

# TEST REPORT

FCC BT LE Test for SM-S721B/DS  
Certification

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

**REPORT NO.**  
HCT-RF-2407-FC079

**DATE OF ISSUE**  
July 24, 2024

**Tested by**  
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**TEST  
REPORT**

**REPORT NO.**  
HCT-RF-2407-FC079

**DATE OF ISSUE**  
July 24, 2024

**Additional Model**  
SM-S721B

**Applicant**                    **SAMSUNG Electronics Co., Ltd.**  
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

**Product Name**                Mobile Phone  
**Model Name**                    SM-S721B/DS

**FCC ID**                            A3LSMS721B

**Average Output Power**      Ant.1: 16.26 dBm (42.30 mW)  
  Ant.2: 14.49 dBm (28.15 mW)  
  Dual Ant.1+ Ant.2: 14.55 dBm (28.48 mW)

**Date of Test**                    June 03, 2024 ~ July 23, 2024

**FCC Classification**            Digital Transmission System(DTS)

**Test Standard Used**            FCC Rule Part(s): Part 15.247

**Test Results**                    PASS

**Location of Test**                 Permanent Testing Lab     On Site Testing Lab  
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Republic of Korea)

## REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 24, 2024	Initial Release

## Notice

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### Content

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Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

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

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

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

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

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

When confirmation of authenticity of this test report is required, please contact [www.hct.co.kr](http://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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## 1. EUT DESCRIPTION

<b>Model</b>	SM-S721B/DS				
<b>Additional Model</b>	SM-S721B				
<b>EUT Type</b>	Mobile Phone				
<b>Power Supply</b>	DC 3.88 V				
<b>Frequency Range</b>	125k, 500k, 1M Bit/s : 2402 - 2480 MHz 2M Bit/s : 2404 - 2478 MHz (Except for 2426 MHz)				
<b>Number of Channels</b>	125k, 500k, 1M Bit/s : 40 Channels 2M Bit/s : 37 Channels				
<b>Max. RF Output Power (Normal)</b>	Ant.1	Peak (For information only)	1 M Bit/s: 2 M Bit/s: 125 k Bit/s : 500 k Bit/s :	16.527 dBm (44.95 mW) 16.737 dBm (47.17 mW) 8.159 dBm (6.54 mW) 8.281 dBm (6.73 mW)	
		Average	1 M Bit/s: 2 M Bit/s: 125 k Bit/s : 500 k Bit/s :	16.26 dBm (42.30 mW) 16.22 dBm (41.84 mW) 7.87 dBm (6.13 mW) 7.89 dBm (6.15 mW)	
	Ant.2	Peak (For information only)	1 M Bit/s: 2 M Bit/s:	14.681 dBm (29.38 mW) 14.684 dBm (29.40 mW)	
		Average	1 M Bit/s: 2 M Bit/s:	14.48 dBm (28.05 mW) 14.49 dBm (28.15 mW)	
	Dual Ant.1 + Ant.2	Peak (For information only)	1 M Bit/s: 2 M Bit/s:	14.593 dBm (28.80 mW) 14.755 dBm (29.88 mW)	
		Average	1 M Bit/s: 2 M Bit/s:	14.41 dBm (27.64 mW) 14.55 dBm (28.48 mW)	
	<b>Modulation Type</b>	GFSK			
	<b>Bluetooth Version</b>	5.3			
<b>Antenna Specification</b>	Type: Metal ANT.1 Peak Gain: -2.42 dBi, ANT.2 Peak Gain: -4.07 dBi				
<b>Serial number</b>	Conducted : R3CX503F4BK Radiated : R3CX40LGFHH				

## ANTENNA CONFIGURATIONS

1. Below Tables are the possible configurations.

Configurations	SISO		Dual BT
	Ant1(Core-0)	Ant2(Core-1)	Ant1 & Ant2
Bluetooth Low Energy	O	O	O

Note:

1) O = Support, X = Not Support

2) BLE 1M/2Mbps Mode support Ant2(Core-1) and Dual BT, But 125k/500kbps do not support Ant2(Core-1) and Dual BT.

## 2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled “guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

### EUT CONFIGURATION

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

### EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

### GENERAL TEST PROCEDURES

#### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

#### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

## DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

### 3. 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's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

### 4. FACILITIES AND ACCREDITATIONS

#### FACILITIES

The SAC(Semi-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. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated March 11, 2024 (Registration Number: KR0032).

#### EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



## 5. ANTENNA REQUIREMENTS

### According to FCC 47 CFR § 15.203

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of § 15.203

## 6. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of  $k=2$  to indicate a 95 % level of confidence.

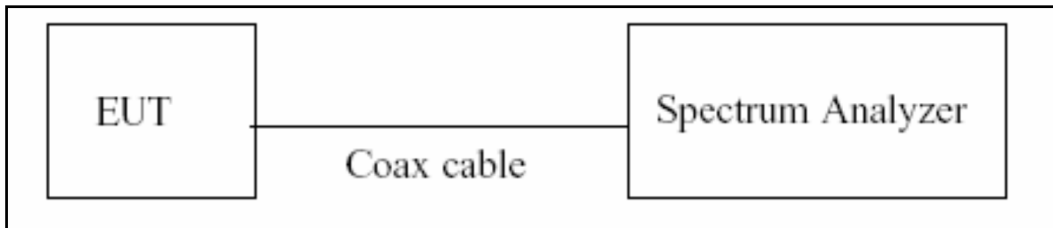
The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.98 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (9 kHz ~ 30 MHz)	4.36 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (30 MHz ~ 1 GHz)	5.70 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (1 GHz ~ 18 GHz)	5.52 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (18 GHz ~ 40 GHz)	5.66 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (Above 40 GHz)	5.58 ( Confidence level about 95 %, $k=2$ )

## 7. DESCRIPTION OF TESTS

### 7.1. Duty Cycle

#### Test Configuration



#### Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method, 6.0)b) in KDB 558074 v05r02.

The largest available value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if  $T \leq 6.25$  microseconds. ( $50/6.25 = 8$ )

The zero-span method was used because all measured T data are  $> 6.25$  microseconds and both RBW and VBW are  $> 50/T$ .

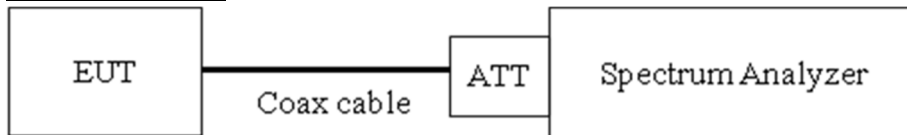
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ( $\geq$  RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep  $> 100$
6. Trace mode = Clear write
7. Measure  $T_{total}$  and  $T_{on}$
8. Calculate Duty Cycle =  $T_{on}/T_{total}$  and Duty Cycle Factor =  $10\log(1/\text{Duty Cycle})$

## 7.2. 6 dB Bandwidth

### Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

### Test Configuration



### Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to

(Procedure 8.2 in KDB 558074 v05r02, Procedure 11.8.1 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW  $\geq 3 \times$  RBW
- 3) Detector = Peak
- 4) Trace mode = max hold
- 5) Sweep = auto couple
- 6) Allow the trace to stabilize
- 7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

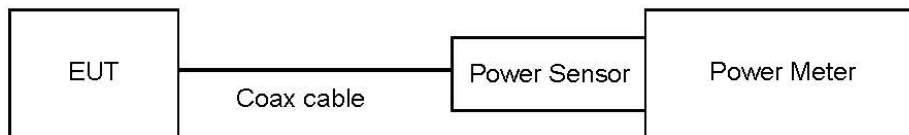
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

### 7.3. Output Power

#### Limit

The maximum permissible conducted output power is 1 Watt.

#### Test Configuration



#### Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)  
: Measure the peak power of the transmitter.
  
- Average Power (Procedure 8.3.2.3 in KDB 558074 v05r02, Procedure 11.9.2.3 in ANSI 63.10-2013)
  - 1) Measure the duty cycle.
  - 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
  - 3) Add  $10 \log(1/x)$ , where  $x$  is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

#### Sample Calculation

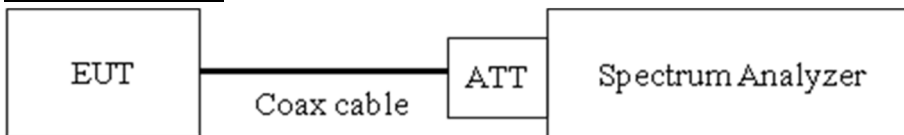
- Conducted Output Power(Peak) = Measured Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

## 7.4. Power Spectral Density

### Limit

The transmitter power density average over 1-second interval shall not be greater than 8 dBm in any 3 kHz BW.

### Test Configuration



### Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set span to at least 1.5 times the OBW.
- 3)  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- 4)  $\text{VBW} \geq 3 \times \text{RBW}$ .
- 5) Sweep = auto couple
- 6) Detector = power averaging (rms) or sample detector (when rms not available).
- 7) Ensure that the number of measurement points in the sweep  $\geq [2 \times \text{span} / \text{RBW}]$ .
- 8) Employ trace averaging (rms) mode over a minimum of 100 traces
- 9) Use the peak marker function to determine the maximum amplitude level.
- 10) Use the peak marker function to determine the maximum amplitude level within the RBW.  
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
- 11) if then duty factor shall be added to adjust the result if the duty cycle is less than 98 %

### Sample Calculation

- Power Spectral Density = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

## 7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

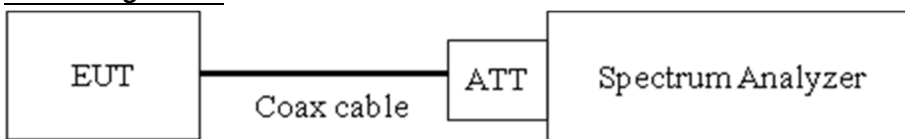
### Limit

The maximum conducted (average) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least

30 dB relative to the maximum in-band peak PSD level in 100 kHz.

[ Conducted > 30 dBc ]

### Test Configuration



### Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 8.5 in KDB 558074 v05r02, Procedure 11.11 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW  $\geq 3 \times$  RBW
- 3) Set span to encompass the spectrum to be examined
- 4) Detector = Peak
- 5) Trace Mode = max hold
- 6) Sweep time = auto couple
- 7) Ensure that the number of measurement points  $\geq 2 \times$  Span/VBW
- 8) Allow trace to fully stabilize.
- 9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

**Factors for frequency**

Freq(MHz)	ANT.1 Factor(dB)	ANT.2 Factor(dB)
30	10.04	10.56
100	10.21	10.71
200	10.24	10.75
300	10.22	10.72
400	10.23	10.71
500	10.41	10.91
600	10.44	11.93
700	10.58	11.09
800	10.60	11.11
900	10.70	11.21
1 000	10.71	11.20
2 000	10.72	11.23
2 400	10.74	11.24
2 500	10.74	11.24
3 000	11.32	11.30
4 000	11.56	11.54
5 000	11.82	11.82
6 000	11.82	11.82
7 000	12.16	12.18
8 000	12.30	12.31
9 000	12.35	12.33
10 000	12.41	10.43
11 000	12.58	12.60
12 000	12.88	12.85
13 000	13.04	13.02
14 000	13.07	13.04
15 000	12.97	12.97
16 000	13.00	13.01
17 000	12.89	12.92
18 000	13.15	13.13
19 000	13.59	13.56
20 000	13.41	13.43
21 000	13.54	13.51
22 000	13.52	13.50
23 000	13.60	13.61
24 000	13.62	13.63
25 000	13.63	13.64
26 000	13.71	13.75

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

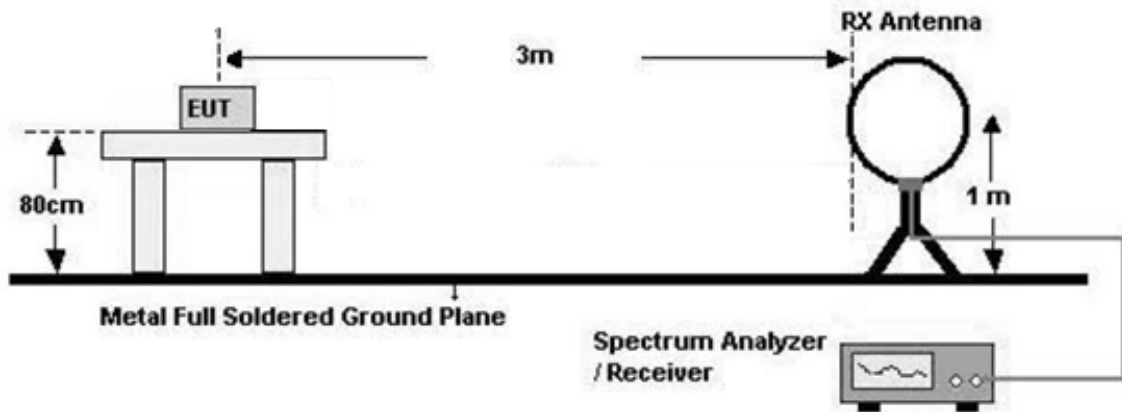
### 7.6. Radiated Test

#### Limit

Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ )	Measurement Distance (m)
0.009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

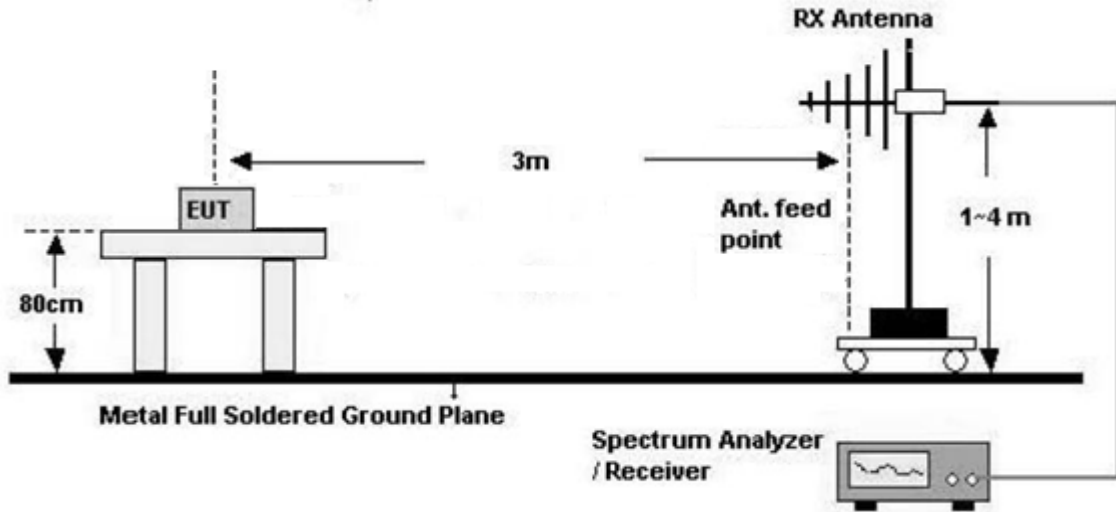
#### Test Configuration

Below 30 MHz

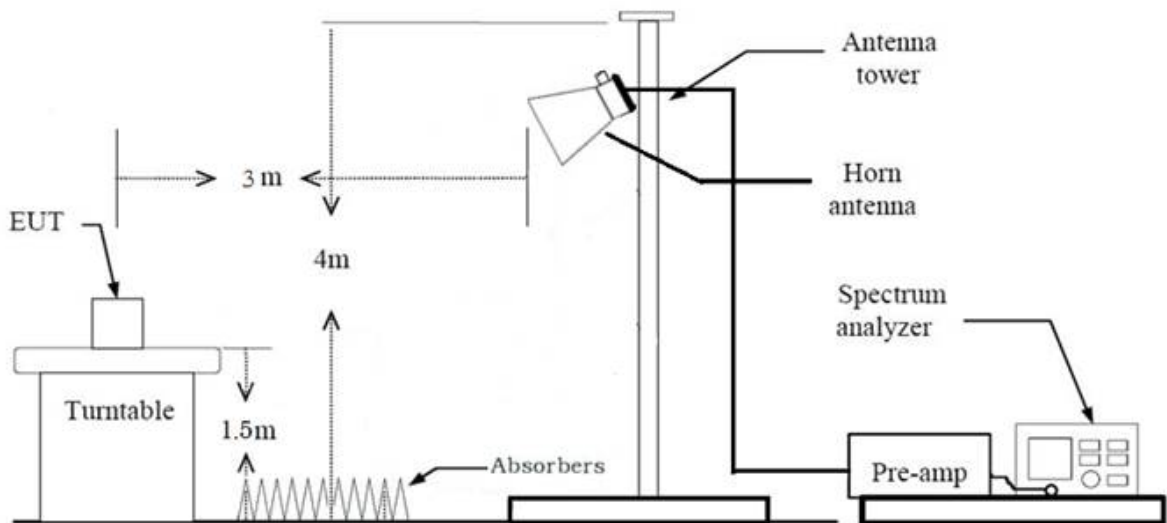




30 MHz - 1 GHz



Above 1 GHz



### **Test Procedure of Radiated spurious emissions(Below 30 MHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) =  $40\log(3\text{ m}/300\text{ m}) = -80\text{ dB}$   
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) =  $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$   
Measurement Distance : 3 m
8. Spectrum Setting
  - Frequency Range = 9 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Max hold
  - RBW = 9 kHz
  - VBW  $\geq 3 \times$  RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 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.

