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FCC BT LE REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
November 22, 2022

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2211-FC028

FCC ID:	**A3LSMA146M**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model:	SM-A146M/DS
Additional Model:	SM-A146M
EUT Type:	Mobile Phone
Average Output Power:	11.48 dBm (14.06 mW)
Frequency Range:	2 402 MHz ~ 2 480 MHz
Modulation type	GFSK
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247

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.

REVIEWED BY

Report prepared by : Kyung Jun Woo
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2211-FC028	November 22, 2022	- First Approval Report

Table of Contents

1. EUT DESCRIPTION

Model	SM-A146M/DS	
Additional Model	SM-A146M	
EUT Type	Mobile Phone	
Power Supply	DC 4.2 V	
Frequency Range	2 402 MHz ~ 2 480 MHz	
Max. RF Output Power (Normal)	Peak (For information only)	1 M Bit/s: 8.034 dBm (6.36 mW) 2 M Bit/s: 11.754 dBm (14.98 mW) 125 k Bit/s : 8.024 dBm (6.34 mW) 500 k Bit/s : 8.027 dBm (6.35 mW)
	Average	1 M Bit/s: 7.89 dBm (6.15 mW) 2 M Bit/s: 11.48 dBm (14.06 mW) 125k Bit/s : 7.88 dBm (6.14 mW) 500k Bit/s : 7.88 dBm (6.14 mW)
Modulation Type	GFSK	
Bluetooth Version	5.2	
Number of Channels	40 Channels	
Date(s) of Tests	October 04, 2022 ~ November 18, 2022	
Serial number	Radiated: R93T900CNST Conducted : R93T8000K9P	

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 April 02, 2018 (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.

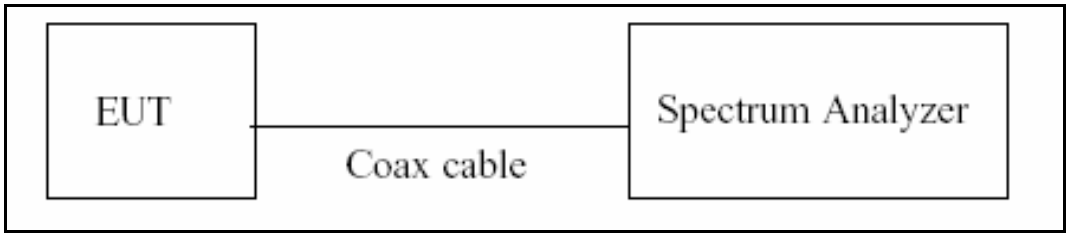
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.00 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.48 (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 ≤ 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*.

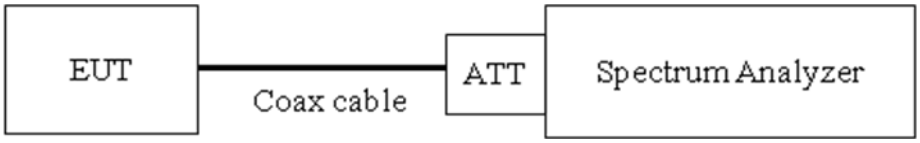
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

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)

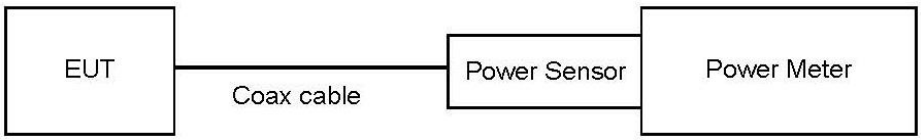
1) RBW = 100 kHz
2) VBW ≥ 3 x RBW
3) Detector = Peak
4) Trace mode = max hold
5) Sweep = auto couple
6) Allow the trace to stabilize
7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

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

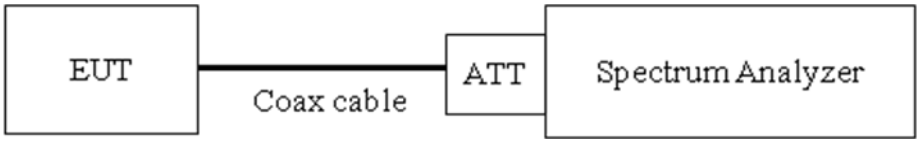
▪ Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

