-QAM | -32.15 | 29.14 | -10.05 | 1.40 | V | | 0.059 | 17.69 | | |
| | | 256-QAM | -34.79 | 26.50 | -10.05 | 1.40 | V | | 0.032 | 15.05 | | |
| | | PI/2 BPSK | -29.64 | 31.78 | -10.05 | 1.41 | V | | 0.108 | 20.32 | | |
| | | QPSK | -29.85 | 31.57 | -10.05 | 1.41 | V | | 0.103 | 20.11 | | |
| 841.5 | | 16-QAM | -30.83 | 30.59 | -10.05 | 1.41 | V | | 0.082 | 19.13 | 1 | 77 |
| | | 64-QAM | -32.19 | 29.23 | -10.05 | 1.41 | V | | 0.060 | 19.84 1 77 18.63 1 77 17.33 1 77 14.66 20.22 20.20 18.99 1 77 17.69 1 77 15.05 20.32 20.11 | | |
| | | 256-QAM | -34.78 | 26.64 | -10.05 | 1.41 | V | | 0.033 | 15.18 | | |



| Freq | Mod/ Bandwidth | Modulation | Measured Level | Substitute Level | Ant. Gain | C.L | Pol | Limit | El | RP | | RB |
|-------|-------------------|------------|-------------------|---------------------|-----------|------|-----|--------|-------|-------|---|--------|
| (MHz) | [SCS (kHz)] | | (dBm) | (dBm) | (dBd) | | | w | w | dBm | Size | Offset |
| | | PI/2 BPSK | -29.62 | 31.59 | -10.05 | 1.39 | V | | 0.104 | 20.15 | | |
| | | QPSK | -29.67 | 31.54 | -10.05 | 1.39 | V | | 0.102 | 20.10 | | |
| 834.0 | | 16-QAM | -30.84 | 30.37 | -10.05 | 1.39 | V | | 0.078 | 18.93 | 1 | 104 |
| | | 64-QAM | -32.17 | 29.04 | -10.05 | 1.39 | V | | 0.058 | 17.60 | | |
| | | 256-QAM | -34.80 | 26.41 | -10.05 | 1.39 | V | | 0.031 | 14.97 | | |
| | - | PI/2 BPSK | -29.65 | 31.64 | -10.05 | 1.40 | V | | 0.105 | 20.19 | | |
| | Sub6 n5/ | QPSK | -29.71 | 31.58 | -10.05 | 1.40 | V | | 0.103 | 20.13 | | |
| 836.5 | 20 MHz | 16-QAM | -30.87 | 30.42 | -10.05 | 1.40 | V | < 7.00 | 0.079 | 18.97 | 1 | 104 |
| | [15 kHz] | 64-QAM | -32.13 | 29.16 | -10.05 | 1.40 | V | | 0.059 | 17.71 | | |
| | | 256-QAM | -34.85 | 26.44 | -10.05 | 1.40 | V | | 0.032 | 14.99 | | |
| | | PI/2 BPSK | -29.70 | 31.75 | -10.05 | 1.40 | V | | 0.107 | 20.30 | | |
| | | QPSK | -29.80 | 31.65 | -10.05 | 1.40 | V | | 0.105 | 20.20 | | |
| 839.0 | _ | 16-QAM | -30.92 | 30.53 | -10.05 | 1.40 | V | | 0.081 | 19.08 | 1 | 104 |
| | | 64-QAM | -32.27 | 29.18 | -10.05 | 1.40 | v | | 0.059 | 17.73 | 0.15 0.10 8.93 1 10 7.60 4.97 0.19 0.13 8.97 1 10 7.71 4.99 0.30 0.20 9.08 1 10 | |
| | | 256-QAM | -34.85 | 26.60 | -10.05 | 1.40 | V | | 0.033 | 15.15 | | |



8.2 RADIATED SPURIOUS EMISSIONS

| NR Band: | N5 |
|-------------|-----------------|
| Bandwidth: | 5 MHz |
| Modulation: | PI/2 BPSK |
| Distance: | <u>3 meters</u> |
| SCS: | <u>15 kHz</u> |

| | Freq | Measured | Ant. | Substitut | | | Result | Limit | F | 8B |
|-------------------|----------|----------------|---------------|------------------|------|-----|--------|--------|------|--------|
| Ch | (MHz) | Level (dBm) | Gain (dBi) | e Level (dBm) | C.L | Pol | (dBm) | (dBm) | Size | Offset |
| | 1 653.00 | -59.06 | 9.20 | -67.97 | 2.03 | V | -60.80 | -13.00 | | |
| | 2 479.50 | -59.87 | 10.20 | -63.12 | 2.45 | V | -55.37 | -13.00 | | |
| 165300 (826.5) | 3 306.00 | -61.26 | 10.90 | -63.30 | 2.92 | V | -55.32 | -13.00 | 1 | 12 |
| (020.3) | 4 132.50 | -61.19 | 11.30 | -61.04 | 3.25 | V | -52.99 | -13.00 | | |
| | 4 959.00 | -62.25 | 10.90 | -57.96 | 3.58 | V | -50.64 | -13.00 | | |
| | 1 673.00 | -58.61 | 9.20 | -67.79 | 2.03 | V | -60.62 | -13.00 | | |
| | 2 509.50 | -59.42 | 10.30 | -63.95 | 2.50 | V | -56.15 | -13.00 | | |
| 167300 (836.5) | 3 346.00 | -61.24 | 10.95 | -64.13 | 2.89 | V | -56.07 | -13.00 | 1 | 23 |
| (050.5) | 4 182.50 | -60.96 | 11.30 | -60.81 | 3.30 | V | -52.81 | -13.00 | | |
| | 5 019.00 | -61.30 | 10.70 | -56.24 | 3.55 | V | -49.09 | -13.00 | | |
| | 1 693.00 | -59.14 | 9.40 | -67.76 | 2.00 | V | -60.36 | -13.00 | | |
| | 2 539.50 | -60.58 | 10.30 | -65.41 | 2.52 | V | -57.63 | -13.00 | | |
| 169300 (846.5) | 3 386.00 | -60.91 | 11.00 | -63.39 | 2.94 | V | -55.33 | -13.00 | 1 | 12 |
| (0-0.0) | 4 232.50 | -62.75 | 11.20 | -61.83 | 3.28 | V | -53.91 | -13.00 | | |
| | 5 079.00 | -62.98 | 10.70 | -57.82 | 3.61 | V | -50.73 | -13.00 | | |