### **KDB 414788 OFS and Chamber Correlation Justification**

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

**Test Procedure of Radiated spurious emissions(Below 1 GHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

**6. Spectrum Setting****(1) Measurement Type(Peak):**

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Max hold
- RBW = 100 kHz
- VBW  $\geq$  3 x RBW

**(2) Measurement Type(Quasi-peak):**

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Quasi-Peak
- RBW = 120 kHz

In general, (1) is used mainly

7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 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.

### Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)
  - (1) Measurement Type(Peak):
    - Measured Frequency Range : 1 GHz – 25 GHz
    - Detector = Peak
    - Trace = Max hold
    - RBW = 1 MHz
    - VBW  $\geq$  3 x RBW
  - (2) Measurement Type(Average):
    - Duty cycle < 98 %, duty cycle variations are less than  $\pm 2$  %
    - Measured Frequency Range : 1 GHz – 25 GHz
    - Detector = RMS
    - Averaging type = power (*i.e.*, RMS)
    - RBW = 1 MHz
    - VBW  $\geq$  3 x RBW
    - Sweep time = auto.
    - Trace mode = average (at least 100 traces).
    - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
    - Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1
9. Measurement value only up to 6 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.
10. Distance extrapolation factor =  $20\log(\text{test distance} / \text{specific distance})$  (dB)
11. Total (Measurement Type : Peak)

= Peak Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G)  
+ Distance Factor(D.F)

Total (Measurement Type : Average)

= Average Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G)  
+ Distance Factor(D.F)

#Note : Used Average measurement method according to KDB 558074 Section11 Q3

### **Test Procedure of Radiated Restricted Band Edge**

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = Peak
- Trace = Max hold
- RBW = 1 MHz
- VBW  $\geq$  3 x RBW

(2) Measurement Type(Average):

- Duty cycle < 98 %, duty cycle variations are less than  $\pm 2$  %
- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW  $\geq$  3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

9. Measurement value only up to 6 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.

10. Distance extrapolation factor =  $20\log(\text{test distance} / \text{specific distance})$  (dB)

11.Total

(1)Measurement(Peak)

= Measured Value(Peak)

(2)Measurement(Avg)

= Measured Value(Avg)

- We apply to the offset in range 1 GHz - 18 GHz

- The offset = Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

#Note : Used Average measurement method according to KDB 558074 Section11 Q3

### 7.7. AC Power line Conducted Emissions

#### Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 <sup>(a)</sup>	56 to 46 <sup>(a)</sup>
0.50 to 5	56	46
5 to 30	60	50

<sup>(a)</sup>Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

#### Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

#### Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

#### Sample Calculation

Quasi-peak(Final Result) = Measured Value + Correction Factor

## 7.8. Worst case configuration and mode

### Radiated Test

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone, Stand alone + External accessories(Earphone etc)
  - Worstcase : Stand alone
2. EUT Axis
  - (1) Ant.1
    - Radiated Spurious Emissions : X
    - Radiated Restricted Band Edge : X
  - (2) Ant.2
    - Radiated Spurious Emissions : Y
    - Radiated Restricted Band Edge : Y
  - (3) Dual Ant.1+ Ant.2
    - Radiated Spurious Emissions : Y
    - Radiated Restricted Band Edge : X
3. All packet length of operation were investigated and the test results are worst case in lowest packet length.

(Worst case :1M Bit/s 37 Byte, 2M Bit/s 37 Byte)

(125k, 500k, 1M Bit/s all have the same 1 MHz Band width and only Worst result is attached.)
4. All datarate of operation were investigated and the worst case configuration results are reported.
  - Worst case : 1 M, 2 M
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
  - Position : Horizontal, Vertical, Parallel to the ground plane
9. SM-S721B/DS, SM-S721B were tested and the worst case results are reported.

(Worst case: SM-S721B/DS)

### AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
  - Mode : Stand alone+ External accessories(Earphone, etc)+Travel Adapter  
Stand alone + Travel Adapter
  - Worstcase : Stand alone + Travel Adapter
2. SM-S721B/DS, SM-S721B were tested and the worst case results are reported.

(Worst case: SM-S721B/DS)



Conducted test

1. The EUT was configured with packet length of highest power.
  - ALL supported mode tested.
  - Worst Results refer to Notes for each test item
2. SM-S721B/DS, SM-S721B were tested and the worst case results are reported.  
(Worst case: SM-S721B/DS)

## 8. SUMMARY TEST OF RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 30 dBc		PASS
AC Power line Conducted Emissions	§ 15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS
Radiated Restricted Band Edge	§ 15.247(d), 15.205, 15.209	cf. Section 7.6		PASS

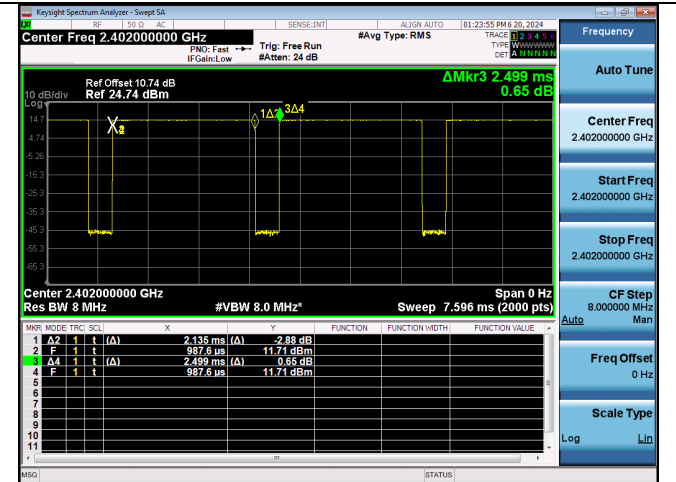
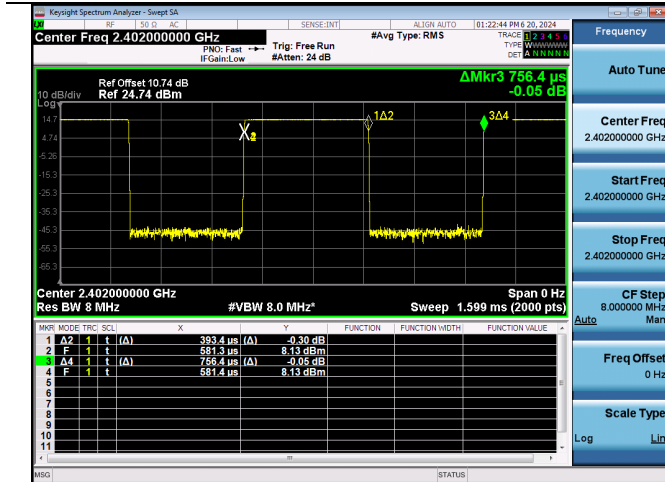
## 9. TEST RESULT

### 9.1 DUTY CYCLE

Data rate (Bit/s)	Packet length (Byte)	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
1M	37	0.393	0.756	0.520	2.839
	255	2.135	2.499	0.854	0.684
2M	37	0.208	0.536	0.388	4.115
	255	1.079	1.408	0.766	1.156
125k	37	3.104	4.112	0.755	1.221
	255	17.060	18.070	0.944	0.250
500k	37	1.067	1.816	0.588	2.310
	255	4.555	5.309	0.858	0.665

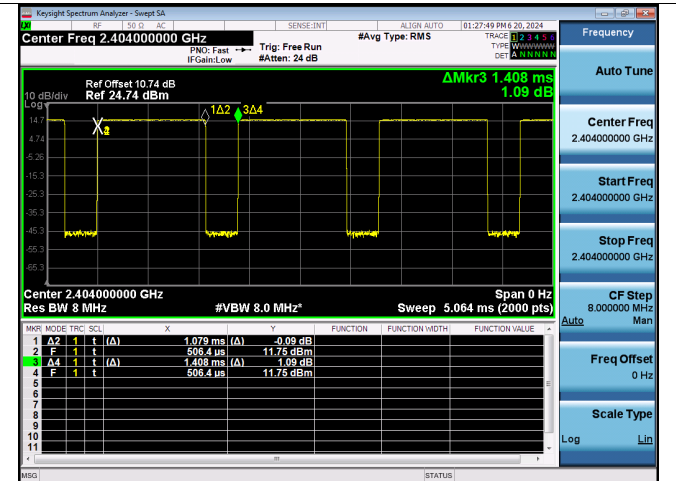
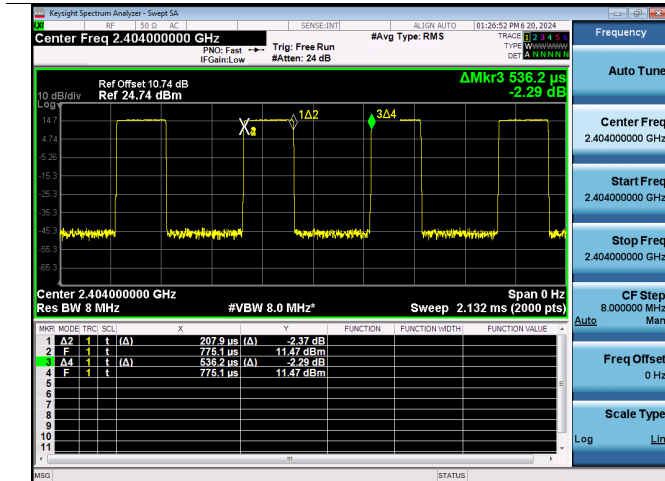
1 M Bit/s (37 Byte)

1 M Bit/s (255 Byte)



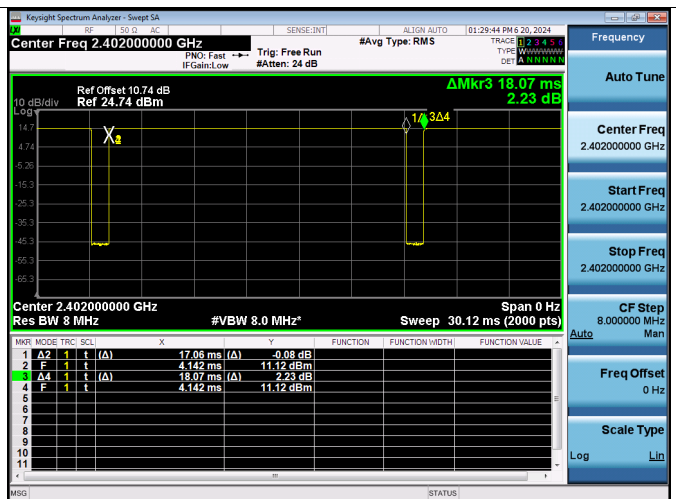
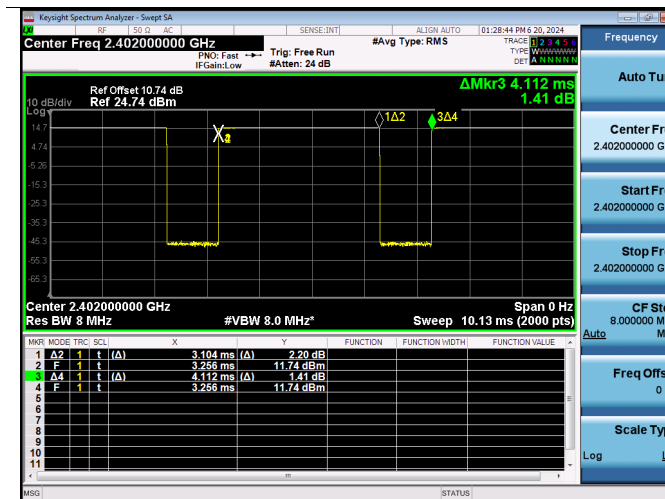
2 M Bit/s (37 Byte)

2 M Bit/s (255 Byte)



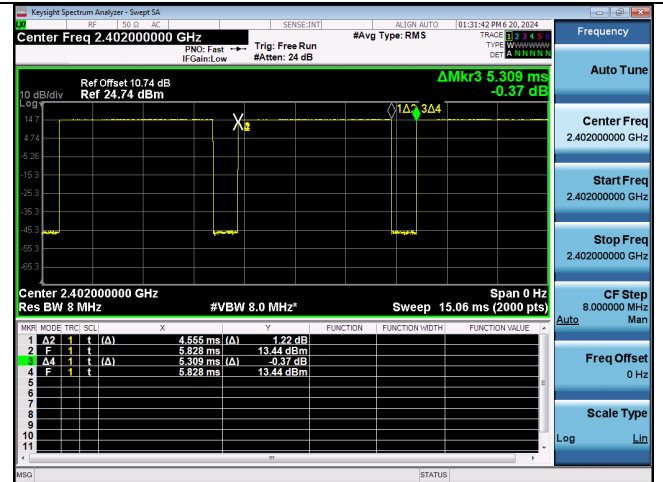
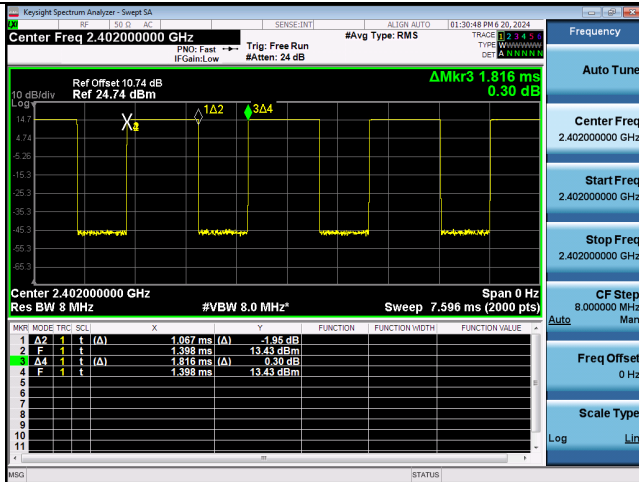
125 k Bit/s(37 Byte)

125 k Bit/s(255 Byte)



500 k Bit/s(37 Byte)

500 k Bit/s(255 Byte)



## 9.2 6 dB BANDWIDTH

[Ant. 1]

Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
1M(37)	37	688.8	> 500
	17	682.7	
	39	677.4	
1M(255)	37	666.4	> 500
	17	667.8	
	39	667.5	
2M(37)	0	1156	> 500
	17	1152	
	36	1155	
2M(255)	0	1154	> 500
	17	1148	
	36	1155	
125k(37)	37	611.8	> 500
	17	612.8	
	39	612.3	
125k(255)	37	614.2	> 500
	17	613.8	
	39	612.3	
500k(37)	37	666.1	> 500
	17	665.1	
	39	662.4	
500k(255)	37	671.2	> 500
	17	666.1	
	39	665.1	

**Note:**

In order to simplify the report, attached plots were only the narrowest 6 dB BW Channel.