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) RBW = 3 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x 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 ≥ [2 ×span / 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

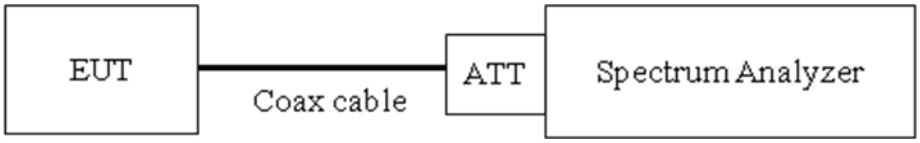
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

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 ≥ 3 x 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 ≥ 2 x 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)	Factor(dB)
30	10.35
100	10.39
200	10.44
300	10.48
400	10.54
500	10.54
600	10.54
700	10.57
800	10.58
900	10.59
1000	10.64
2000	10.79
2400	10.85
2500	10.85
3000	10.85
4000	10.85
5000	10.83
6000	10.95
7000	11.01
8000	11.10
9000	11.17
10000	11.17
11000	11.38
12000	11.50
13000	11.49
14000	11.58
15000	11.68
16000	11.77
17000	11.86
18000	11.87
19000	11.91
20000	12.00
21000	12.09
22000	12.28
23000	12.42
24000	12.34
25000	12.01
26000	12.14

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

2. Factor = Attenuator loss + Cable loss

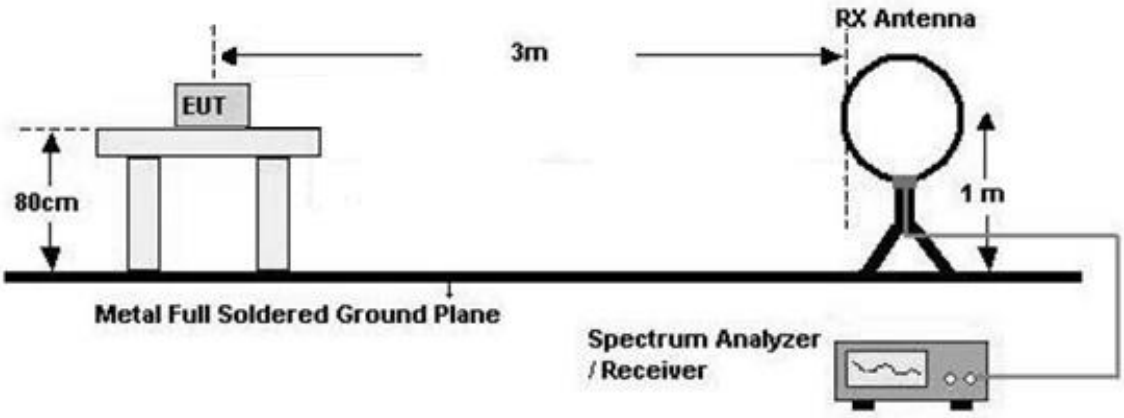
7.6. Radiated Test

Limit

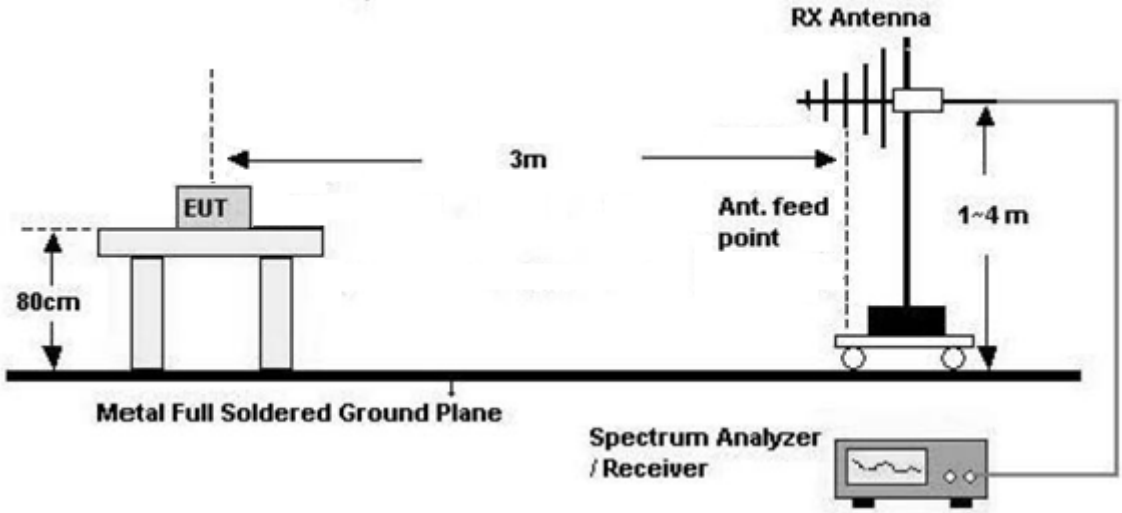
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