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8.3 PEAK-TO-AVERAGE RATIO

| Band | Band Width | Frequenc y (MHz) | Modulatio n | Resource Block Size | Resource Block Offset | Data (dB) |
|------|---------------|------------------------|----------------|------------------------|-----------------------------|-----------|
| | | | BPSK | | | 4.43 |
| | | | QPSK | | | 5.28 |
| | 5 MHz | | 16-QAM | 25 | | 5.84 |
| | | | 64-QAM | | | 6.17 |
| | | | 256-QAM | | | 6.41 |
| | | | BPSK | | | 4.19 |
| | | | QPSK | | | 5.09 |
| | 10 MHz | | 16-QAM 50 | 5.61 | | |
| | | | 64-QAM | | | 5.92 |
| Sub6 | | 836.5 | 256-QAM | | 0 | 6.43 |
| n5 | | 030.5 | BPSK | | 0 | 4.18 |
| | | | QPSK | | | 5.03 |
| | 15 MHz | | 16-QAM | 75 | | 5.73 |
| | | | 64-QAM | | | 5.89 |
| | | | 256-QAM | | | 6.28 |
| | | | BPSK | | | 4.48 |
| | | | QPSK | | | 5.41 |
| | 20 MHz | | 16-QAM | 100 | | 5.90 |
| | | | 64-QAM | | | 6.22 |
| | | | 256-QAM | | | 6.53 |

Note:

1. Plots of the EUT's Peak- to- Average Ratio are shown Page 60 \sim 79.

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8.4 OCCUPIED BANDWIDTH

| Band | Band Width | Frequenc y (MHz) | Modulatio n | Resource Block Size | Resource Block Offset | Data (MHz) | |
|------|---------------|------------------------|----------------|------------------------|-----------------------------|------------|--------|
| | | | BPSK | | | 4.5036 | |
| | | | | QPSK | | | 4.5173 |
| | 5 MHz | | 16-QAM | 25 | | 4.5168 | |
| | | | 64-QAM | | | 4.5152 | |
| | | | 256-QAM | | | 4.5067 | |
| | | | BPSK | | | 8.9816 | |
| | | | QPSK | | | 9.0012 | |
| | 10 MHz | | 16-QAM | 50 | | 8.9758 | |
| | | | 64-QAM | | | 8.9558 | |
| Sub6 | | 000 5 | 256-QAM | 8.9944 | | | |
| n5 | | 836.5 | BPSK | | 0 | 13.468 | |
| | | | QPSK | | | 13.453 | |
| | 15 MHz | | 16-QAM | 75 | | 13.484 | |
| | | | 64-QAM | | | 13.443 | |
| | | | 256-QAM | | | 13.478 | |
| | | | BPSK | | | 17.977 | |
| | 20 MHz | | QPSK | | | 17.947 | |
| | | | 16-QAM | 100 | | 17.917 | |
| | | | 64-QAM | | | 17.946 | |
| | | | 256-QAM | | | 17.975 | |

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 40 \sim 59.

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| Band | Band Width (MHz) | Frequenc y (MHz) | Frequency of Maximum Harmonic (GHz) | Factor (dB) | Measuremen t Maximum Data (dBm) | Result (dBm) | Limit (dBm) |
|------|------------------------|------------------------|--|----------------|---|-----------------|----------------|
| | | 826.5 | 8.0429 | 30.815 | -74.793 | -43.978 | |
| | 5 | 836.5 | 9.1595 | 30.815 | -74.151 | -43.336 | |
| | | 846.5 | 9.6999 | 30.815 | -74.470 | -43.655 | |
| | | 829.0 | 8.0195 | 30.815 | -74.861 | -44.046 | |
| | 10 | 836.5 | 5.2468 | 30.815 | -75.041 | -44.226 | |
| Sub6 | | 844.0 | 6.0065 | 30.815 | -74.626 | -43.811 | 12.00 |
| n5 | | 831.5 | 9.0952 | 30.815 | -74.317 | -43.502 | -13.00 |
| | 15 | 836.5 | 4.0190 | 30.200 | -74.799 | -44.599 | |
| | | 841.5 | 3.7807 | 30.200 | -74.674 | -44.474 | |
| | | 834.0 | 9.0798 | 30.815 | -73.925 | -43.110 | |
| | 20 | 836.5 | 3.7503 | 30.200 | -73.480 | -43.280 | |
| | | 839.0 | 8.0249 | 30.815 | -74.596 | -43.781 | |

8.5 CONDUCTED SPURIOUS EMISSIONS

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 104 ~ 115.

2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)

3. Factor(dB) = Cable Loss + Ext. Attenuator + Power Splitter

| Frequency Range (GHz) | Factor [dB] |
|-----------------------|-------------|
| 0.03 - 1 | 27.494 |
| 1 - 5 | 30.200 |
| 5 - 10 | 30.815 |
| 10 - 15 | 31.340 |
| 15 - 20 | 31.713 |
| Above 20 | 32.355 |

8.6 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 80 ~ 103.

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8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

| BandWidth: | <u>5 MHz</u> |
|------------------|------------------------------|
| Voltage(100 %): | 3.880 VDC |
| Batt. Endpoint: | 3.300 VDC |
| Deviation Limit: | $\pm~$ 0.000 25 % or 2.5 ppm |

| Test. Frequncy | Voltage | Temp. | Frequency | Frequency | Deviation | ppm |
|-------------------|----------------|----------|-------------|------------|-----------|-------|
| (MHz) | (%) | (°C) | (Hz) | Error (Hz) | (%) | |
| | 100 % | +20(Ref) | 836 500 006 | 0.0 | 0.000 000 | 0.000 |
| | 100 % | -30 | 836 500 011 | 4.5 | 0.000 001 | 0.005 |
| | 100 % | -20 | 836 500 012 | 6.1 | 0.000 001 | 0.007 |
| | 100 % | -10 | 836 500 012 | 5.9 | 0.000 001 | 0.007 |
| 836.5 | 100 % | 0 | 836 500 011 | 4.4 | 0.000 001 | 0.005 |
| 830.5 | 100 % | +10 | 836 500 014 | 8.2 | 0.000 001 | 0.010 |
| | 100 % | +30 | 836 500 013 | 7.1 | 0.000 001 | 0.008 |
| | 100 % | +40 | 836 500 011 | 5.2 | 0.000 001 | 0.006 |
| | 100 % | +50 | 836 500 013 | 6.6 | 0.000 001 | 0.008 |
| | Batt. Endpoint | +20 | 836 500 011 | 4.9 | 0.000 001 | 0.006 |



| BandWidth: | <u>10 MHz</u> |
|------------------|-----------------------------|
| Voltage(100 %): | 3.880 VDC |
| Batt. Endpoint: | 3.300 VDC |
| Deviation Limit: | \pm 0.000 25 % or 2.5 ppm |

| Test. Frequncy | Voltage | Temp. | Frequency | Frequency | Deviation | ppm |
|-------------------|----------------|----------|-------------|------------|-----------|-------|
| (MHz) | (%) | (°C) | (Hz) | Error (Hz) | (%) | |
| | 100 % | +20(Ref) | 836 500 002 | 0.0 | 0.000 000 | 0.000 |
| | 100 % | -30 | 836 500 010 | 8.1 | 0.000 001 | 0.010 |
| | 100 % | -20 | 836 500 009 | 6.4 | 0.000 001 | 0.008 |
| | 100 % | -10 | 836 500 010 | 8.0 | 0.000 001 | 0.010 |
| 026 5 | 100 % | 0 | 836 500 009 | 7.2 | 0.000 001 | 0.009 |
| 836.5 | 100 % | +10 | 836 500 009 | 6.9 | 0.000 001 | 0.008 |
| | 100 % | +30 | 836 500 007 | 4.8 | 0.000 001 | 0.006 |
| | 100 % | +40 | 836 500 007 | 4.5 | 0.000 001 | 0.005 |
| | 100 % | +50 | 836 500 010 | 8.2 | 0.000 001 | 0.010 |
| | Batt. Endpoint | +20 | 836 500 008 | 6.2 | 0.000 001 | 0.007 |