1M Bit/s: 255 Byte

2M Bit/s: 255 Byte

125k Bit/s: 37 Byte

500k Bit/s: 37 Byte

**[Ant. 2]**

Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
1M(37)	37	685.6	> 500
	17	682.5	
	39	681.0	
1M(255)	37	667.3	> 500
	17	667.4	
	39	667.5	
2M(37)	0	1153	> 500
	17	1157	
	36	1155	
2M(255)	0	1159	> 500
	17	1162	
	36	1151	

**Note:**

In order to simplify the report, attached plots were only the narrowest 6 dB BW Channel.

1M Bit/s: 255 Byte

2M Bit/s: 255 Byte

**[Dual Ant. 1]**

Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
1M(37)	37	683.7	> 500
	17	672.6	
	39	697.5	
1M(255)	37	665.6	> 500
	17	663.1	
	39	672.3	
2M(37)	0	1153	> 500
	17	1148	
	36	1148	
2M(255)	0	1143	> 500
	17	1154	
	36	1155	

**Note:**

In order to simplify the report, attached plots were only the narrowest 6 dB BW Channel.

1M Bit/s: 255 Byte

2M Bit/s: 255 Byte

**[Dual Ant. 2]**

Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
1M(37)	37	678.1	> 500
	17	672.8	
	39	688.0	
1M(255)	37	662.6	> 500
	17	664.8	
	39	669.3	
2M(37)	0	1148	> 500
	17	1141	
	36	1132	
2M(255)	0	1154	> 500
	17	1155	
	36	1153	

**Note:**

In order to simplify the report, attached plots were only the narrowest 6 dB BW Channel

1M Bit/s: 255 Byte

2M Bit/s: 37 Byte



[Ant.1]

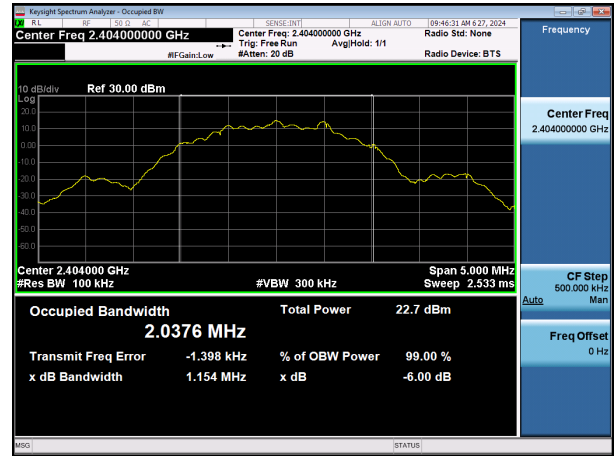
1 MBit/s (255 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 37)

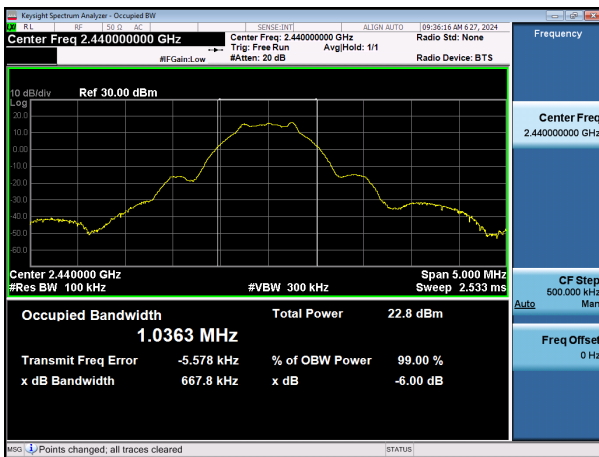


2 MBit/s (255 Byte) Test Plots

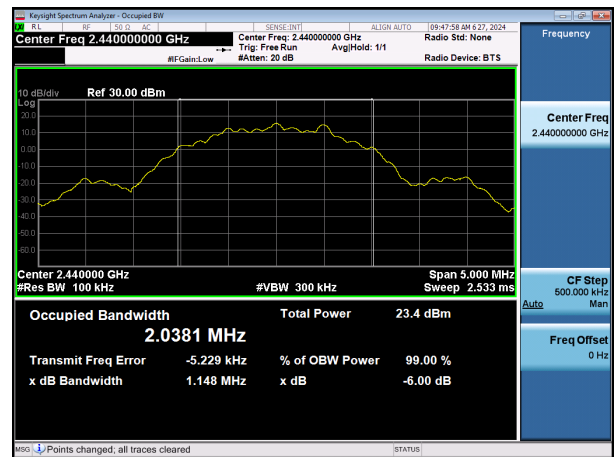
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (High-CH 39)

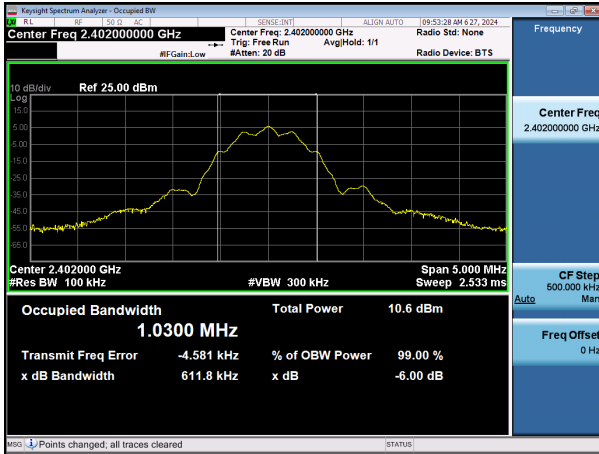


6 dB Bandwidth plot (High-CH 36)



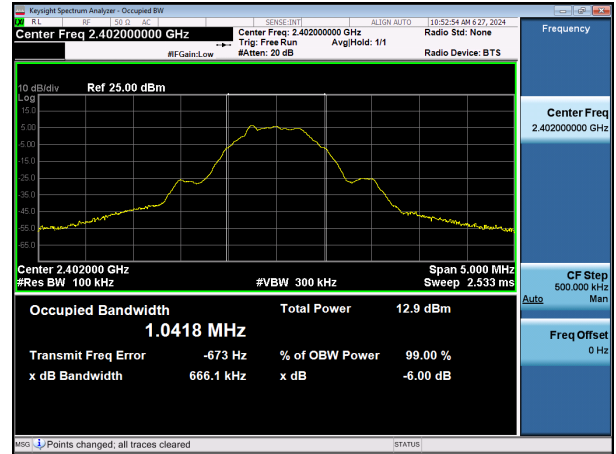
125k Bit/s(37 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 37)



500k Bit/s(37 Byte) Test Plots

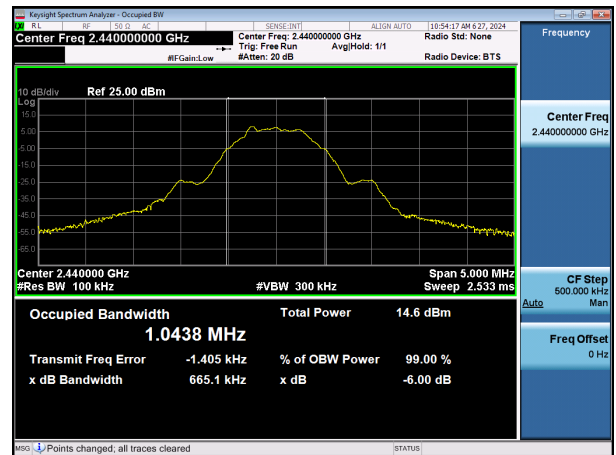
6 dB Bandwidth plot (Low-CH 37)



6 dB Bandwidth plot (Mid-CH 17)



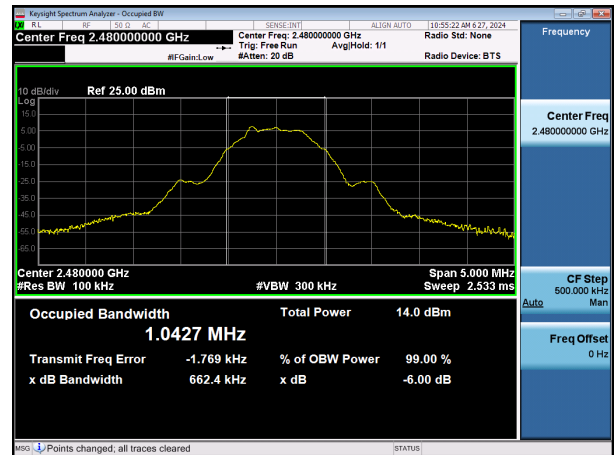
6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (High-CH 39)



6 dB Bandwidth plot (High-CH 39)



[Ant.2]

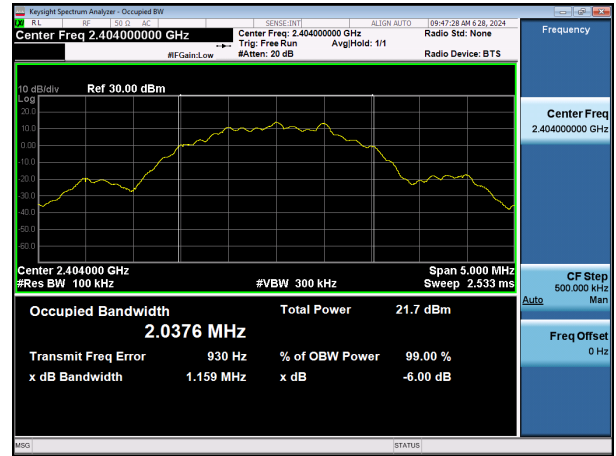
1 MBit/s (255 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 37)

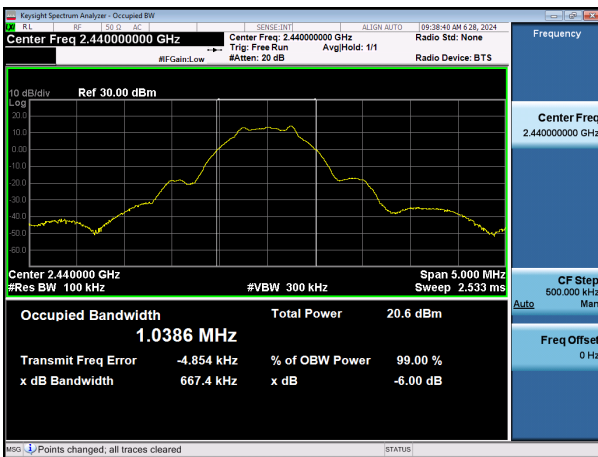


2 MBit/s (255 Byte) Test Plots

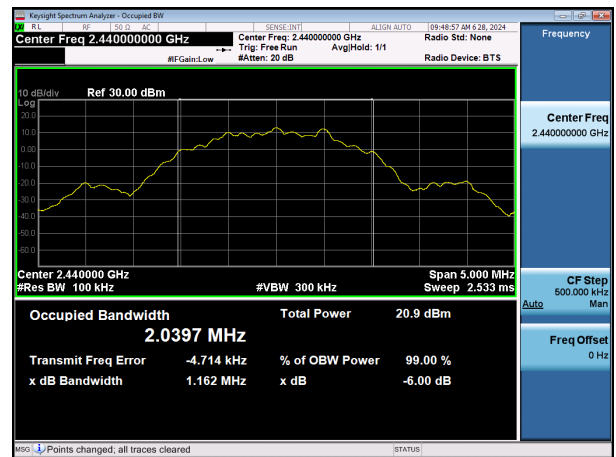
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (High-CH 39)



6 dB Bandwidth plot (High-CH 36)



[Dual Ant.1]

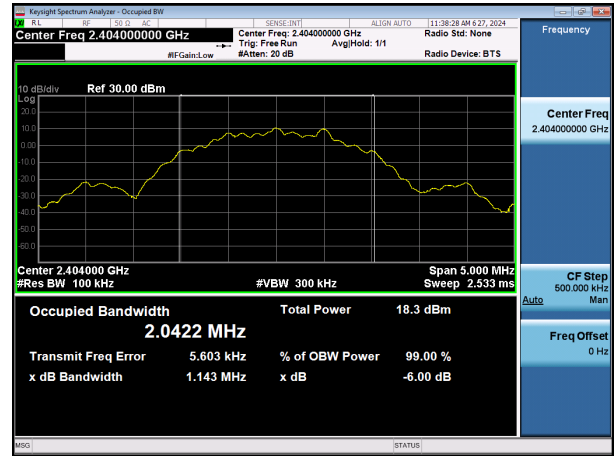
1 MBit/s (255 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 37)

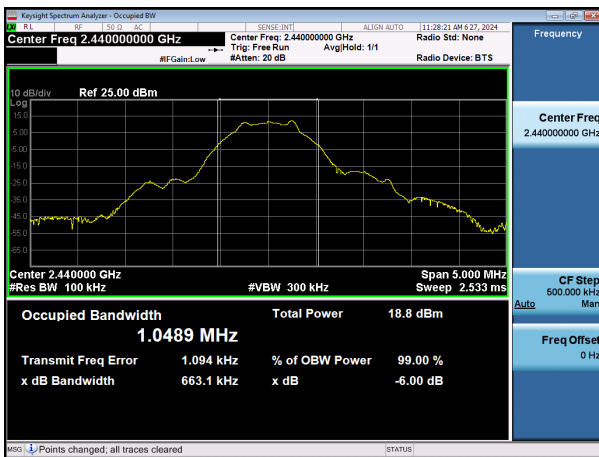


2 MBit/s (255 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (High-CH 39)



6 dB Bandwidth plot (High-CH 36)



[Dual Ant.2]