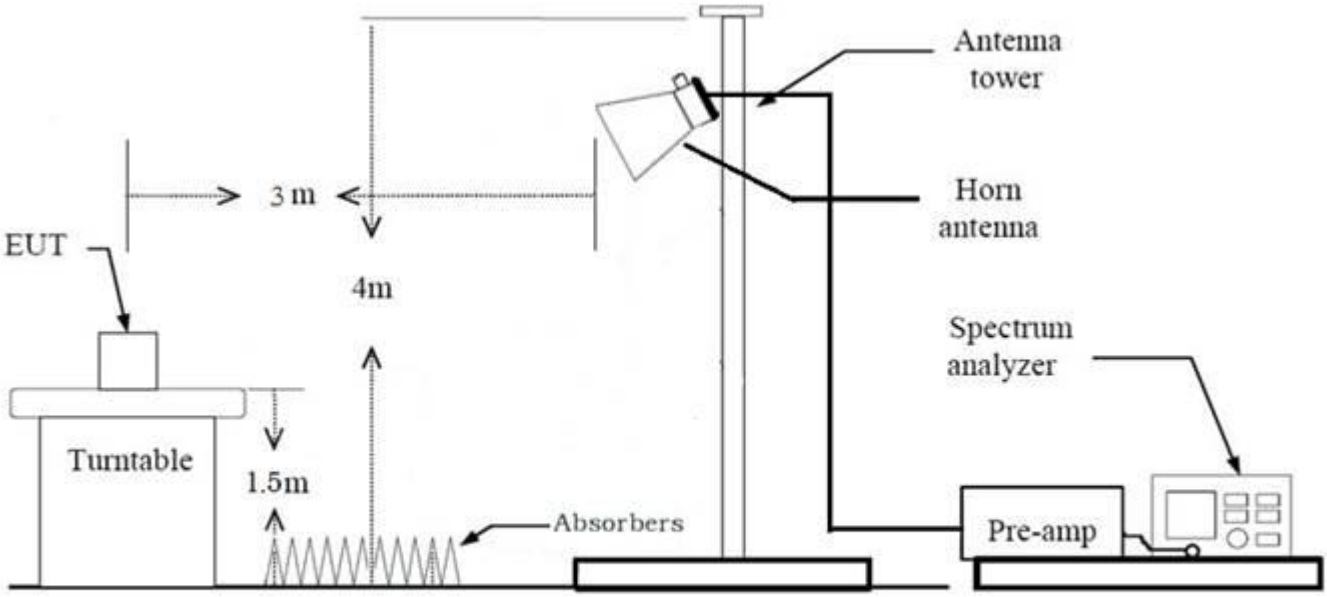
Below 30 MHz



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) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x 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 = Maxhold
      - RBW = 100 kHz
      - VBW ≥ 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 ≥ 3 x RBW

   (2) Measurement Type(Average):
   - Duty cycle < 98 %, duty cycle variations are less than ±2 %
   - Measured Frequency Range : 1 GHz – 25 GHz
   - Detector = RMS
   - Averaging type = power (*i.e.*, RMS)
   - RBW = 1 MHz
   - VBW ≥ 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 = 20log (test distance / 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) + Duty Cycle Factor