| BandWidth: | <u>15 MHz</u> |
|------------------|-----------------------------------|
| Voltage(100 %): | 3.880 VDC |
| Batt. Endpoint: | 3.300 VDC |
| Deviation Limit: | $\pm 0.00025\%{ m or}2.5{ m ppm}$ |

| Test. Frequncy | Voltage | Temp. | Frequency | Frequency | Deviation | ppm |
|-------------------|----------------|----------|-------------|------------|-----------|-------|
| (MHz) | (%) | (°C) | (Hz) | Error (Hz) | (%) | |
| | 100 % | +20(Ref) | 836 500 005 | 0.0 | 0.000 000 | 0.000 |
| | 100 % | -30 | 836 500 010 | 5.3 | 0.000 001 | 0.006 |
| | 100 % | -20 | 836 500 014 | 9.2 | 0.000 001 | 0.011 |
| | 100 % | -10 | 836 500 014 | 8.6 | 0.000 001 | 0.010 |
| 026 5 | 100 % | 0 | 836 500 012 | 7.2 | 0.000 001 | 0.009 |
| 836.5 | 100 % | +10 | 836 500 009 | 3.5 | 0.000 000 | 0.004 |
| | 100 % | +30 | 836 500 010 | 4.8 | 0.000 001 | 0.006 |
| | 100 % | +40 | 836 500 010 | 4.4 | 0.000 001 | 0.005 |
| | 100 % | +50 | 836 500 010 | 5.1 | 0.000 001 | 0.006 |
| | Batt. Endpoint | +20 | 836 500 011 | 5.9 | 0.000 001 | 0.007 |



| BandWidth: | <u>20 MHz</u> |
|------------------|-----------------------------|
| Voltage(100 %): | 3.880 VDC |
| Batt. Endpoint: | 3.300 VDC |
| Deviation Limit: | \pm 0.000 25 % or 2.5 ppm |

| Test. Frequncy | Voltage | Temp. | Frequency | Frequency | Deviation | ppm |
|-------------------|----------------|----------|-------------|------------|-----------|-------|
| (MHz) | (%) | (°C) | (Hz) | Error (Hz) | (%) | |
| | 100 % | +20(Ref) | 836 500 003 | 0.0 | 0.000 000 | 0.000 |
| | 100 % | -30 | 836 500 010 | 7.2 | 0.000 001 | 0.009 |
| | 100 % | -20 | 836 500 012 | 8.4 | 0.000 001 | 0.010 |
| | 100 % | -10 | 836 500 010 | 6.9 | 0.000 001 | 0.008 |
| 02C F | 100 % | 0 | 836 500 009 | 5.5 | 0.000 001 | 0.007 |
| 836.5 | 100 % | +10 | 836 500 011 | 7.4 | 0.000 001 | 0.009 |
| | 100 % | +30 | 836 500 011 | 8.1 | 0.000 001 | 0.010 |
| | 100 % | +40 | 836 500 013 | 9.4 | 0.000 001 | 0.011 |
| | 100 % | +50 | 836 500 009 | 6.2 | 0.000 001 | 0.007 |
| | Batt. Endpoint | +20 | 836 500 008 | 5.1 | 0.000 001 | 0.006 |





8.8 UPLINK CARRIER AGGREGATION

Test Note

1. All tests were evaluated for the two bands using various combinations of RB size, RB offset,

modulation, and channel bandwidth.

2. All modes of operation were investigated and the worst case configuration results are reported in this section.

Please refer to the table below.

3. The worst case is reported with the modulations, RB sizes and offsets.

- N5A(ANT A)-N41A(ANT I)

(PCC - Modulation: BPSK, RB: 1, RB Offset: 23, SCC - Modulation: BPSK, RB: 1, RB Offset: 19)

Radiated Spurious Emissions

| DCC | 500 | P | SCC | | |
|------------|-------------|---------|---------|---------|---------|
| PCC | SCC | BW(MHz) | Channel | BW(MHz) | Channel |
| N5A(ANT A) | N41A(ANT I) | 5 | 167300 | 15 | 518598 |

8.8.1 RADIATED SPURIOUS EMISSIONS

N5A(ANT A)(PCC)- N41A(ANT I)(SCC)

| Freq.(MHz) | Measured Level [dBm] | Ant. Gain (dBi) | Substitute Level [dBm] | C.L | Pol. | Result (dBm) | Limit (dBm) |
|------------|----------------------------|--------------------|------------------------------|------|------|-----------------|----------------|
| 1 673.00 | -59.60 | 9.20 | -68.78 | 2.03 | V | -61.61 | -13.00 |
| 2 509.50 | -61.19 | 10.30 | -65.72 | 2.50 | V | -57.92 | -13.00 |
| 3 346.00 | -62.26 | 10.95 | -65.15 | 2.89 | V | -57.09 | -13.00 |

| Freq.(MHz) | Measured Level [dBm] | Ant. Gain (dBi) | Substitute Level [dBm] | C.L | Pol. | Result (dBm) | Limit (dBm) |
|------------|----------------------------|--------------------|------------------------------|------|------|-----------------|----------------|
| 5 185.98 | -62.72 | 11.00 | -64.22 | 3.70 | V | -56.92 | -25.00 |
| 7 778.97 | -64.67 | 10.90 | -57.29 | 4.61 | V | -51.00 | -25.00 |
| 10 371.96 | -64.99 | 11.20 | -54.29 | 5.41 | V | -48.50 | -25.00 |



Report No. HCT-RF-2404-FC024-R1

9. TEST PLOTS

The report shall not be (partly) reproduced except in full without approval of the laboratory.



| KEYSIGHT Input RF RL Align Auto | Input Z 50 Q Corr CCorr Freq Ref. Int (S) NFE: Adaptive | Atten 16 dB Preamp Off | Trig: Free Run Gate Ott #IF Gain Low | Center Freq. AvgiHold 50 Radio Std N | | Center Frequency 836.500000 MHz | Settings |
|--|--|--|--|--|------------------------------------|--|----------|
| Graph Grale/Div 10.0 dB | | Ref Lvi Offset 27 Ref Value 40.00 (| | | | Span 10.000 MHz | |
| 00 30.0 20.0 10.0 | | | | ~ | | CF Step 1.000000 MHz Auto Man | |
| 2 00 10 0 26 0 36 0 46 0 56 0 | | | | | PE | Freq Offset 0 Hz | |
| Center 836.500 MHz Res BW 100.00 kHz | | #Video BW 390. | 00 kHz | Sw | Span 10 Mi eep 16.7 ms (1001 pt | | |
| 2 Metrics T | | | | | | | |
| Occupied Bandwidt 4.5 | h 036 MHz | | Total Power | | 31.1 dBm | | |
| Transmit Freq Error x dB Bandwidth | -23.479 k 5.233 M | | % of OBW Po x dB | wer | 99.00 % -26.00 dB | | Loc |
| 1501 | ? Mar 04, 2024 11:49:13 AM | 0 | | | | 7 | |

Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 BPSK_Full RB_0)



| Align Auto | Corr CCorr Preamp Freq Ref. Int (S) NFE Adaptive | 6 dB Trig Free Run o Off Gate Off #IF Gain Low | Center Freq: 836.500000 MH AvgjHold: 500/500 Radio Std: None | Center Frequency 836.500000 MHz | Settings |
|--|--|--|--|--|----------|
| Graph cale/Div 10.0 dB | Ref Lvi C | 0ffset 27.11 dB e 40.00 dBm | | Span 10.000 MHz | |
| 00 0.0 0.0 0.0 | | | ~ | CF Step 1.000000 MHz Auto Man | |
| | | | | PEAK 0 Hz | |
| enter 836.500 MHz tes BW 100.00 kHz | #Video E | 3W 390.00 kHz | Spar Sweep 16.7 ms (| n 10 MHz 1001 pts) | |
| Metrics | | | | | |
| 4.517 Transmit Freq Error x dB Bandwidth | 3 MHz -13.869 kHz 5.238 MHz | Total Power % of OBW Pow x dB | 30.4 dBm wer 99.00 % -26.00 dB | | Lo |

Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 QPSK_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 16QAM_ Full RB _0)





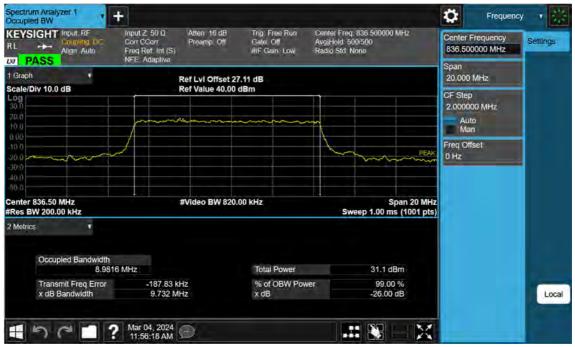
Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 64QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (5 M BW Ch.167300 256QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 BPSK_ Full RB _0)



| GHT Input RF Input Z 50 Q Atten 16 d Compliand BC Con CCon Preamp O Align Auto Freq Ref Inf (S) NFE Adaptive | | Center Frequency Settings 836.500000 MHz |
|---|--|---|
| Ref Lvi Offs v 10.0 dB Ref Value 40 | | Span 20.000 MHz |
| | | CF Step 2,000000 MHz Auto Man |
| | | PEAK Freq Offset |
| 36.50 MHz #Video BW / 200.00 kHz | 320.00 kHz Span 20 Sweep 1.00 ms (100 | |
| Occupied Bandwidth 9.0012 MHz | Total Power 30.6 dBm | |
| Transmit Freq Error -190.99 kHz x dB Bandwidth 9.840 MHz | % of OBW Power 99.00 % x dB -26.00 dB | La |

Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 QPSK_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 16QAM_ Full RB _0)





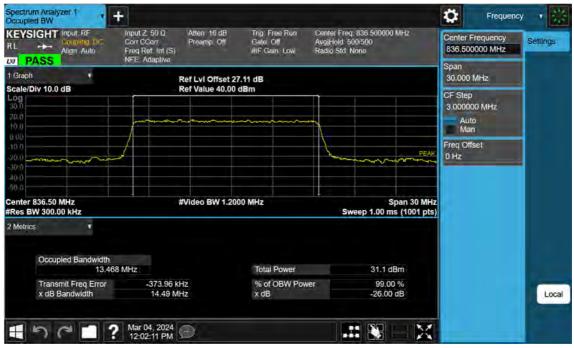
Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 64QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (10 M BW Ch.167300 256QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 BPSK_ Full RB _0)



| Settings | r Frequency 00000 MHz | 836.50 | | Center Freq. Avg[Hold: 50 Radio Std: N | Trig: Free Run Gate: Off #IF Gain: Low | Atten 16 dB Preamp Off | Input Z: 50 Q Corr CCorr Freq Ref. Int (S) NFE: Adaptive | out RF upling DC gn Auto | |
|----------|--------------------------|---|-----------------------------------|--|--|-------------------------------------|---|--------------------------------|----------------------------|
| | | Span 30.000 | | | | Ref LvI Offset 2 Ref Value 40.00 | | | raph le/Div 10.0 |
| | 000 MHz uto | and the second se | | | namaya | | | | 0 0 0 |
| | Difset | | PEA | · · · · · · · · · · · · · · · · · · · | | | | | |
| | | | Span 30 MH p 1.00 ms (1001 pts | Swi | 0 MHz | #Video BW 1.20 | | | ter 836.50 / s BW 300.0 |
| | | | 31.0 dBm | | Total Power | | MHz | Bandwidth 13.45 | etrics Occup |
| Lo | | | 99.00 % -26.00 dB | er | % of OBW Pov x dB | | -391.90 kl | Freq Error | Transr x dB B |

Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 QPSK_ Full RB _0)



| | Input Z 50 Q Atten 16 dB Corr CCorr Preamp Off Freq Ref. Int (S) NFE Adaptive | Gate Off AvgiHol | Freq: 836.500000 MHz d: 500/500 itd: None | Center Frequency 836.500000 MHz | Settings |
|--|--|------------------------|---|--|----------|
| Graph Grale/Div 10.0 dB | Ref Lvi Offset 2 Ref Value 40.00 | | | Span 30.000 MHz | |
| 20.0 20.0 10.0 | from the second second | | | CF Slep 3.000000 MHz Auto Man | |
| 0 00 10 0 20 0 20 0 40 0 50 0 | | | PEAK | Freq Offset 0 Hz | |
| enter 836.50 MHz Res BW 300.00 kHz | #Video BW 1.20 | DO MHz | Span 30 MHz Sweep 1.00 ms (1001 pts) | | |
| Metrics • Occupied Bandwidth 13.48 | 84 MHz | Total Power | 29.8 dBm | | |
| Transmit Freq Error x dB Bandwidth | -382.27 kHz 14.68 MHz | % of OBW Power x dB | 99.00 % -26.00 dB | | Lo |

Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 16QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 64QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (15 M BW Ch.167300 256QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 BPSK_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 QPSK_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 16QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 64QAM_ Full RB _0)





Sub6 n5. Occupied Bandwidth Plot (20 M BW Ch.167300 256QAM_Full RB_0)





Sub6 n5. PAR Plot (5 M BW_Ch.167300_BPSK_Full RB_0)





Sub6 n5. PAR Plot (5 M BW_Ch. 167300_QPSK_ Full RB _0)





Sub6 n5. PAR Plot (5 M BW_Ch. 167300_16QAM_ Full RB _0)





Sub6 n5. PAR Plot (5 M BW_Ch. 167300_64QAM_ Full RB _0)





Sub6 n5. PAR Plot (5 M BW_Ch. 167300_256QAM_ Full RB _0)





Sub6 n5. PAR Plot (10 M BW_Ch. 167300_ BPSK_ Full RB _0)