1 MBit/s (255 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 37)

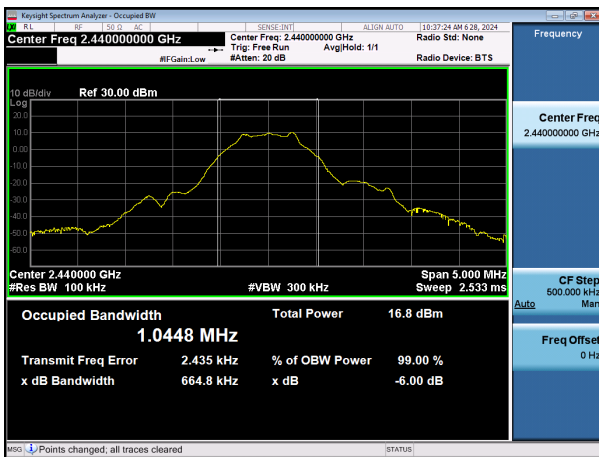


2 MBit/s (37 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 17)



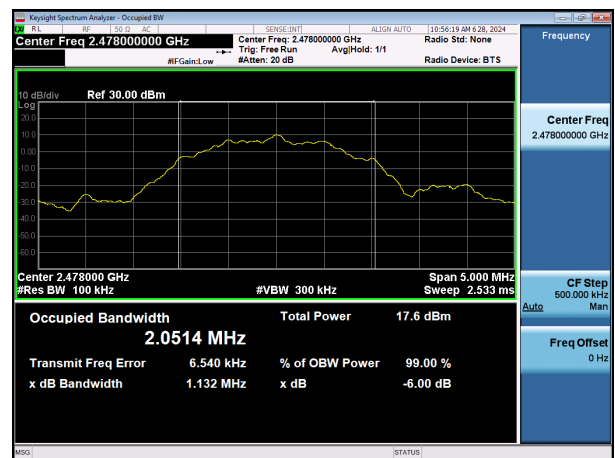
6 dB Bandwidth plot (Mid-CH 17)



6 dB Bandwidth plot (High-CH 39)



6 dB Bandwidth plot (High-CH 36)



### 9.3 OUTPUT POWER

#### Peak Power

[Ant.1]

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Peak Power (dBm)	Limit (dBm)
		Frequency [MHz]	Channel		
1M	37	2402	37	15.492	30
		2440	17	16.527	
		2480	39	15.796	
	255	2402	37	15.190	
		2440	17	16.377	
		2480	39	15.627	
2M	37	2404	0	15.690	
		2440	17	16.737	
		2478	36	16.295	
	255	2404	0	15.646	
		2440	17	16.654	
		2478	36	16.149	
125k	37	2402	37	6.451	
		2440	17	8.127	
		2480	39	7.649	
	255	2402	37	6.660	
		2440	17	8.159	
		2480	39	7.602	
500k	37	2402	37	6.538	
		2440	17	8.174	
		2480	39	7.697	
	255	2402	37	6.480	
		2440	17	8.281	
		2480	39	7.647	

**[Ant.2]**

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Peak Power (dBm)	Limit (dBm)
		Frequency [MHz]	Channel		
1M	37	2402	37	14.681	30
		2440	17	14.221	
		2480	39	14.145	
	255	2402	37	14.388	
		2440	17	14.244	
		2480	39	14.179	
2M	37	2404	0	14.613	30
		2440	17	14.524	
		2478	36	14.522	
	255	2404	0	14.684	
		2440	17	14.234	
		2478	36	14.334	

[Dual (Ant. 1 + Ant. 2)]

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Dual Ant.1 Power(dBm)	Dual Ant.2 Power(dBm)	Dual (Ant. 1 + Ant. 2) Power(dBm)	Limit (dBm)
		Frequency [MHz]	Channel				
1M	37	2402	37	10.719	11.299	14.029	30
		2440	17	12.173	10.751	14.530	
		2480	39	11.677	11.487	14.593	
	255	2402	37	10.755	11.568	14.191	
		2440	17	12.195	10.746	14.541	
		2480	39	11.616	11.541	14.589	
2M	37	2404	0	10.956	11.850	14.436	30
		2440	17	12.234	10.764	14.571	
		2478	36	12.124	11.328	14.755	
	255	2404	0	11.069	11.748	14.432	
		2440	17	12.403	10.721	14.653	
		2478	36	12.095	11.165	14.665	



### Average Power

#### Note :

1. Total Power [dBm] = Measured Power [dBm] + Duty Cycle Factor [dB]

#### [Ant.1]

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Measured Power (dBm)	Duty Cycle Factor (dB)	Result (dBm)	Limit (dBm)
		Frequency [MHz]	Channel				
1M	37	2402	37	12.42	2.84	15.26	30
		2440	17	13.20	2.84	16.04	
		2480	39	12.73	2.84	15.57	
	255	2402	37	14.40	0.68	15.08	
		2440	17	15.58	0.68	16.26	
		2480	39	14.79	0.68	15.47	
2M	37	2404	0	11.07	4.11	15.18	
		2440	17	12.02	4.11	16.13	
		2478	36	11.63	4.11	15.74	
	255	2404	0	14.21	1.16	15.37	
		2440	17	15.06	1.16	16.22	
		2478	36	14.51	1.16	15.67	
125k	37	2402	37	5.15	1.22	6.37	
		2440	17	6.65	1.22	7.87	
		2480	39	6.27	1.22	7.49	
	255	2402	37	6.01	0.25	6.26	
		2440	17	7.61	0.25	7.86	
		2480	39	7.25	0.25	7.50	
500k	37	2402	37	4.01	2.31	6.32	
		2440	17	5.57	2.31	7.88	
		2480	39	5.25	2.31	7.56	
	255	2402	37	5.64	0.67	6.31	
		2440	17	7.22	0.67	7.89	
		2480	39	6.82	0.67	7.49	

## [Ant.2]

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Measured Power (dBm)	Duty Cycle Factor (dB)	Result (dBm)	Limit (dBm)
		Frequency [MHz]	Channel				
1M	37	2402	37	11.64	2.84	14.48	30
		2440	17	11.22	2.84	14.06	
		2480	39	11.20	2.84	14.04	
	255	2402	37	13.63	0.68	14.31	
		2440	17	13.38	0.68	14.06	
		2480	39	13.36	0.68	14.04	
2M	37	2404	0	10.38	4.11	14.49	
		2440	17	10.17	4.11	14.28	
		2478	36	9.99	4.11	14.10	
	255	2404	0	13.30	1.16	14.46	
		2440	17	12.95	1.16	14.11	
		2478	36	13.10	1.16	14.26	

**[Dual Ant.1]**

Data rate	Packet length	LE Mode		Measured Power	Duty Cycle Factor	Result	Limit
(Bit/s)	(Byte)	Frequency [MHz]	Channel	(dBm)	(dB)	(dBm)	(dBm)
1M	37	2402	37	7.78	2.84	10.62	30
		2440	17	9.07	2.84	11.91	
		2480	39	8.63	2.84	11.47	
	255	2402	37	9.85	0.68	10.53	
		2440	17	11.18	0.68	11.86	
		2480	39	10.58	0.68	11.26	
2M	37	2404	0	6.61	4.11	10.72	
		2440	17	7.72	4.11	11.83	
		2478	36	7.71	4.11	11.82	
	255	2404	0	9.64	1.16	10.80	
		2440	17	10.79	1.16	11.95	
		2478	36	10.61	1.16	11.77	

**[Dual Ant.2]**

Data rate	Packet length	LE Mode		Measured Power	Duty Cycle Factor	Result	Limit
(Bit/s)	(Byte)	Frequency [MHz]	Channel	(dBm)	(dB)	(dBm)	(dBm)
1M	37	2402	37	8.35	2.84	11.19	30
		2440	17	7.74	2.84	10.58	
		2480	39	8.50	2.84	11.34	
	255	2402	37	10.73	0.68	11.41	
		2440	17	9.89	0.68	10.57	
		2480	39	10.72	0.68	11.40	
2M	37	2404	0	7.56	4.11	11.67	
		2440	17	6.50	4.11	10.61	
		2478	36	7.11	4.11	11.22	
	255	2404	0	10.49	1.16	11.65	
		2440	17	9.45	1.16	10.61	
		2478	36	9.90	1.16	11.06	

[Dual (Ant. 1 + Ant .2)]

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Dual Ant.1 Power (dBm)	Dual Ant.2 Power (dBm)	Dual (Ant. 1 + Ant. 2) Power (dBm)	Limit (dBm)
		Frequency [MHz]	Channel				
1M	37	2402	37	10.62	11.19	13.92	30
		2440	17	11.91	10.58	14.31	
		2480	39	11.47	11.34	14.41	
	255	2402	37	10.53	11.41	14.01	
		2440	17	11.86	10.57	14.28	
		2480	39	11.26	11.40	14.34	
2M	37	2404	0	10.72	11.67	14.24	30
		2440	17	11.83	10.61	14.28	
		2478	36	11.82	11.22	14.55	
	255	2404	0	10.80	11.65	14.25	
		2440	17	11.95	10.61	14.34	
		2478	36	11.77	11.06	14.44	

## 9.4 POWER SPECTRAL DENSITY

[Ant.1]

Frequency (MHz)	Channel No.	Mode	Test Result			Limit
			Measured PSD (dBm)	Duty Cycle Factor(dB)	Total PSD (dBm)	
2402	37	1 MBit/s 37 Byte	1.913	2.84	4.752	8 dBm / 3 kHz
2440	17		2.697	2.84	5.536	
2480	39		2.027	2.84	4.866	
2402	37	1 MBit/s 255 Byte	2.251	0.68	2.935	
2440	17		4.246	0.68	4.930	
2480	39		3.500	0.68	4.184	
2404	0	2 MBit/s 37 Byte	-0.500	4.11	3.615	
2440	17		0.929	4.11	5.044	
2478	36		0.759	4.11	4.874	
2404	0	2 MBit/s 255 Byte	-0.346	1.16	0.810	
2440	17		1.518	1.16	2.674	
2478	36		0.417	1.16	1.573	
2402	37	125k 37 Byte	-1.091	1.22	0.130	
2440	17		0.549	1.22	1.770	
2480	39		0.078	1.22	1.299	
2402	37	125k 255 Byte	-0.136	0.25	0.114	
2440	17		1.573	0.25	1.823	
2480	39		1.102	0.25	1.352	
2402	37	500k 37 Byte	-4.567	2.31	-2.257	
2440	17		-3.495	2.31	-1.185	
2480	39		-3.926	2.31	-1.616	
2402	37	500k 255 Byte	-5.826	0.67	-5.161	
2440	17		-4.221	0.67	-3.556	
2480	39		-5.171	0.67	-4.506	

**Note :**

1. Total PSD = Measured PSD + Duty Cycle Factor
2. In order to simplify the report, The plots were attached with the highest PSD Mode.  
Worst case : 1M Bit/s (37 Byte)

**[Ant.2]**

Frequency (MHz)	Channel No.	Mode	Test Result			Limit
			Measured PSD (dBm)	Duty Cycle Factor(dB)	Total PSD (dBm)	
2402	37	1 MBit/s 37 Byte	1.386	2.84	4.225	8 dBm / 3 kHz
2440	17		0.044	2.84	2.883	
2480	39		0.420	2.84	3.259	
2402	37	1 MBit/s 255 Byte	2.087	0.68	2.771	
2440	17		2.067	0.68	2.751	
2480	39		1.363	0.68	2.047	
2404	0	2 MBit/s 37 Byte	-2.138	4.11	1.977	
2440	17		-1.960	4.11	2.155	
2478	36		-1.768	4.11	2.347	
2404	0	2 MBit/s 255 Byte	-0.240	1.16	0.916	
2440	17		-0.657	1.16	0.499	
2478	36		-1.230	1.16	-0.074	

**Note :**

1. Total PSD = Measured PSD + Duty Cycle Factor
2. In order to simplify the report, The plots were attached with the highest PSD Mode.  
Worst case : 1M Bit/s (37 Byte)

**[Dual Ant.1]**

Frequency (MHz)	Channel No.	Mode	Test Result			Limit
			Measured PSD (dBm)	Duty Cycle Factor(dB)	Total PSD (dBm)	
2402	37	1M Bit/s 37 Byte	-2.111	2.84	0.728	8dBm/3kHz
2440	17		-1.032	2.84	1.807	
2480	39		-1.208	2.84	1.631	
2402	37	1M Bit/s 255 Byte	-1.135	0.68	-0.451	
2440	17		-0.166	0.68	0.518	
2480	39		-1.123	0.68	-0.439	
2404	0	2M Bit/s 37 Byte	-4.076	4.11	0.039	
2440	17		-2.633	4.11	1.482	
2478	36		-4.632	4.11	-0.517	
2404	0	2M Bit/s 255 Byte	-4.176	1.16	-3.020	
2440	17		-3.478	1.16	-2.322	
2478	36		-2.987	1.16	-1.831	

**[Dual Ant.2]**

Frequency (MHz)	Channel No.	Mode	Test Result			Limit
			Measured PSD (dBm)	Duty Cycle Factor(dB)	Total PSD (dBm)	
2402	37	1M Bit/s 37 Byte	-2.869	2.84	-0.030	8dBm/3kHz
2440	17		-3.063	2.84	-0.224	
2480	39		-3.215	2.84	-0.376	
2402	37	1M Bit/s 255 Byte	-0.627	0.68	0.057	
2440	17		-2.424	0.68	-1.740	
2480	39		-1.113	0.68	-0.429	
2404	0	2M Bit/s 37 Byte	-4.560	4.11	-0.445	
2440	17		-6.133	4.11	-2.018	
2478	36		-5.521	4.11	-1.406	
2404	0	2M Bit/s 255 Byte	-3.280	1.16	-2.124	
2440	17		-5.522	1.16	-4.366	
2478	36		-4.515	1.16	-3.359	

[Dual (Ant.1+ Ant.2)]

Frequency (MHz)	Channel No.	Mode	Test Result			Limit
			Dual Ant. 1 PSD (dBm)	Dual Ant. 2 PSD (dBm)	Dual (Ant.1 + Ant.2) PSD (dBm)	
2402	37	1 MBit/s 37 Byte	0.728	-0.030	3.376	8 dBm / 3 kHz
2440	17		1.807	-0.224	3.920	
2480	39		1.631	-0.376	3.753	
2402	37	1 MBit/s 255 Byte	-0.451	0.057	2.820	
2440	17		0.518	-1.740	2.544	
2480	39		-0.439	-0.429	2.576	
2404	0	2 MBit/s 37 Byte	0.039	-0.445	2.814	
2440	17		1.482	-2.018	3.085	
2478	36		-0.517	-1.406	2.071	
2404	0	2 MBit/s 255 Byte	-3.020	-2.124	0.461	
2440	17		-2.322	-4.366	-0.215	
2478	36		-1.831	-3.359	0.482	

**Note :**

1. Total PSD = Measured PSD + Duty Cycle Factor
2. In order to simplify the report, The plots were attached with the highest PSD Mode.  
Worst case : 1M Bit/s (37 Byte)



Test Plots

Ant.1 (1 MBit/s (37 Byte))

Power Spectral Density (Low-CH 37)



Ant.2 (1 MBit/s (37 Byte))

Power Spectral Density (Low-CH 37)



Power Spectral Density (Mid-CH 17)



Power Spectral Density (Mid-CH 17)



Power Spectral Density (High-CH 39)



Power Spectral Density (High-CH 39)



Dual Ant.1 (1 MBit/s (37 Byte))

Power Spectral Density (Low-CH 37)



Dual Ant.2 (1 MBit/s (37 Byte))

Power Spectral Density (Low-CH 37)



Power Spectral Density (Mid-CH 17)



Power Spectral Density (Mid-CH 17)



Power Spectral Density (High-CH 39)



Power Spectral Density (High-CH 39)



## 9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

### [BAND EDGE]

#### [Ant. 1]

Frequency (MHz)	Mode	Channel No.	Position	Test Result	
				Measured Level (dB)	Limit (dBc)
2402	1M Bit/s 37 Byte	37	Lower	56.126	30
2480		39	Upper	62.841	30
2402	1M Bit/s 255 Byte	37	Lower	56.260	30
2480		39	Upper	62.538	30
2404	2M Bit/s 37 Byte	0	Lower	61.015	30
2478		36	Upper	62.813	30
2404	2M Bit/s 255 Byte	0	Lower	60.950	30
2478		36	Upper	63.024	30
2402	125k Bit/s 37 Byte	37	Lower	55.630	30
2480		39	Upper	58.852	30
2402	125k Bit/s 255 Byte	37	Lower	58.008	30
2480		39	Upper	63.106	30
2402	500k Bit/s 37 Byte	37	Lower	54.887	30
2480		39	Upper	59.766	30
2402	500k Bit/s 255 Byte	37	Lower	56.429	30
2480		39	Upper	59.657	30

#### Note :

In order to simplify the report, attached plots were only the worst case channel and data rate.