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 ≥ 3 x RBW

   (2) Measurement Type(Average):
   - Duty cycle < 98 %, duty cycle variations are less than ±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 ≥ 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 = 20log (test distance / specific distance) (dB)
11. Total(Measurement Type : Peak)

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

Total(Measurement Type : Average)

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

#Note : Used Average measurement method accroding 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[a]	56 to 46[a]
0.50 to 5	56	46
5 to 30	60	50

[a]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:
   - Radiated Spurious Emissions : X
   - 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 1MHz 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
6. SM-A146M/DS, SM-A146M were tested and the worst case results are reported.

(Worst case : SM-A146M/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-A146M/DS, SM-A146M were tested and the worst case results are reported.

(Worst case : SM-A146M/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-A146M/DS, SM-A146M were tested and the worst case results are reported.

(Worst case : SM-A146M/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

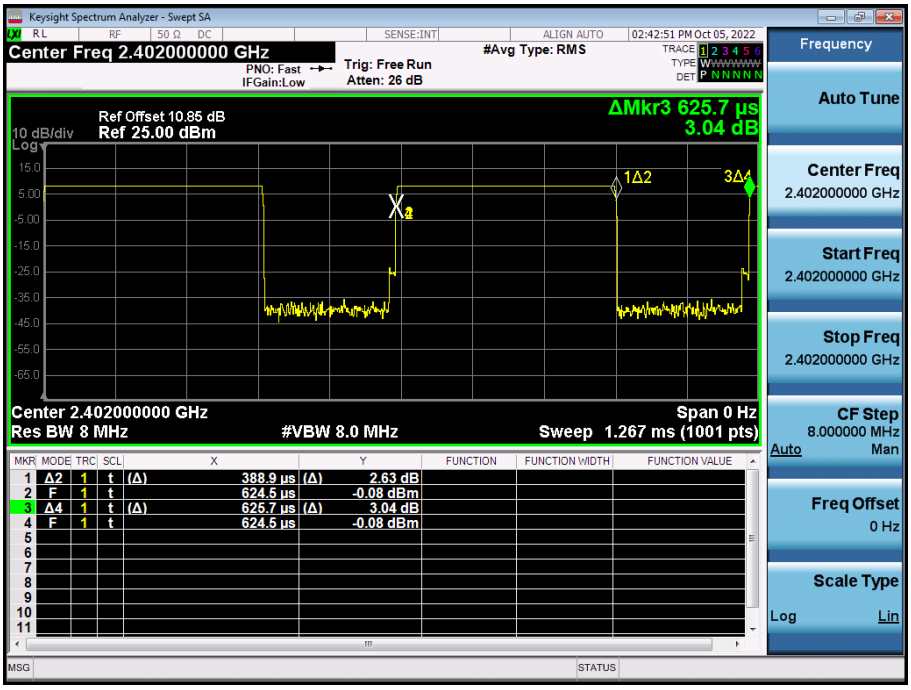
9. TEST RESULT

9.1 DUTY CYCLE

Data rate (Bit/s)	Packet length (Byte)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
1M	37	0.389	0.626	0.6215	2.07
	255	2.135	2.500	0.8540	0.69
2M	37	0.203	0.624	0.3245	4.89
	255	1.074	1.877	0.5723	2.42
125k	37	3.100	3.753	0.8259	0.83
	255	17.067	17.500	0.9752	0.11
500k	37	1.064	1.872	0.5684	2.45
	255	4.550	5.000	0.9100	0.41