Sub6 n5. PAR Plot (10 M BW_Ch. 167300_QPSK_ Full RB _0)





Sub6 n5. PAR Plot (10 M BW_Ch. 167300_16QAM_ Full RB _0)





Sub6 n5. PAR Plot (10 M BW_Ch. 167300_64QAM_ Full RB _0)





Sub6 n5. PAR Plot (10 M BW_Ch. 167300_256QAM_ Full RB _0)





Sub6 n5. PAR Plot (15 M BW_Ch. 167300_ BPSK_ Full RB _0)





Sub6 n5. PAR Plot (15 M BW_Ch. 167300_QPSK_ Full RB _0)





Sub6 n5. PAR Plot (15 M BW_Ch. 167300_16QAM_ Full RB _0)





Sub6 n5. PAR Plot (15 M BW_Ch. 167300_64QAM_ Full RB _0)





Sub6 n5. PAR Plot (15 M BW_Ch. 167300_256QAM_ Full RB _0)





Sub6 n5. PAR Plot (20 M BW_Ch. 167300_ BPSK_ Full RB _0)





Sub6 n5. PAR Plot (20 M BW_Ch. 167300_QPSK_ Full RB _0)





Sub6 n5. PAR Plot (20 M BW_Ch. 167300_16QAM_ Full RB _0)





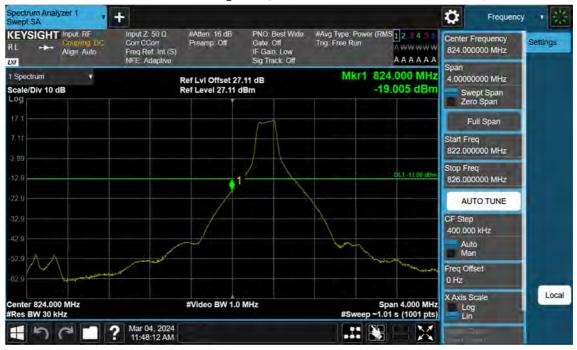
Sub6 n5. PAR Plot (20 M BW_Ch. 167300_64QAM_ Full RB _0)





Sub6 n5. PAR Plot (20 M BW_Ch. 167300_256QAM_ Full RB _0)





Sub6 n5. Lower Band Edge Plot (5 M BW Ch.165300 BPSK_RB1_Offset 0)





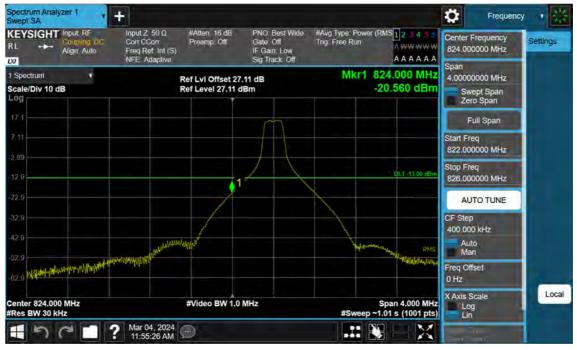
Sub6 n5. Lower Band Edge Plot (5 M BW Ch.165300 BPSK_RB25_Offset 0)



| Align Auto Fre | orr CCorr Preamp Off eq Ref. Int (S) FE: Adaptive | Gate Off Trig IF Gain. Low Sig Track. Off | ig Type: Power (RM) : Free Run | | Center Frequency 821.000000 MHz | Settings |
|-------------------------------------|---|--|--|--|---|----------|
| spectrum sale/Div 10 dB | Ref LvI Offset 27 Ref Level 27.11 d | | Mkr1 822 -31 | .088 MHz .934 dBm | Span 4.00000000 MHz Swept Span Zero Span | |
| 7.1 | | | | | Full Span | |
| 11 | | | | | Start Freq 819.000000 MHz | |
| 2.9 | | | | QL1-13.00 dBm | Stop Freq 823.000000 MHz | |
| 2.10 | | | 1 | | AUTO TUNE | |
| 2.9 | | and the second s | and the second s | and and an and and and and and and and a | CF Step 400.000 kHz | |
| 29 | | | | | Auto Man | |
| 2.0 | | | | | Freq Offset 0 Hz | |
| enter 821.000 MHz tes BW 100 kHz | #Video BW 300 | kHz | Sp #Sweep ~1.0 | an 4.000 MHz I s (1001 pts) | X Axis Scale Log Lin | Local |

Sub6 n5. Lower Extended Band Edge Plot (5 M BW Ch.165300 BPSK_RB25_0)





Sub6 n5. Lower Band Edge Plot (10 M BW Ch.165800 BPSK_RB1_Offset 0)



| Align Auto Fre | put Z 50 Q #Atten 16 dB orr CCorr Preamp Off eq Ref. Int (S) FE Adaptive | PNO Best Wide # Gate Off Ti IF Gain Low Sig Track Off | Avg Type: Power (RMS 1 2 1 4 5 ig: Free Run A A A A A | A |
|------------------------------|---|--|---|---------------------------------------|
| ctrum + /Div 10 dB | Ref Lvi Offset 27 Ref Level 27.11 d | | Mkr1 824.000 MH -26.968 dB | |
| | | | | Full Span |
| | | | Sh | Start Freq 822.000000 MHz |
| | | | DL1-13.00 dE | Stop Freq 826.000000 MHz |
| | 1 | 4 | | AUTO TUNE |
| | | | | CF Step 400.000 kHz Auto Man |
| | | | | Freq Offset 0 Hz |
| er 824.000 MHz BW 100 kHz | #Video BW 300 | kHz | Span 4.000 Mi #Sweep ~1.01 s (1001 pt | |

Sub6 n5. Lower Band Edge Plot (10 M BW Ch.165800 BPSK_RB50_Offset 0)



| Spectrum Ref Lvi Offset 27.11 dB Ref Level 27.11 dBm Mkr1 819.932 MHz -33.923 dBm Span 4.0000000 MHz 00 01 10 dB Ref Level 27.11 dBm -33.923 dBm -5000000 MHz 01 01 10 dB 01 dBm -33.923 dBm -5000000 MHz 02 01 01 dBm -33.923 dBm -5000000 MHz 20 01 dBm 01 dBm -5000000 MHz 210 01 dBm 01 dBm -5000 dBm 220 01 dBm 01 dBm -5000000 MHz 220 0 01 dBm -500 dBm 220 0 01 dBm -500 dBm 220 0 01 dBm -500 dBm 220 0 00 dBm -500 dBm 220 0 00 dBm -500 dBm 220 0 0 -500 | | L RF bling (DC) r Auto | Input Z: 50 Q Corr CCorr Freq Ref. Int (S) NFE: Adaptive | #Atten 16 dB Preamp Off | PNO Best Wide Gate Off IF Gain Low Sig Track Off | #Avg Type: Po Trig: Free Run | wer (RMS123455 A #################################### | Center Frequency 821.000000 MHz | Setting |
|--|------------------------------------|------------------------------|---|----------------------------|---|---------------------------------|--|---|---------|
| 1 Start Freq | Spectrum cale/Div 10 dB | • | | | | Mkr | | Swept Span | |
| 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 71 | | | | | | | Full Span | |
| CLI-13 00 dBm Stop Freq B23.000000 MHz AUTO TUNE CF Step 400.000 KHz Auto Man Freq Offset 0 Hz X Axis Scale | | | | | | | | and the second se | |
| 2.9 2.9 2.9 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 | | | | | | | D£1-13.00 dBm | | |
| 229 229 229 229 220 220 220 220 220 220 | 2.0 | | 41 | | | | | AUTO TUNE | |
| Freq Offset 0 Hz X Axis Scale | 2.9 | | | | | | RMS | 400.000 kHz Auto | |
| | | | | | | | | | |
| Res BW 100 kHz Span 4,000 kHz Log #Sweep ~1.01 s (1001 pts) | enter 821.000 MH Res BW 100 kHz | z | | #Video BW 300 | kHz | #Swe | Span 4.000 MHz ep ~1.01 s (1001 pts) | loa | La |