- Lower Band Edge: 500k Bit/s (37 Byte)
- Upper Band Edge: 125k Bit/s (37 Byte)

**[Ant. 2]**

Frequency (MHz)	Mode	Channel No.	Position	Test Result	
				Measured Level (dB)	Limit (dBc)
2402	1M Bit/s 37 Byte	37	Lower	55.269	30
2480		39	Upper	59.408	30
2402	1M Bit/s 255 Byte	37	Lower	55.218	30
2480		39	Upper	59.590	30
2404	2M Bit/s 37 Byte	0	Lower	59.905	30
2478		36	Upper	61.003	30
2404	2M Bit/s 255 Byte	0	Lower	59.267	30
2478		36	Upper	61.291	30

**Note :**

In order to simplify the report, attached plots were only the worst case channel and data rate.

- Lower Band Edge: 1M Bit/s (255 Byte)
- Upper Band Edge: 1M Bit/s (37 Byte)

**[Dual Ant. 1]**

Frequency (MHz)	Mode	Channel No.	Position	Test Result	
				Measured Level (dB)	Limit (dBc)
2402	1M Bit/s 37 Byte	37	Lower	55.049	30
2480		39	Upper	63.042	30
2402	1M Bit/s 255 Byte	37	Lower	55.360	30
2480		39	Upper	63.105	30
2404	2M Bit/s 37 Byte	0	Lower	57.688	30
2478		36	Upper	59.302	30
2404	2M Bit/s 255 Byte	0	Lower	57.528	30
2478		36	Upper	59.587	30

**Note :**

In order to simplify the report, attached plots were only the worst case channel and data rate.

- Lower Band Edge: 1M Bit/s (37 Byte)
- Upper Band Edge: 2M Bit/s (37 Byte)

**[Dual Ant. 2]**

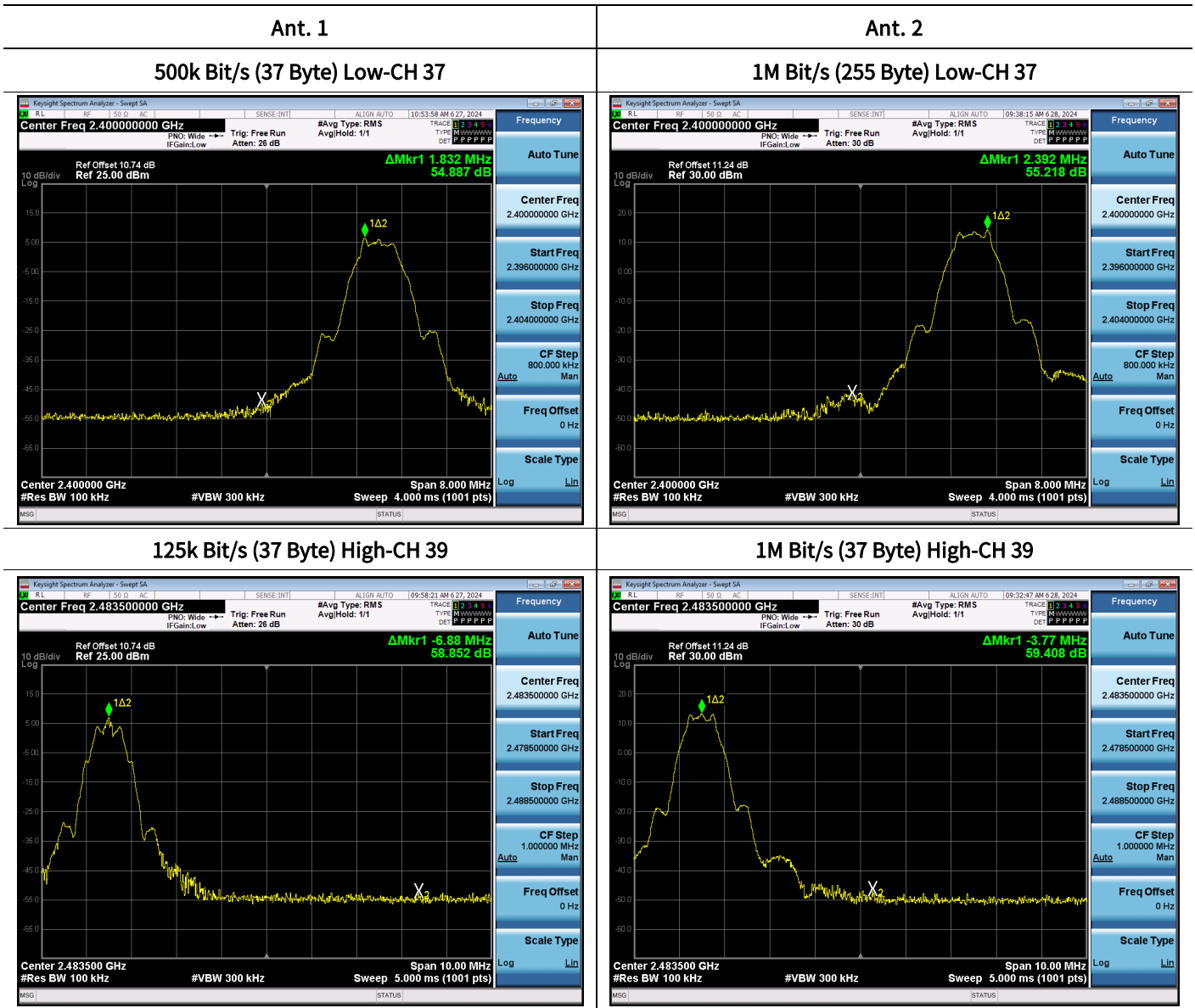
Frequency (MHz)	Mode	Channel No.	Position	Test Result	
				Measured Level (dB)	Limit (dBc)
2402	1M Bit/s 37 Byte	37	Lower	53.873	30
2480		39	Upper	58.066	30
2402	1M Bit/s 255 Byte	37	Lower	54.909	30
2480		39	Upper	58.465	30
2404	2M Bit/s 37 Byte	0	Lower	58.234	30
2478		36	Upper	57.898	30
2404	2M Bit/s 255 Byte	0	Lower	58.000	30
2478		36	Upper	57.542	30

**Note :**

In order to simplify the report, attached plots were only the worst case channel and data rate.

- Lower Band Edge: 1M Bit/s (37 Byte)
- Upper Band Edge: 2M Bit/s (255 Byte)

☐ Test Plot(Band Edge)



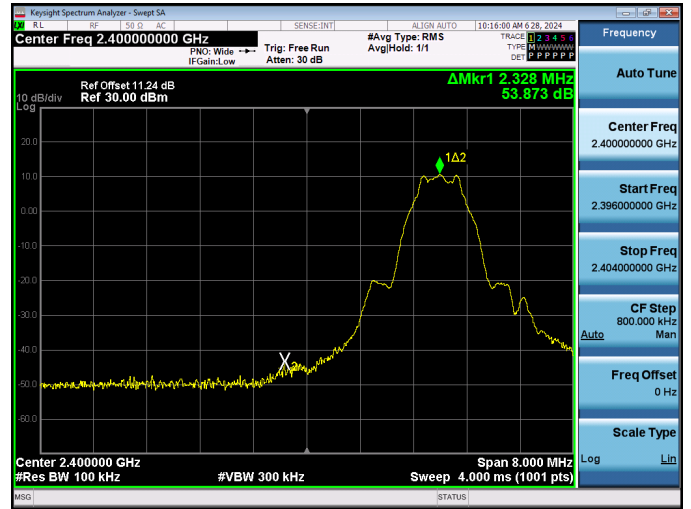
Dual Ant.1

1M Bit/s (37 Byte) Low-CH 37

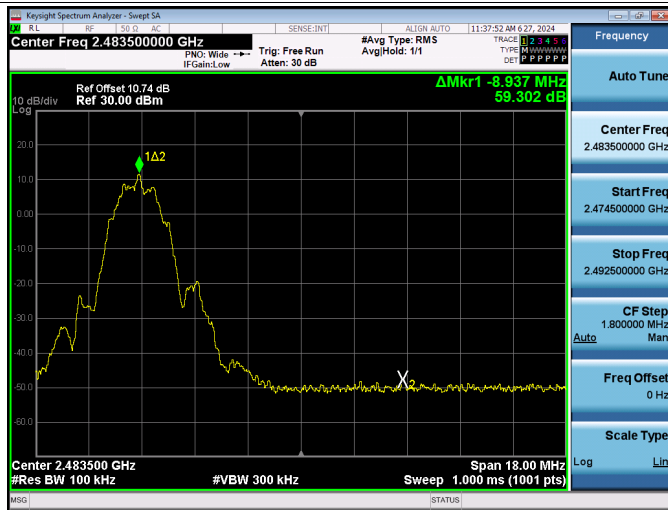


Dual Ant.2

1M Bit/s (37 Byte) Low-CH 37



2M Bit/s (37 Byte) High-CH 36



2M Bit/s (255 Byte) High-CH 36



[CONDUCTED SPURIOUS EMISSIONS]

In order to simplify the report, attached plots were only the worst case channel and data rate.

- Worst case

Ant. 1 : 1M Bit/s 255 Byte Ch. 17(2 440 MHz)

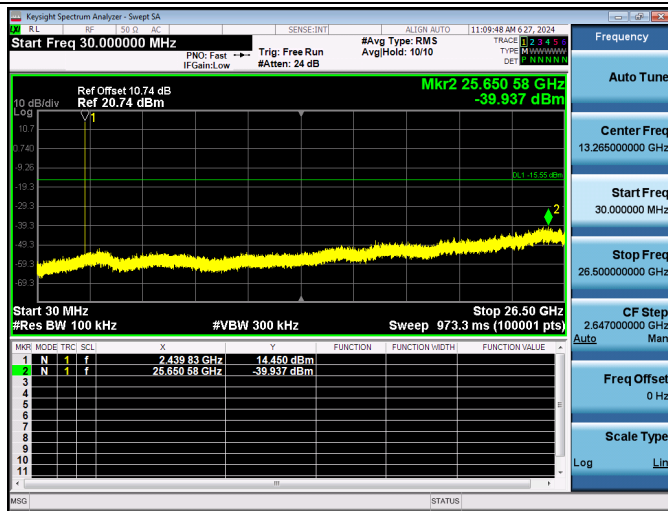
Ant. 2 : 2M Bit/s 37 Byte Ch. 0(2 404 MHz)

Dual Ant. 1 : 2M Bit/s 255 Byte Ch. 17(2 440 MHz)

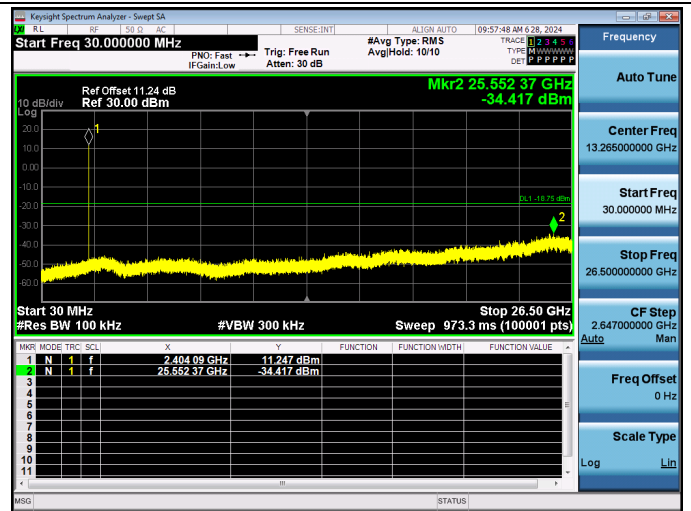
Dual Ant. 2 : 2M Bit/s 37 Byte Ch. 0(2 404 MHz)

☐ Test Plots(Conducted Spurious Emission (30 MHz – 26.5 GHz))

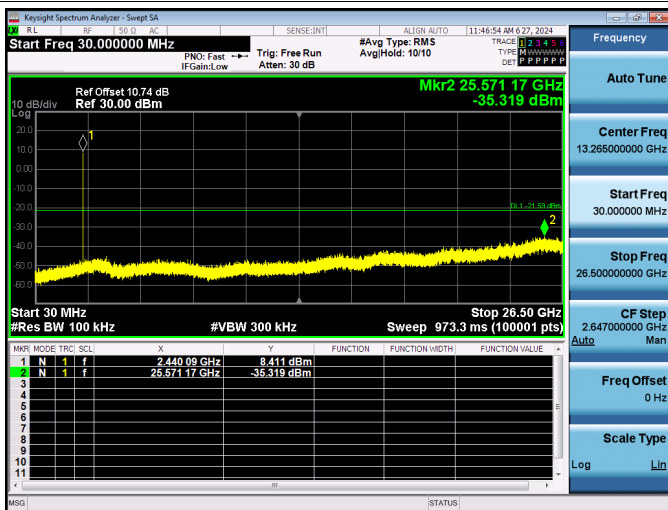
Ant. 1 Conducted Spurious Emission



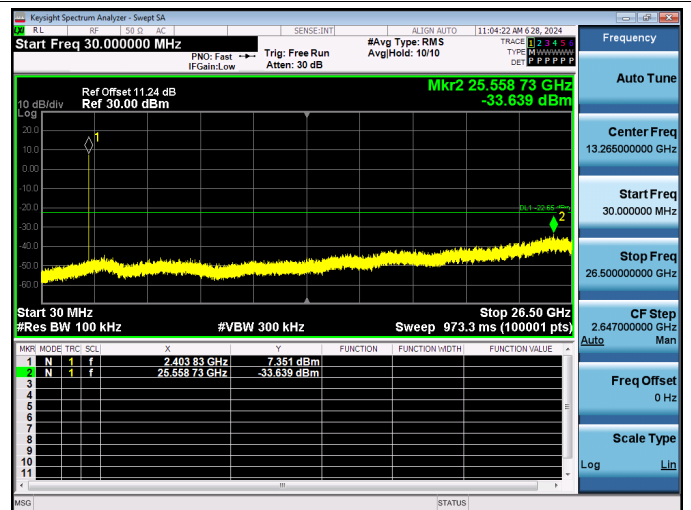
Ant. 2 Conducted Spurious Emission



Dual BT Ant. 1 Conducted Spurious Emission



Dual BT Ant. 2 Conducted Spurious Emission





## 9.6 RADIATED SPURIOUS EMISSIONS

### Frequency Range : 9 kHz – 30 MHz

Frequency	Measured Value	A.F+C.L+D.F	POL	Total	Limit	Margin
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]