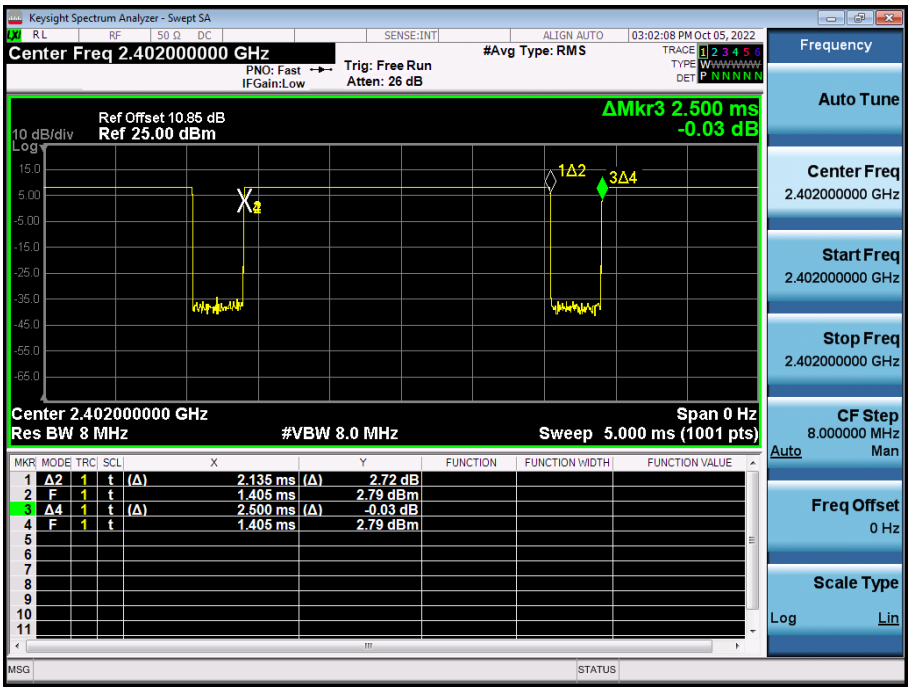
▣ 1 M Bit/s (37 Byte) Test Plots

Duty Cycle (Low-CH 0)



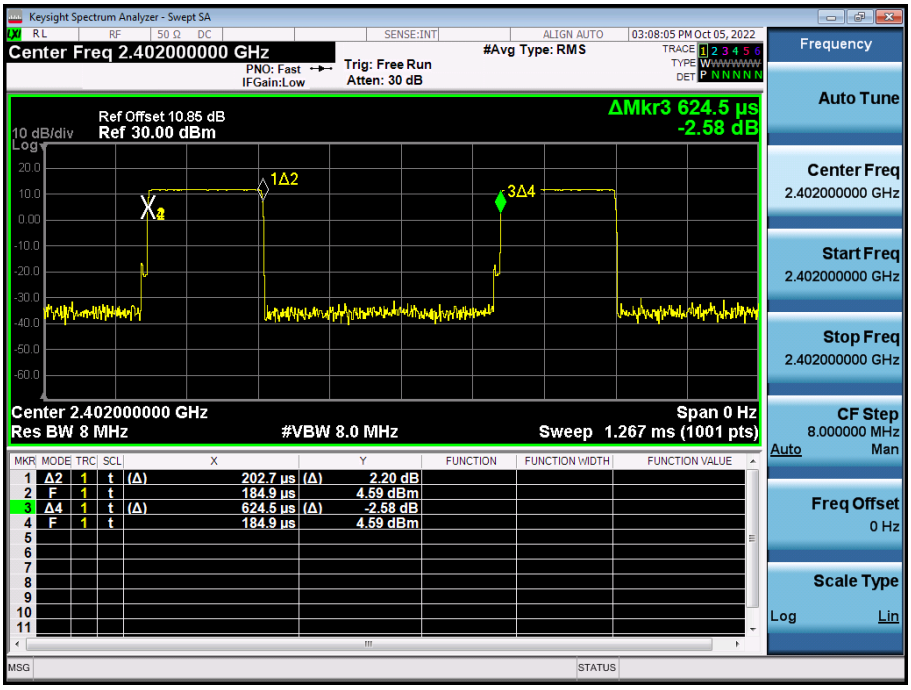
▣ 1 M Bit/s (255 Byte) Test Plots

Duty Cycle (Low-CH 0)