Sub6 n5. Lower Extended Band Edge Plot (10 M BW Ch.165800 BPSK_RB50_0)





Sub6 n5. Lower Band Edge Plot (15 M BW Ch.166300 BPSK_RB1_Offset 0)



| Align Auto Fre | but Z 50 Q #Atten 16 dB m CCorr Preamp Off eq Ref. Int (S) E Adaptive | PNO Best Wide Gate Off IF Gain Low Sig Track Off | #Avg Type: Power (RMS 1 2 1 4 5 Trig: Free Run A WW WW A A A A A | A A |
|------------------------------|--|---|--|---------------------------------------|
| ctrum + /Div 10 dB | Ref Lvi Offset 2 Ref Level 27.11 | | Mkr1 824.000 MI -26.858 dB | |
| | | | | Full Span |
| | | | R | Start Freq 822,000000 MHz |
| | | | DE1-13.00 d | Stop Freq 826.000000 MHz |
| | | 12 | | AUTO TUNE |
| | | | | CF Step 400.000 kHz Auto Man |
| | | | | Freq Offset 0 Hz |
| er 824.000 MHz BW 150 kHz | #Video BW 47 | 0 kHz | Span 4.000 M #Sweep ~1.01 s (1001 p | |

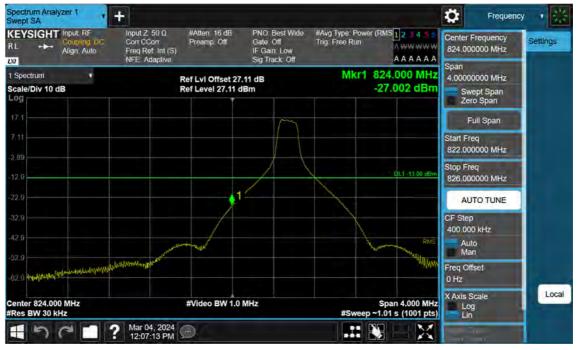
Sub6 n5. Lower Band Edge Plot (15 M BW Ch.166300 BPSK_RB75_Offset 0)



| L Align Auto | Input Z 50 Q #Atten 16 dB Corr CCorr Preamp Off Freq Ref. Int (S) NFE Adaptive | PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off | #Avg Type: Power (RMS12345 Trig: Free Run A A A A A A | 821.000000 MHz | Sétüngs |
|-------------------------------------|---|---|---|------------------------------|---------|
| Spectrum • cale/Div 10 dB | Ref Lvi Offset 2 Ref Level 27.11 | | Mkr1 821.264 MH: -30.925 dBn | | |
| 7 1 | | | | Full Span | |
| .89 | | | | Start Freq 819.000000 MHz | |
| 2.9 | | | DE1-13.00 dBn | Stop Freq 823.000000 MHz | |
| 2.0 | | •1 | | AUTO TUNE | |
| 2.9 | | | RMS | CF Step 400.000 kHz | |
| 2.9 | | | | Auto Man | |
| 2.0 | | | | Freq Offset 0 Hz | _ |
| enter 821.000 MHz Res BW 100 kHz | #Video BW 3 | 00 kHz | Span 4.000 MH #Sweep ~1.01 s (1001 pts | | Local |

Sub6 n5. Lower Extended Band Edge Plot (15 M BW Ch.166300 BPSK_RB75_0)





Sub6 n5. Lower Band Edge Plot (20 M BW Ch.166800 BPSK_RB1_Offset 0)



| Align Auto | Input Z: 50 Q #Atten 16 dB Corr CCorr Preamp Off Freq Ref. Int (S) NFE: Adaptive | PNO Best Wide #Avg Gate Off Trig F IF Gain Low Sig Track Off | Type: Power (RMS12145) ree Run A WWWWW A A A A A A | Center Frequency 824.000000 MHz |
|-----------------------------------|---|---|--|---------------------------------------|
| spectrum • ale/Div 10 dB | Ref Lvi Offset 2 Ref Level 27.11 | | Mkr1 824.000 MHz -28.731 dBm | |
| 7.1 | | | | Full Span |
| 89 | | | RM3 | Start Freq 822.000000 MHz |
| 1.9 | | | DL1 -13.00 dBm | Stop Freq 826.000000 MHz |
| 2.0 | | 1 | | AUTO TUNE |
| 2.9 | | | | CF Step 400.000 kHz Auto Man |
| 2.9 | | | | Freq Offset 0 Hz |
| nter 824.000 MHz es BW 200 kHz | #Video BW 62 | 0 kHz | Span 4.000 MHz #Sweep ~1.01 s (1001 pts) | |

Sub6 n5. Lower Band Edge Plot (20 M BW Ch.166800 BPSK_RB100_Offset 0)



| | Input, RF Coupling, BC Align: Auto | Input Z: 50 Q Corr CCorr Freq Ref. Int (S) | #Atten 16 dB Preamp Off | PNO Best Wide Gate Off IF Gain Low | #Avg Type: Pow Tng: Free Run | ver (RMS <mark>123455</mark> A WW WW W A A A A A A A | | Frequency 0000 MHz | Séttings |
|---------------------------------|--|--|---|--|---------------------------------|--|-------------------------------|----------------------------------|----------|
| 2 Spectrum cale/Div 10 dB | * | | Ref LvI Offset 27. Ref Level 27.11 d | | Mkr | 822.836 MHz -36.292 dBm | SW | 0000 MHz rept Span ro Span | |
| 7.1 | | | | | | | F | ull Span | |
| .89 | | | | | | | Start Fr 819.00 | eq 0000 MHz | |
| 2.9 | | | | | | DE1 -13.00 dBm | Stop Fr 823.00 | eq 0000 MHz | |
| 2.0 | | | | | | | AL | TO TUNE | |
| 2.9 | | | | | | 1.3 | CF Step 400.00 Au Ma | 0 kHz to | |
| 2.9 | | | | | | | Freq Of 0 Hz | fset | |
| enter 821.000 Res BW 100 k | | | #Video BW 300 | kHz | #Swee | Span 4.000 MHz p ~1.01 s (1001 pts) | X Axis S Lo Lir | g | LO |
| 50 | 9 7 9 | Mar 04, 2024 12:06:52 PM | Ð | | | | | | |