No Critical peaks found

#### Note:

1. The Measured of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor =  $40\log(\text{specific distance} / \text{test distance})$  (dB)
3. Limit line = specific Limits (dB $\mu$ V) + Distance extrapolation factor

### Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	POL	Total	Limit	Margin
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]

No Critical peaks found

#### Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

**Frequency Range : Above 1 GHz**
**[Ant.1]**

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2402 MHz
Channel No	CH 37

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4804	50.21	-5.49	V	44.72	73.98	29.26	PK
4804	39.54	-5.49	V	34.05	53.98	19.93	AV
7206	46.54	1.86	V	48.40	73.98	25.58	PK
7206	34.91	1.86	V	36.77	53.98	17.21	AV
4804	50.37	-5.49	H	44.88	73.98	29.10	PK
4804	39.59	-5.49	H	34.10	53.98	19.88	AV
7206	46.60	1.86	H	48.46	73.98	25.52	PK
7206	34.99	1.86	H	36.85	53.98	17.13	AV

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2440 MHz
Channel No	CH 17

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4880	51.28	-5.18	V	46.10	73.98	27.88	PK
4880	40.22	-5.18	V	35.04	53.98	18.94	AV
7320	47.68	1.94	V	49.62	73.98	24.36	PK
7320	35.51	1.94	V	37.45	53.98	16.53	AV
4880	51.64	-5.18	H	46.46	73.98	27.52	PK
4880	40.34	-5.18	H	35.16	53.98	18.82	AV
7320	47.96	1.94	H	49.90	73.98	24.08	PK
7320	35.64	1.94	H	37.58	53.98	16.40	AV

Operation Mode            1 M Bit/s (37 Bytes)  
 Operating Frequency      2480 MHz  
 Channel No                 CH 39

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4960	50.40	-4.82	V	45.58	73.98	28.40	PK
4960	39.11	-4.82	V	34.29	53.98	19.69	AV
7440	47.68	2.13	V	49.81	73.98	24.17	PK
7440	35.78	2.13	V	37.91	53.98	16.07	AV
4960	50.45	-4.82	H	45.63	73.98	28.35	PK
4960	39.13	-4.82	H	34.31	53.98	19.67	AV
7440	47.51	2.13	H	49.64	73.98	24.34	PK
7440	35.72	2.13	H	37.85	53.98	16.13	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2404 MHz
Channel No	CH 0

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4808	50.60	-5.49	V	45.11	73.98	28.87	PK
4808	38.61	-5.49	V	33.12	53.98	20.86	AV
7212	46.88	1.92	V	48.80	73.98	25.18	PK
7212	35.37	1.92	V	37.29	53.98	16.69	AV
4808	50.67	-5.49	H	45.18	73.98	28.80	PK
4808	38.74	-5.49	H	33.25	53.98	20.73	AV
7212	46.95	1.92	H	48.87	73.98	25.11	PK
7212	35.40	1.92	H	37.32	53.98	16.66	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2440 MHz
Channel No	CH 17

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4880	52.18	-5.18	V	47.00	73.98	26.98	PK
4880	39.35	-5.18	V	34.17	53.98	19.81	AV
7320	47.08	1.94	V	49.02	73.98	24.96	PK
7320	35.42	1.94	V	37.36	53.98	16.62	AV
4880	52.83	-5.18	H	47.65	73.98	26.33	PK
4880	39.40	-5.18	H	34.22	53.98	19.76	AV
7320	47.19	1.94	H	49.13	73.98	24.85	PK
7320	35.58	1.94	H	37.52	53.98	16.46	AV

Operation Mode            2 M Bit/s (37 Bytes)  
 Operating Frequency        2478 MHz  
 Channel No                    CH 36

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4956	50.00	-4.93	V	45.07	73.98	28.91	PK
4956	38.43	-4.93	V	33.50	53.98	20.48	AV
7434	48.22	2.11	V	50.33	73.98	23.65	PK
7434	35.58	2.11	V	37.69	53.98	16.29	AV
4956	50.01	-4.93	H	45.08	73.98	28.90	PK
4956	38.48	-4.93	H	33.55	53.98	20.43	AV
7434	47.99	2.11	H	50.10	73.98	23.88	PK
7434	35.45	2.11	H	37.56	53.98	16.42	AV

**[Ant.2]**

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2402 MHz
Channel No	CH 37

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4804	49.16	-5.49	V	43.67	73.98	30.31	PK
4804	37.55	-5.49	V	32.06	53.98	21.92	AV
7206	46.73	1.86	V	48.59	73.98	25.39	PK
7206	34.79	1.86	V	36.65	53.98	17.33	AV
4804	49.17	-5.49	H	43.68	73.98	30.30	PK
4804	37.58	-5.49	H	32.09	53.98	21.89	AV
7206	46.89	1.86	H	48.75	73.98	25.23	PK
7206	34.99	1.86	H	36.85	53.98	17.13	AV

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2440 MHz
Channel No	CH 17

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4880	49.82	-5.18	V	44.64	73.98	29.34	PK
4880	38.54	-5.18	V	33.36	53.98	20.62	AV
7320	46.94	1.94	V	48.88	73.98	25.10	PK
7320	35.15	1.94	V	37.09	53.98	16.89	AV
4880	50.07	-5.18	H	44.89	73.98	29.09	PK
4880	38.61	-5.18	H	33.43	53.98	20.55	AV
7320	47.01	1.94	H	48.95	73.98	25.03	PK
7320	35.38	1.94	H	37.32	53.98	16.66	AV

Operation Mode            1 M Bit/s (37 Bytes)  
 Operating Frequency      2480 MHz  
 Channel No                CH 39

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4960	49.87	-4.82	V	45.05	73.98	28.93	PK
4960	37.70	-4.82	V	32.88	53.98	21.10	AV
7440	47.50	2.13	V	49.63	73.98	24.35	PK
7440	35.55	2.13	V	37.68	53.98	16.30	AV
4960	49.81	-4.82	H	44.99	73.98	28.99	PK
4960	37.59	-4.82	H	32.77	53.98	21.21	AV
7440	46.80	2.13	H	48.93	73.98	25.05	PK
7440	35.50	2.13	H	37.63	53.98	16.35	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2404 MHz
Channel No	CH 0

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4804	49.33	-5.49	V	43.84	73.98	30.14	PK
4804	37.14	-5.49	V	31.65	53.98	22.33	AV
7206	46.42	1.86	V	48.28	73.98	25.70	PK
7206	34.85	1.86	V	36.71	53.98	17.27	AV
4804	49.45	-5.49	H	43.96	73.98	30.02	PK
4804	37.54	-5.49	H	32.05	53.98	21.93	AV
7206	46.45	1.86	H	48.31	73.98	25.67	PK
7206	35.04	1.86	H	36.90	53.98	17.08	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2440 MHz
Channel No	CH 17

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4880	50.61	-5.18	V	45.43	73.98	28.55	PK
4880	38.05	-5.18	V	32.87	53.98	21.11	AV
7320	47.05	1.94	V	48.99	73.98	24.99	PK
7320	35.25	1.94	V	37.19	53.98	16.79	AV
4880	50.96	-5.18	H	45.78	73.98	28.20	PK
4880	38.37	-5.18	H	33.19	53.98	20.79	AV
7320	47.08	1.94	H	49.02	73.98	24.96	PK
7320	35.37	1.94	H	37.31	53.98	16.67	AV



Operation Mode            2 M Bit/s (37 Bytes)  


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 Operating Frequency      2478 MHz  


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 Channel No                 CH 36  


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Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4960	47.42	-4.82	V	42.60	73.98	31.38	PK
4960	35.82	-4.82	V	31.00	53.98	22.98	AV
7440	47.49	2.13	V	49.62	73.98	24.36	PK
7440	35.69	2.13	V	37.82	53.98	16.16	AV
4960	47.39	-4.82	H	42.57	73.98	31.41	PK
4960	35.80	-4.82	H	30.98	53.98	23.00	AV
7440	47.55	2.13	H	49.68	73.98	24.30	PK
7440	35.77	2.13	H	37.90	53.98	16.08	AV

**[Dual Ant.1+ Ant.2]**

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2402 MHz
Channel No	CH 37

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4804	48.78	-5.49	V	43.29	73.98	30.69	PK
4804	37.48	-5.49	V	31.99	53.98	21.99	AV
7206	46.41	1.86	V	48.27	73.98	25.71	PK
7206	34.81	1.86	V	36.67	53.98	17.31	AV
4804	48.64	-5.49	H	43.15	73.98	30.83	PK
4804	37.40	-5.49	H	31.91	53.98	22.07	AV
7206	46.48	1.86	H	48.34	73.98	25.64	PK
7206	34.83	1.86	H	36.69	53.98	17.29	AV

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2440 MHz
Channel No	CH 17

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4880	50.20	-5.18	V	45.02	73.98	28.96	PK
4880	38.40	-5.18	V	33.22	53.98	20.76	AV
7320	46.67	1.94	V	48.61	73.98	25.37	PK
7320	35.21	1.94	V	37.15	53.98	16.83	AV
4880	49.91	-5.18	H	44.73	73.98	29.25	PK
4880	38.29	-5.18	H	33.11	53.98	20.87	AV
7320	46.77	1.94	H	48.71	73.98	25.27	PK
7320	35.37	1.94	H	37.31	53.98	16.67	AV

Operation Mode            1 M Bit/s (37 Bytes)  
 Operating Frequency      2480 MHz  
 Channel No                CH 39

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4960	49.42	-4.82	V	44.60	73.98	29.38	PK
4960	37.61	-4.82	V	32.79	53.98	21.19	AV
7440	47.25	2.13	V	49.38	73.98	24.60	PK
7440	35.49	2.13	V	37.62	53.98	16.36	AV
4960	49.50	-4.82	H	44.68	73.98	29.30	PK
4960	37.68	-4.82	H	32.86	53.98	21.12	AV
7440	47.38	2.13	H	49.51	73.98	24.47	PK
7440	35.66	2.13	H	37.79	53.98	16.19	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2404 MHz
Channel No	CH 0

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4808	48.72	-5.49	V	43.23	73.98	30.75	PK
4808	37.29	-5.49	V	31.80	53.98	22.18	AV
7212	46.25	1.92	V	48.17	73.98	25.81	PK
7212	34.69	1.92	V	36.61	53.98	17.37	AV
4808	48.75	-5.49	H	43.26	73.98	30.72	PK
4808	37.43	-5.49	H	31.94	53.98	22.04	AV
7212	46.43	1.92	H	48.35	73.98	25.63	PK
7212	34.85	1.92	H	36.77	53.98	17.21	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2440 MHz
Channel No	CH 17

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4880	50.13	-5.18	V	44.95	73.98	29.03	PK
4880	38.37	-5.18	V	33.19	53.98	20.79	AV
7320	46.48	1.94	V	48.42	73.98	25.56	PK
7320	35.19	1.94	V	37.13	53.98	16.85	AV
4880	49.93	-5.18	H	44.75	73.98	29.23	PK
4880	38.25	-5.18	H	33.07	53.98	20.91	AV
7320	46.65	1.94	H	48.59	73.98	25.39	PK
7320	35.22	1.94	H	37.16	53.98	16.82	AV

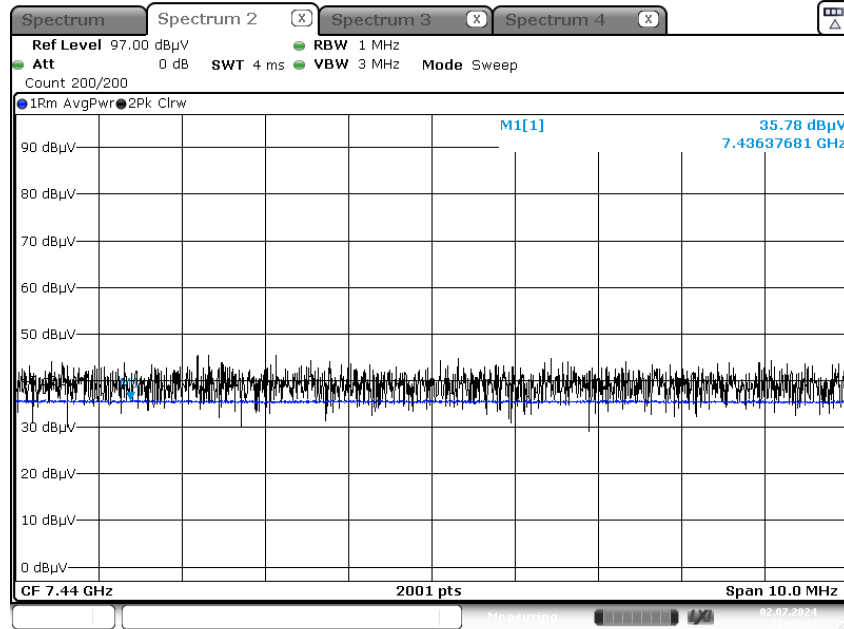
Operation Mode            2 M Bit/s (37 Bytes)  
 Operating Frequency      2478 MHz  
 Channel No                CH 36

Frequency	Measured Value	AF+CL-AG	Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
4956	49.11	-4.93	V	44.18	73.98	29.80	PK
4956	37.58	-4.93	V	32.65	53.98	21.33	AV
7434	47.59	2.11	V	49.70	73.98	24.28	PK
7434	35.15	2.11	V	37.26	53.98	16.72	AV
4956	49.23	-4.93	H	44.30	73.98	29.68	PK
4956	37.64	-4.93	H	32.71	53.98	21.27	AV
7434	47.78	2.11	H	49.89	73.98	24.09	PK
7434	35.54	2.11	H	37.65	53.98	16.33	AV

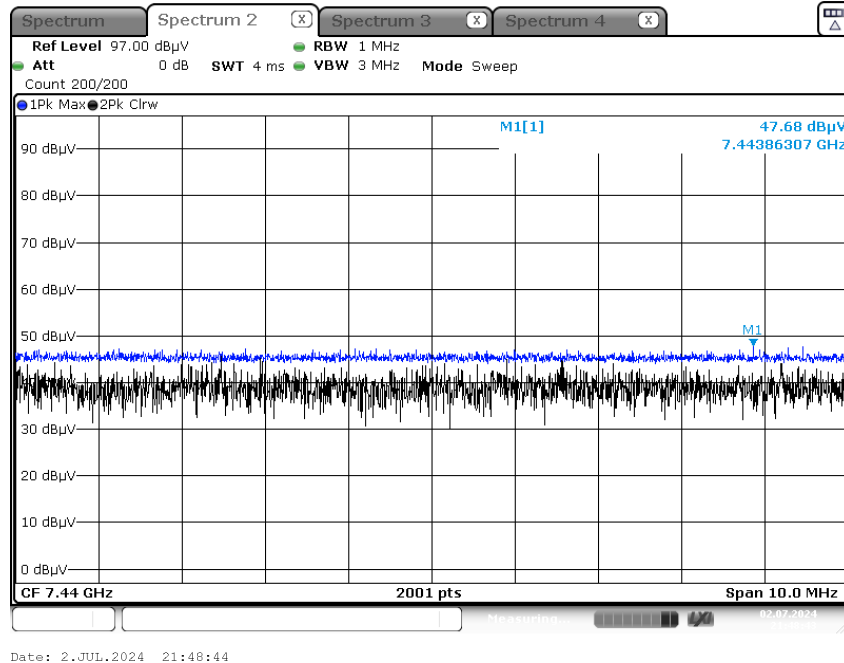
[Ant.1]

▣ 1 M Bit/s 37 Bytes Test Plots

Radiated Spurious Emissions plot – Average Result (Ch.39 3rd Harmonic, X-H)



Radiated Spurious Emissions plot – Peak Result (Ch.39 3rd Harmonic, X-H)



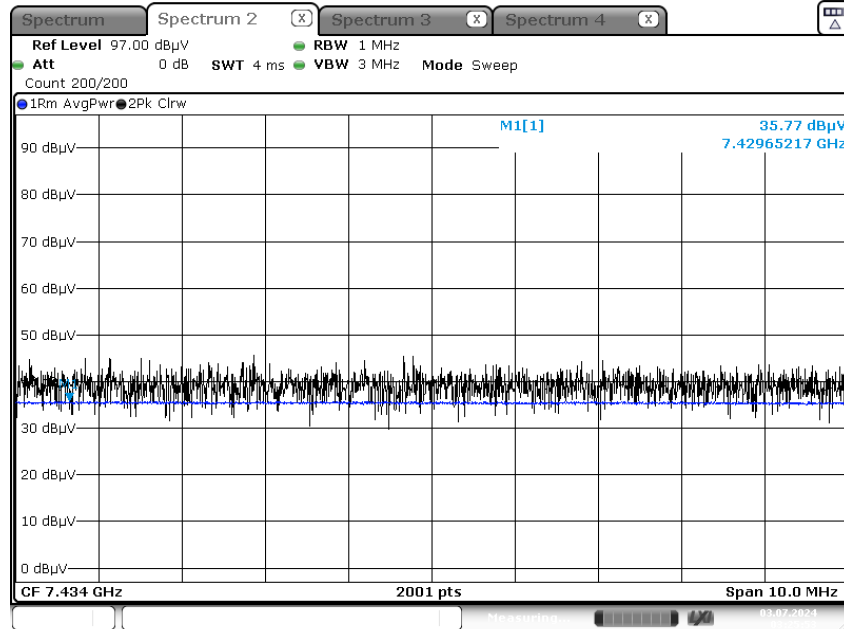
**Note:**

Plots of worst case are only reported.