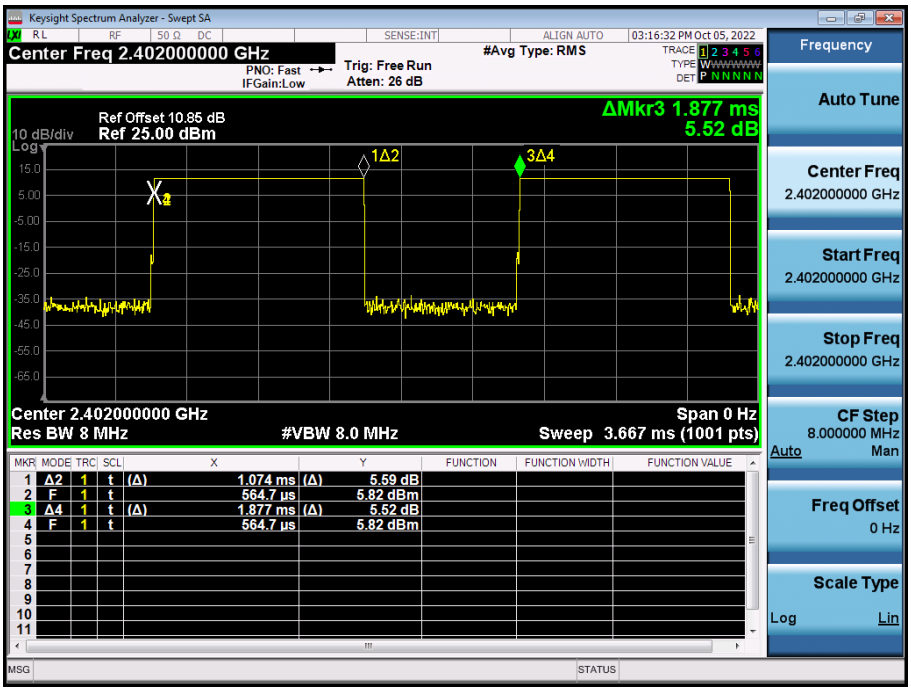
▣ 2 M Bit/s (37 Byte) Test Plots

Duty Cycle (Low-CH 0)



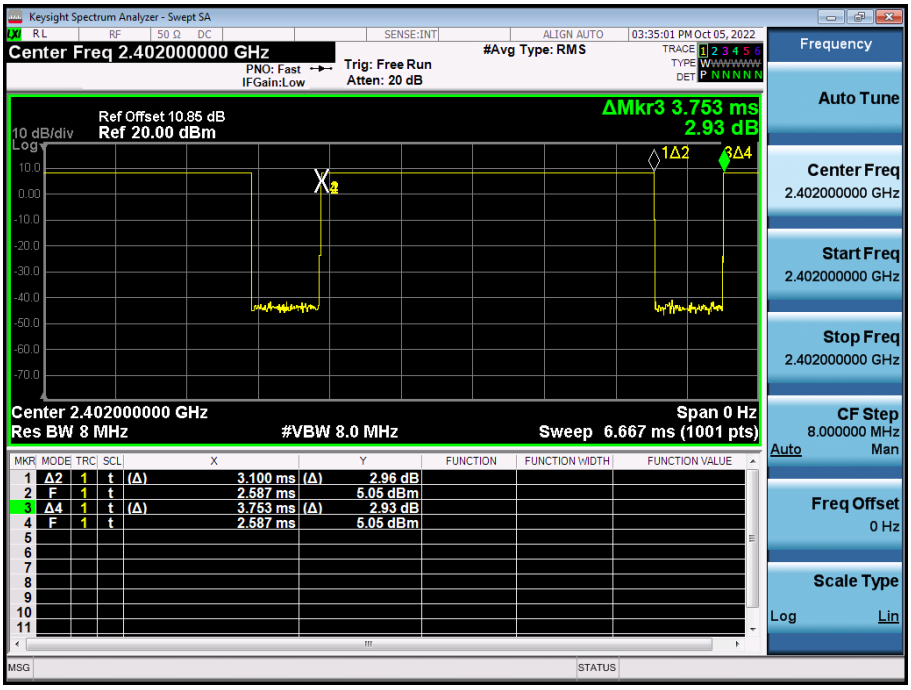
▣ 2 M Bit/s (255 Byte) Test Plots

Duty Cycle (Low-CH 0)