Sub6 n5. Lower Extended Band Edge Plot (20 M BW Ch.166800 BPSK_RB100_0)





Sub6 n5. Upper Band Edge Plot (5 M BW Ch.169300 BPSK_RB1_Offset 24)



| EYSIGHT Input. RF Couping BC Align Auto | Input Z: 50 Q Corr CCorr Freq Ref. Int (S) NFE: Adaptive | #Atten 16 dB Preamp Off | PNO Best Wide Gate Off IF Gain Low Sig Track Off | #Avg Type: Po Trig: Free Run | ver (RMS <mark>123455</mark> A WWWWW A A A A A A A | Center Frequency 849.000000 MHz | Settings |
|---|---|---|---|---------------------------------|--|---|----------|
| Spectrum • cale/Div 10 dB | | Ref LvI Offset 27. Ref Level 27.11 d | | Mkr | 1 849.000 MHz -26.122 dBm | Span 4.00000000 MHz Swept Span Zero Span | |
| 7.1 | | | | | | Full Span | |
| .89 | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ~ | | | | Start Freq 847.000000 MHz | |
| 2.9 | | | | | Q1.1-13.00 dBm | Stop Freq 851.000000 MHz | |
| 2.0 | | | | | | AUTO TUNE | |
| 2.9 | | | | m | And States | CF Step 400.000 kHz | |
| 2.9 | | | | | | Auto Man | |
| 2.0 | | | | | | Freq Offset 0 Hz | |
| enter 849.000 MHz Res BW 51 kHz | | #Video BW 160 | kHz | #Swe | Span 4.000 MHz ep ~1.01 s (1001 pts) | X Axis Scale Log Lin | Lo |

Sub6 n5. Upper Band Edge Plot (5 M BW Ch.169300 BPSK_RB25_Offset 0)





Sub6 n5. Upper Extended Band Edge Plot (5 M BW Ch.169300 BPSK_RB25_0)





Sub6 n5. Upper Band Edge Plot (10 M BW Ch.168800 BPSK_RB1_Offset 51)



| EYSIGHT Input. RF Couping DC Align Auto | | eamp Off | PNO Best Wide Gate Off IF Gain Low Sig Track Off | #Avg Type: Power (Trig: Free Run | | Center Frequency 849.000000 MHz | Séttings |
|---|-----|-----------------------------------|---|--------------------------------------|-------------------------------------|---|----------|
| Spectrum Cale/Div 10 dB | | vi Offset 27.11 evel 27.11 dBr | | | 150.088 MHz 32.984 dBm | Span 4.00000000 MHz Swept Span Zero Span | |
| 7.1 | | | | | | Full Span | |
| .11 | | | | | | Start Freq 847.000000 MHz | |
| 2.9 | | | | | DE1 -13 00 dBm | Stop Freq 851.000000 MHz | |
| 2.0 | | | | <u>1</u> | | AUTO TUNE | |
| 2.9 | | | | | FMS | CF Step 400.000 kHz | |
| 2.9 | | | | | | Auto Man | |
| 2.0 | | | | | | Freq Offset 0 Hz | |
| enter 849.000 MHz Res BW 100 kHz | #Vi | deo BW 300 kH | łz | | Span 4.000 MHz 1.01 s (1001 pts) | X Axis Scale Log Lin | Local |

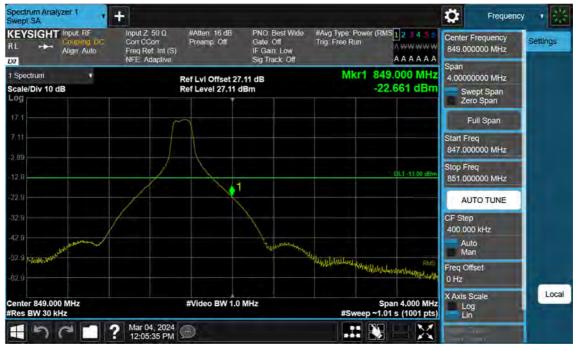
Sub6 n5. Upper Band Edge Plot (10 M BW Ch.168800 BPSK_RB50_Offset 0)



| EYSIGHT Input. RF Coupling BC Align Auto | Input Z: 50 Q Corr CCorr Freq Ref. Int (S) NFE: Adaptive | #Atten 16 dB Preamp Off | PNO Best Wide Gate Off IF Gain Low Sig Track Off | #Avg Type: Power Trig: Free Run | | Center Frequency 852.000000 MHz | Settings |
|--|---|--|---|------------------------------------|--------------------------------------|---|----------|
| Spectrum • cale/Div 10 dB | | Ref LvI Offset 27. Ref Level 27.11 di | | | 850.116 MHz -32.771 dBm | Span 4.00000000 MHz Swept Span Zero Span | |
| 7.1 | | | | | | Full Span | |
| | | | | | | Start Freq 850.000000 MHz | |
| 2.9 | | | | | D)L1 -13 D0 dBm | Stop Freq 854.000000 MHz | |
| 2.0 | | | | | | AUTO TUNE | |
| 12.9 | | | | | RMS | CF Step 400.000 kHz Auto Man | |
| 2.9 | | | | | | Freq Offset 0 Hz | |
| enter 852.000 MHz Res BW 100 kHz | | #Video BW 300 | kHz | #Sweep | Span 4.000 MHz ~1.01 s (1001 pts) | X Axis Scale Log Lin | Local |

Sub6 n5. Upper Extended Band Edge Plot (10 M BW Ch.168800 BPSK_RB50_0)





Sub6 n5. Upper Band Edge Plot (15 M BW Ch.168300 BPSK_RB1_Offset 78)



| EYSIGHT Input. RF Coupling BC Align Auto | Input Z: 50 Q Corr CCorr Freq Ref. Int (S NFE: Adaptive | #Atten 16 dB Preamp Off | PNO: Best Wide Gate Off IF Gain Low Sig Track: Off | Trig: Free Run | rer (RMS123455 A WW WW W A A A A A A A | Center Frequency 849.000000 MHz | Settings |
|--|--|---|---|----------------|--|---|----------|
| Spectrum + ale/Div 10 dB | | Ref LvI Offset 27.1 Ref Level 27.11 dE | | Mkr1 | 850.264 MHz -27.503 dBm | Span 4.00000000 MHz Swept Span Zero Span | |
| 1 | | | | | | Full Span | |
| 89 | | | | | | Start Freq 847.000000 MHz | |
| 1.9 | | | | | DL1 -13.00 dBm | Stop Freq 851.000000 MHz | |
| 2.0 | | | | | 1 BMS | AUTO TUNE | |
| 29 | | | | | | CF Step 400.000 kHz | |
| 2.9 | | | | | | Auto Man | |
| | | | | | | Freq Offset 0 Hz | |
| nter 849.000 MHz es BW 150 kHz | | #Video BW 470 I | kHz | #Swee | Span 4.000 MHz p ~1.01 s (1001 pts) | X Axis Scale Log Lin | LO |