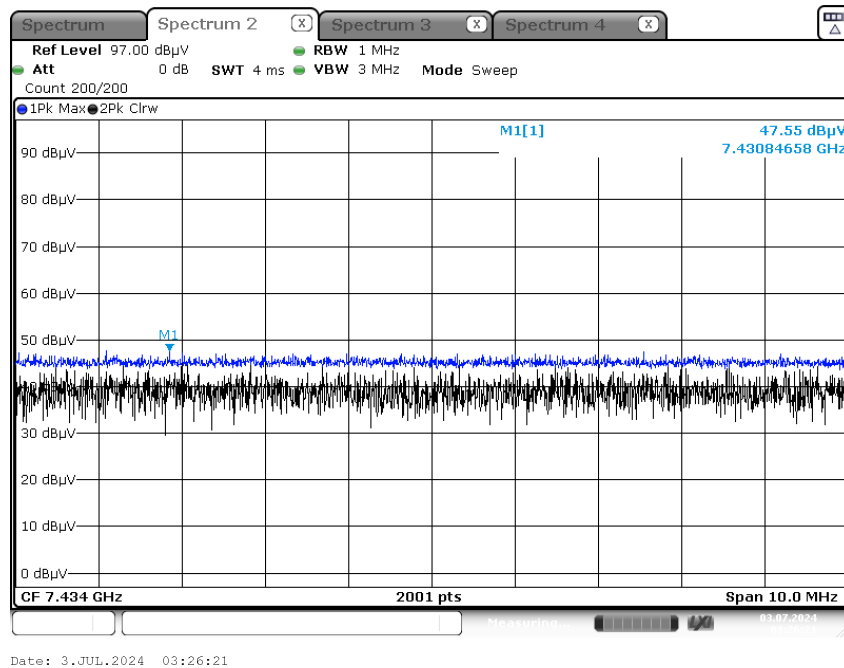
[Ant.2]

2 M Bit/s 37 Bytes Test Plots

Radiated Spurious Emissions plot – Average Result (Ch.36 3rd Harmonic, Y-H)



Radiated Spurious Emissions plot – Peak Result (Ch.36 3rd Harmonic, Y-H)



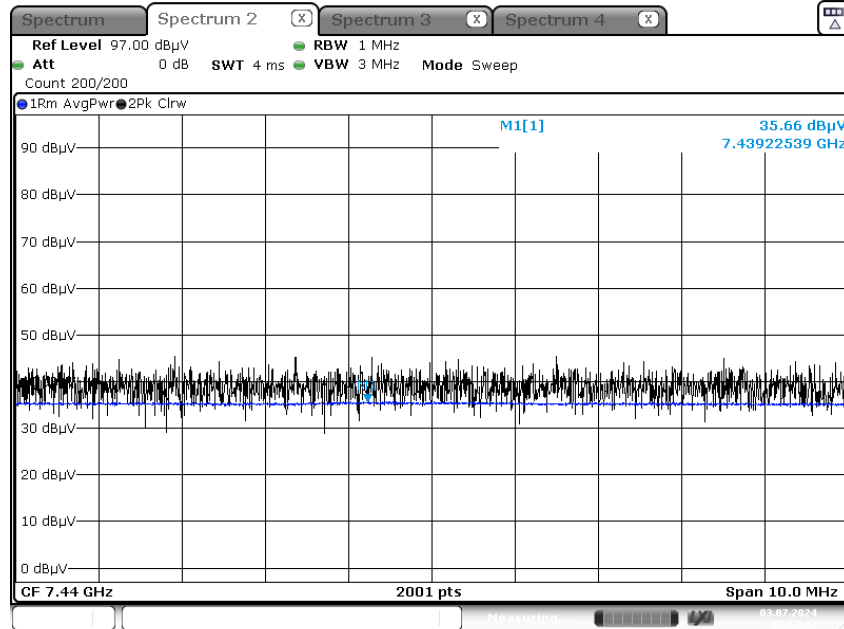
**Note:**

Plots of worst case are only reported.

[Dual Ant.1+ Ant.2]

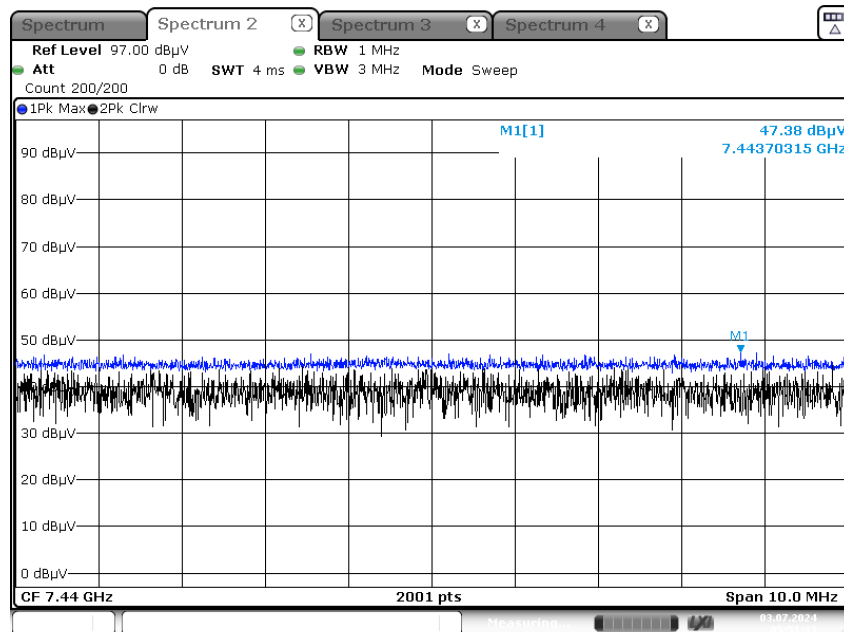
1 M Bit/s 37 Bytes Test Plots

Radiated Spurious Emissions plot – Average Result (Ch.39 3rd Harmonic, Y-H)



Date: 3.JUL.2024 05:51:14

Radiated Spurious Emissions plot – Peak Result (Ch.39 3rd Harmonic, Y-H)



Date: 3.JUL.2024 05:51:33

**Note:**

Plots of worst case are only reported.



## 9.7 RADIATED RESTRICTED BAND EDGES

[Ant.1]

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2402 MHz, 2480 MHz
Channel No.	37 CH, 39 CH

Frequency	Measured Value	A.F+C.L	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
2390.0	55.00	-	H	55.00	73.98	18.98	PK
2390.0	42.58	-	H	42.58	53.98	11.40	AV
2390.0	55.03	-	V	55.03	73.98	18.95	PK
2390.0	42.96	-	V	42.96	53.98	11.02	AV
2483.5	63.64	-	H	63.64	73.98	10.34	PK
2483.5	45.21	-	H	45.21	53.98	8.77	AV
2483.5	62.76	-	V	62.76	73.98	11.22	PK
2483.5	45.19	-	V	45.19	53.98	8.79	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2404 MHz, 2478 MHz
Channel No.	0 CH, 36 CH

Frequency	Measured Value	A.F+C.L	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
2390.0	55.42	-	H	55.42	73.98	18.56	PK
2390.0	42.67	-	H	42.67	53.98	11.31	AV
2390.0	55.50	-	V	55.50	73.98	18.48	PK
2390.0	42.94	-	V	42.94	53.98	11.04	AV
2483.5	60.12	-	H	60.12	73.98	13.86	PK
2483.5	44.42	-	H	44.42	53.98	9.56	AV
2483.5	59.93	-	V	59.93	73.98	14.05	PK
2483.5	44.29	-	V	44.29	53.98	9.69	AV

**[Ant.2]**

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2402 MHz, 2480 MHz
Channel No.	37 CH, 39 CH

Frequency	Measured Value	A.F+C.L	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
2390.0	54.94	0.00	H	54.94	73.98	19.04	PK
2390.0	42.91	0.00	H	42.91	53.98	11.07	AV
2390.0	54.76	0.00	V	54.76	73.98	19.22	PK
2390.0	42.65	0.00	V	42.65	53.98	11.33	AV
2483.5	62.94	0.00	H	62.94	73.98	11.04	PK
2483.5	44.96	0.00	H	44.96	53.98	9.02	AV
2483.5	62.84	0.00	V	62.84	73.98	11.14	PK
2483.5	44.65	0.00	V	44.65	53.98	9.33	AV

Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2404 MHz, 2478 MHz
Channel No.	0 CH, 36 CH

Frequency	Measured Value	A.F+C.L	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
2390.0	54.98	0.00	H	54.98	73.98	19.00	PK
2390.0	42.85	0.00	H	42.85	53.98	11.13	AV
2390.0	54.84	0.00	V	54.84	73.98	19.14	PK
2390.0	42.68	0.00	V	42.68	53.98	11.30	AV
2483.5	59.66	0.00	H	59.66	73.98	14.32	PK
2483.5	44.22	0.00	H	44.22	53.98	9.76	AV
2483.5	59.15	0.00	V	59.15	73.98	14.83	PK
2483.5	44.18	0.00	V	44.18	53.98	9.80	AV

**[Dual Ant.1+ Ant.2]**

Operation Mode	1 M Bit/s (37 Bytes)
Operating Frequency	2402 MHz, 2480 MHz
Channel No.	37 CH, 39 CH

Frequency	Measured Value	A.F+C.L	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
2390.0	55.15	-	H	55.15	73.98	18.83	PK
2390.0	42.75	-	H	42.75	53.98	11.23	AV
2390.0	55.02	-	V	55.02	73.98	18.96	PK
2390.0	42.61	-	V	42.61	53.98	11.37	AV
2483.5	61.57	-	H	61.57	73.98	12.41	PK
2483.5	44.27	-	H	44.27	53.98	9.71	AV
2483.5	61.08	-	V	61.08	73.98	12.90	PK
2483.5	44.18	-	V	44.18	53.98	9.80	AV

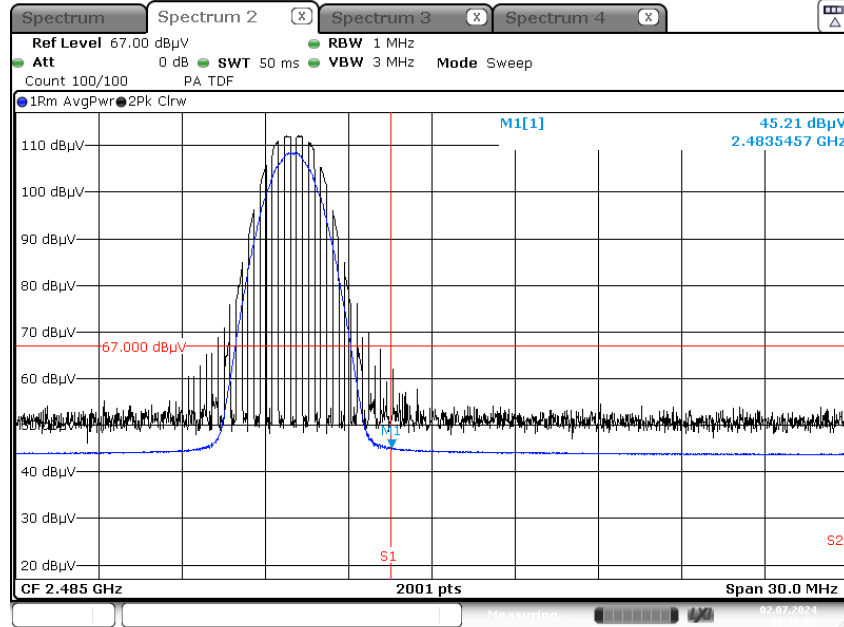
Operation Mode	2 M Bit/s (37 Bytes)
Operating Frequency	2404 MHz, 2478 MHz
Channel No.	0 CH, 36 CH

Frequency	Measured Value	A.F+C.L	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dB $\mu$ V]	[dB/m]	[H/V]	[dB $\mu$ V/m]	[dB $\mu$ V/m]	[dB]	
2390.0	54.64	-	H	54.64	73.98	19.34	PK
2390.0	42.69	-	H	42.69	53.98	11.29	AV
2390.0	54.42	-	V	54.42	73.98	19.56	PK
2390.0	42.58	-	V	42.58	53.98	11.40	AV
2483.5	58.52	-	H	58.52	73.98	15.46	PK
2483.5	43.88	-	H	43.88	53.98	10.10	AV
2483.5	58.48	-	V	58.48	73.98	15.50	PK
2483.5	43.29	-	V	43.29	53.98	10.69	AV

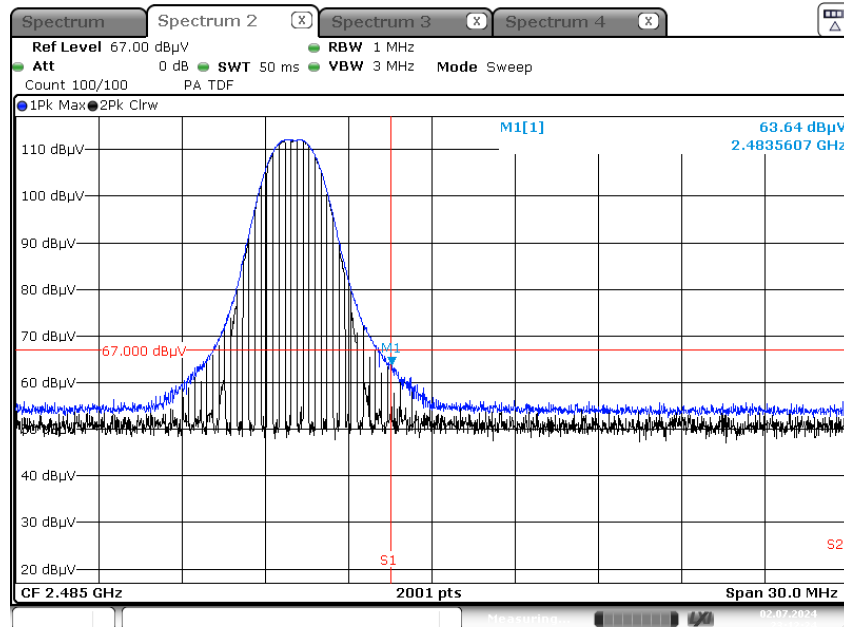
[Ant.1]

Mode : 1 M Bit/s (37 Bytes) Test Plots

Radiated Restricted Band Edges plot – Average Result (Ch.39, X-H)



Radiated Restricted Band Edges plot – Peak Result (Ch.39, X-H)



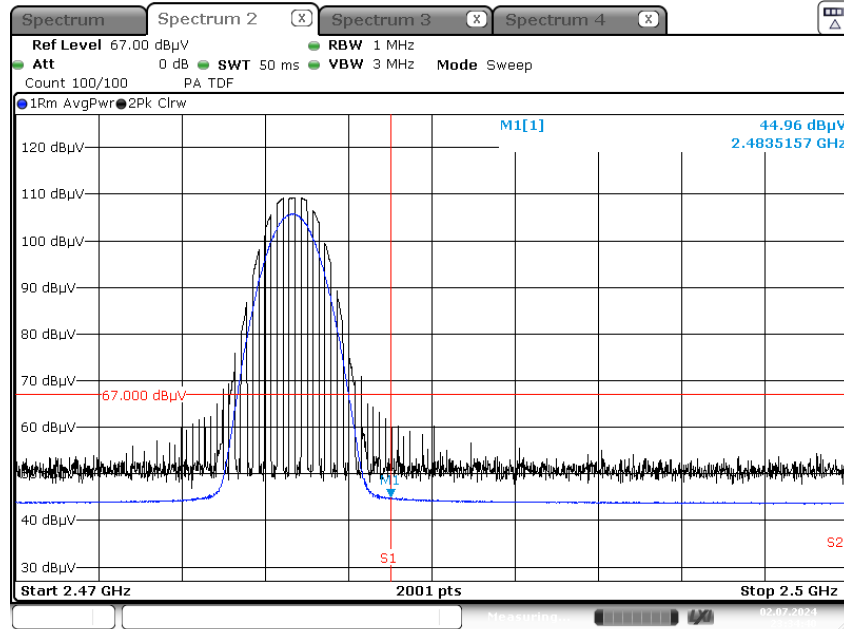
**Note:**

In order to simplify the report, Plot of worst case are only reported.

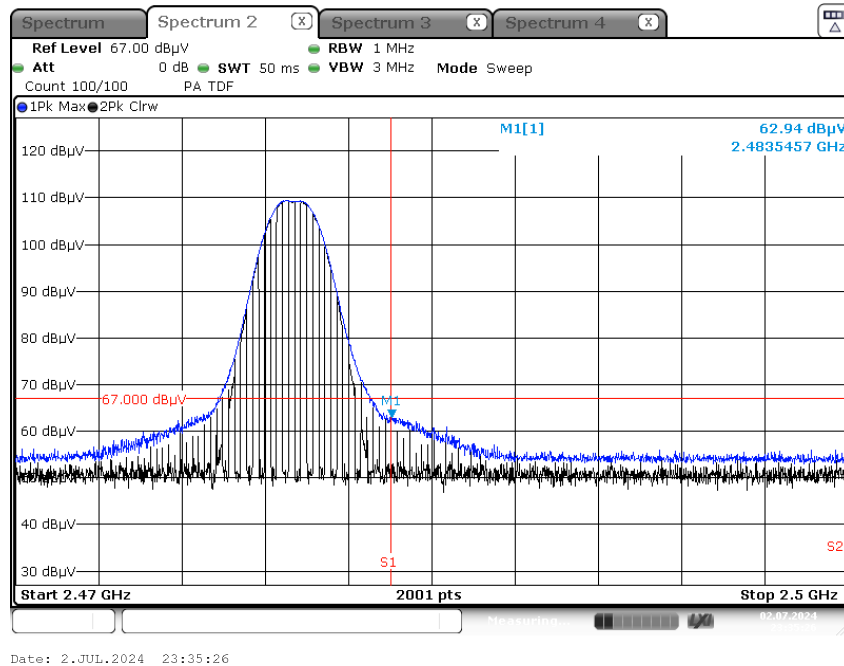
[Ant.2]

Mode : 1 M Bit/s (37 Bytes) Test Plots

Radiated Restricted Band Edges plot – Average Result (Ch.39, Y-H)



Radiated Restricted Band Edges plot – Peak Result (Ch.39, Y-H)



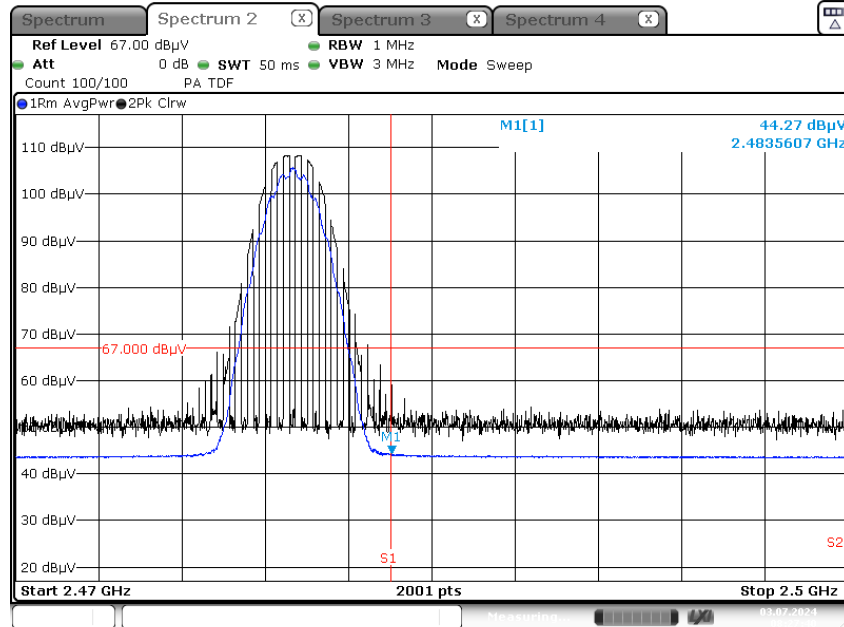
**Note:**

In order to simplify the report, Plot of worst case are only reported.

[Dual Ant.1+ Ant.2]

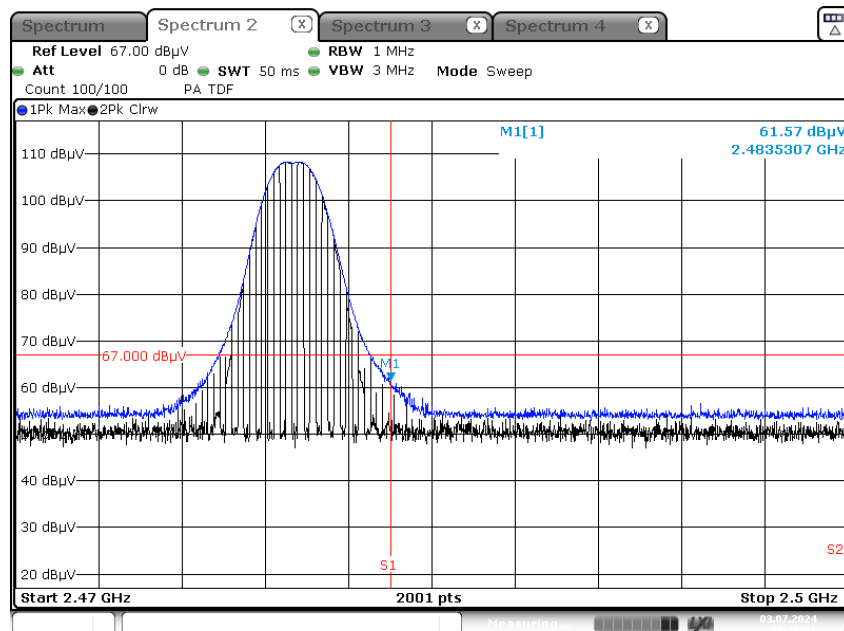
Mode : 1 M Bit/s (37 Bytes) Test Plots

Radiated Restricted Band Edges plot – Average Result (Ch.39, X-H)



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Radiated Restricted Band Edges plot – Peak Result (Ch.39, X-H)



Date: 3.JUL.2024 08:28:21

**Note:**

In order to simplify the report, Plot of worst case are only reported.

## 9.8 POWERLINE CONDUCTED EMISSIONS

### Conducted Emissions

Test

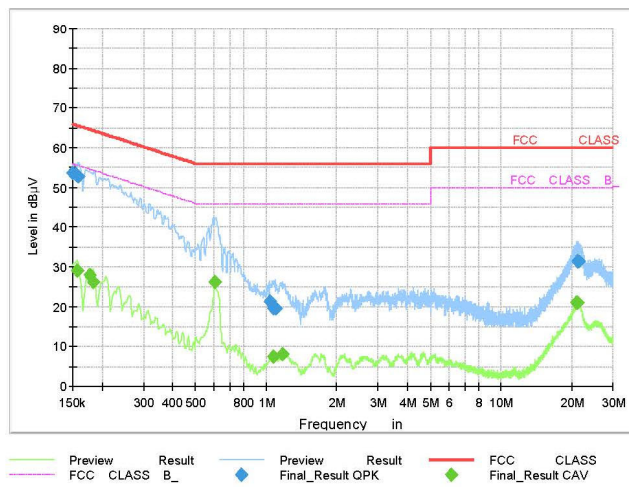
1 / 2

## Test Report

### Common Information

EUT : SM-S721B/DS  
 Operating Conditions : BLE Mode  
 Comment :

Full Spectrum



### Final Result QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1500	53.71	66.00	12.29	9.000	L1	9.6
0.1545	53.37	65.75	12.39	9.000	L1	9.6
0.1590	52.70	65.52	12.81	9.000	N	9.6
1.0378	21.37	56.00	34.63	9.000	L1	9.7
1.0738	19.71	56.00	36.29	9.000	L1	9.7
1.0940	19.71	56.00	36.29	9.000	L1	9.7
21.1258	31.44	60.00	28.56	9.000	L1	10.4
21.3733	31.34	60.00	28.66	9.000	L1	10.4
21.3980	31.43	60.00	28.57	9.000	L1	10.4

2024-07-10

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Test

2 / 2

**Final Result\_CAV**

Frequency (MHz)	CAverage (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.1568	29.27	55.63	26.36	9.000	N	9.6
0.1770	28.01	54.63	26.61	9.000	L1	9.6
0.1838	26.15	54.31	28.17	9.000	N	9.6
0.6080	26.34	46.00	19.66	9.000	L1	9.6
1.0783	7.37	46.00	38.63	9.000	L1	9.7
1.1705	8.10	46.00	37.90	9.000	L1	9.7
20.9773	20.92	50.00	29.08	9.000	L1	10.4
21.0020	21.06	50.00	28.94	9.000	L1	10.4
21.0515	20.94	50.00	29.06	9.000	L1	10.4

2024-07-10

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## 10. LIST OF TEST EQUIPMENT

### Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	07/17/2025	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	07/02/2025	Annual
Temperature Chamber	SU-642	ESPEC	93008124	02/19/2025	Annual
Signal Analyzer	N9030A	Keysight	MY55410508	09/04/2024	Annual
Power Meter	N1911A	Agilent	MY45100523	02/28/2025	Annual
Power Sensor	N1921A	Agilent	MY57820067	02/22/2025	Annual
Directional Coupler	87300B	Agilent	3116A03621	10/30/2024	Annual
Power Splitter	11667B	Hewlett Packard	10545	02/06/2025	Annual
DC Power Supply	E3632A	Agilent	KR01009150	04/18/2025	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C-010	Agilent	08285	05/28/2025	Annual
Attenuator(20 dB)	18N-20dB	Rohde & Schwarz	8	02/20/2025	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	N/A	N/A	N/A
Bluetooth Tester	CBT	Rohde & Schwarz	100808	02/15/2025	Annual

### Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

**Radiated Test**

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller (Antenna mast & Turn Table)	CO3000	Innco system	CO3000/ 15421/57580623/G	N/A	N/A
Antenna Position Tower	MA4640	Innco system	9320422	04/05/2025	Biennial
Turn Table	N/A	Innco system	5930623	N/A	N/A
Loop Antenna	FMZB 1513	Schwarzbeck	1513-175	01/16/2025	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-1135	08/16/2024	Biennial
Horn Antenna	HF907	Rohde & Schwarz	103224	05/07/2026	Biennial
Horn Antenna (15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Amp & Filter Bank Switch Controller	FBSM-01B	T&M system	TM2009001	N/A	N/A
Band Reject Filter	WRCJV2400/2483.5- 2370/2520-60/12SS	Wainwright Instruments	2	01/02/2025	Annual
Band Reject Filter	WRCJV12-4900-5100- 5900-6100-50SS	Wainwright Instruments	5	06/04/2025	Annual
Band Reject Filter	WRCJV12-4900-5100- 5900-6100-50SS	Wainwright Instruments	6	06/04/2025	Annual
Band Reject Filter	WRCJV5100/5850- 40/50-8EEK	Wainwright Instruments	1	02/14/2025	Annual
RF Switching System	FMSR-05B (HPF(3~18GHz) + LNA1(1~18GHz))	T&M system	S5L1	03/12/2025	Annual
RF Switching System	FMSR -05B (ATT(10dB) + LNA1(1~18GHz))	T&M system	S5L2	03/12/2025	Annual
RF Switching System	FMSR -05B (ATT(3dB) + LNA1(1~18GHz))	T&M system	S5L3	03/12/2025	Annual
RF Switching System	FMSR -05B (LNA1(1~18GHz))	T&M system	S5L4	03/12/2025	Annual
RF Switching System	FMSR -05B (HPF(7~18GHz) + LNA2(6~18GHz))	T&M system	S5L5	03/12/2025	Annual
RF Switching System	FMSR -05B (Thru(30MHz ~ 18GHz))	T&M system	S5L6	03/12/2025	Annual
Power Amplifier	CBL18265035	CERNEX	22966	11/17/2024	Annual
Power Amplifier	CBL26405040	CERNEX	25956	02/26/2025	Annual
Bluetooth Tester	TC-3000C	TESCOM	3000C000175	03/19/2025	Annual
Spectrum Analyzer	FSV40 (9 kHz ~ 40 GHz)	Rohde & Schwarz	101510	03/28/2025	Annual

**Note:**

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is

completed before equipment expiration date.

3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

## 11. ANNEX A\_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2407-FC079-P