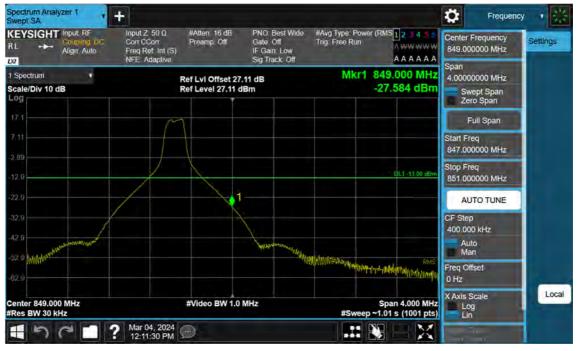
Sub6 n5. Upper Band Edge Plot (15 M BW Ch.168300 BPSK_RB75_Offset 0)



| Séttings | Center Frequency 852,000000 MHz | g Type: Power (RMS121455 Free Run A & W W W W A A A A A A A | Best Wide #A Off Trig ain Low rack Off | #Atten 16 dB Preamp Off | Input Z 50 Ω Corr CCorr Freq Ref. Int (S) NFE: Adaptive | Coupling DC Align Auto | |
|----------|---|--|---|---|--|---------------------------|-------------------------------|
| | Span 4.00000000 MHz Swept Span Zero Span | Mkr1 850.252 MHz -29.558 dBm | | Ref Lvi Offset 27.1 Ref Level 27.11 dB | | iB | Spectrum cale/Div 10 og |
| | Full Span | | | | | | 7.1 |
| | Start Freq 850.000000 MHz | | | | | | 2.89 |
| | Stop Freq 854.000000 MHz | D1.1 - 13 00 dBm. | | | | | 2.9 |
| | AUTO TUNE | | | | | 1 | 2.0 |
| | CF Step 400.000 kHz Auto Man | RMS | | | | | 12.9 12.9 |
| | Freq Offset 0 Hz | | | | | | 02.0 |
| La | X Axis Scale Log Lin | Span 4.000 MHz #Sweep ~1.01 s (1001 pts) | | #Video BW 300 k | | | enter 852.00 Res BW 100 |

Sub6 n5. Upper Extended Band Edge Plot (15 M BW Ch.168300 BPSK_RB75_0)





Sub6 n5. Upper Band Edge Plot (20 M BW Ch.167800 BPSK_RB1_Offset 105)



| Align Auto F | nput Z 50 Q #Atten 16 dB Sort CCorr Preamp Off Freq Ref. Int (S) IFE Adaptive | PNO: Best Wide #Avg Tyj Gate Off Trig: Fre IF Gain Low Sig Track: Off | pe: Power (RMS 1 2 3 4 5 5 e Run A www.www A A A A A A | Center Frequency 849.000000 MHz | Setting |
|-----------------------------------|--|--|--|---|---------|
| spectrum • ale/Div 10 dB | Ref Lvi Offset 27. Ref Level 27.11 d | IT UB | Mkr1 849.128 MHz -32.176 dBm | Span 4.00000000 MHz Swept Span Zero Span | |
| 1 | | | | Full Span | |
| 11 | | | | Start Freq 847.000000 MHz | |
| 1.9 | | | D1.1 -13 00 dBm | Stop Freq 851.000000 MHz | |
| 2.0 | | 1 | | AUTO TUNE | |
| 2.9 | | | RMS | CF Step 400.000 kHz Auto Man | |
| | | | | Freq Offset 0 Hz | - |
| nter 849.000 MHz es BW 200 kHz | #Video BW 620 | | Span 4.000 MHz #Sweep ~1.01 s (1001 pts) | X Axis Scale Log Lin | Lo |

Sub6 n5. Upper Band Edge Plot (20 M BW Ch.167800 BPSK_RB100_Offset 0)



| Align Auto F | nput Z 50 Ω #Atten 16 dB Corr CCorr Preamp Off Freq Ref. Int (S) NFE Adaptive | PNO: Best Wide #Avg Type: Gate Off Trig: Free F IF Gain Low Sig Track Off | Power (RMS123455 Run A WWWWW A A A A A A A | Center Frequency 852,000000 MHz | Setting |
|-----------------------------------|--|--|---|---|---------|
| ipectrum + ale/Div 10 dB | Ref Lvi Offset 27 Ref Level 27.11 d | IT UB | kr1 850.496 MHz -37.371 dBm | Span 4.00000000 MHz Swept Span Zero Span | |
| 1 | | | | Full Span | |
| 11 | | | | Start Freq 850.000000 MHz | |
| 9 | | | DL1 -13 00 dBm | Stop Freq 854.000000 MHz | |
| .0 | | | | AUTO TUNE | |
| 19 19 | | | RMS | CF Step 400.000 kHz Auto Man | |
| 0 | | | | Freq Offset 0 Hz | |
| nter 852.000 MHz es BW 100 kHz | #Video BW 300 | | Span 4.000 MHz weep ~1.01 s (1001 pts) | X Axis Scale Log Lin | Lo |

Sub6 n5. Upper Extended Band Edge Plot (20 M BW Ch.167800 BPSK_RB100_0)





Sub6 n5. Conducted Spurious Plot (165300ch_5 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (167300ch_5 MHz_BPSK_RB 1_1)



| EYSIGHT | Couple Align | 10 DC | Input Z: 50 Q Corr CCorr Freq Ref: Int (S) NFE: Adaptive | #Atten 16 dB Preamp Off | PNO Fast Gate Off IF Gain Low Sig Track Off | #Avg Type Po Trig: Free Rur | wer (RMS123455 Awwwww AAAAAA | Center Frequent 5.015000000 G | Setunds |
|-------------------------------------|-----------------|------------|---|----------------------------|--|--------------------------------|--|---|---------|
| Spectrum ale/Div 10 dl | в 2 | • | | Ref Level 6.00 c | IBm | Mk | r1 9.699 9 GHz -74.470 dBm | 0.010000000 | |
| 4.0 | | | | | | | | Full Span | |
| 4,0 | | | | | | | | Start Freq 30.000000 MH: | z |
| 4.0 4.0 4.0 | | | | | | | 1 | Stop Freq 10.000000000 | GHz |
| art 30 MHz | | | | #Video BW 3.0 | MHz | | Stop 10.000 GHz | | IE . |
| es BW 1.0 M Marker Table Mode | 1Hz Trace | T Scale | x | Y | Function | Sweep Function Width | ~18.7 ms (20001 pts) Function Value | CF Step 997.000000 MH Auto Man | tz |
| 1 N 2 N 3 | 1 | r | 9.699 9 GHz 844.5 MHz | | | | | Freq Offset 0 Hz | |
| 4 5 6 | | | | | | | | X Axis Scale Log Lin | LO |

Sub6 n5. Conducted Spurious Plot (169300ch_5 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (165800ch_10 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (167300ch_10 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (168800ch_10 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (166300ch_15 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (167300ch_15 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (168300ch_15 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (166800ch_20 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (167300ch_20 MHz_BPSK_RB 1_1)





Sub6 n5. Conducted Spurious Plot (167800ch_20 MHz_BPSK_RB 1_1)



10. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

| No. | Description | | | |
|-----|---------------------|--|--|--|
| 1 | HCT-RF-2404-FC024-P | | | |