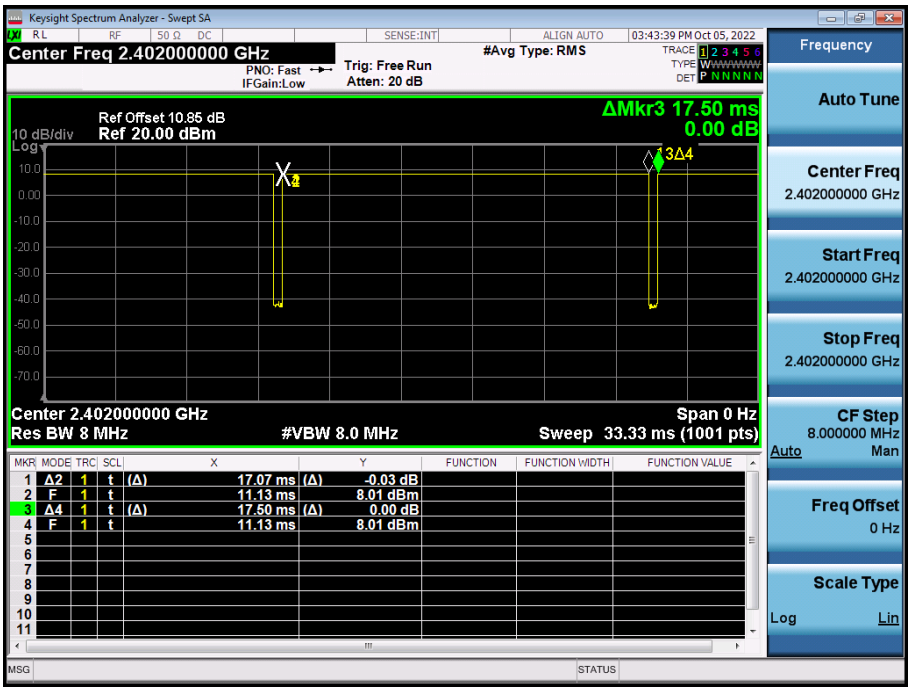
▣ 125 k Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



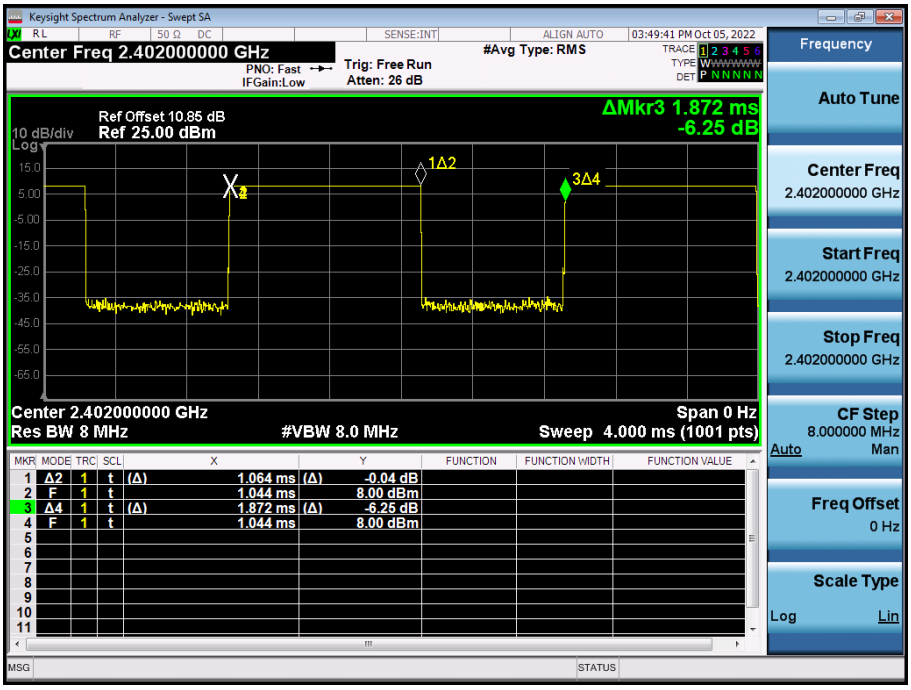
▣ 125 k Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)



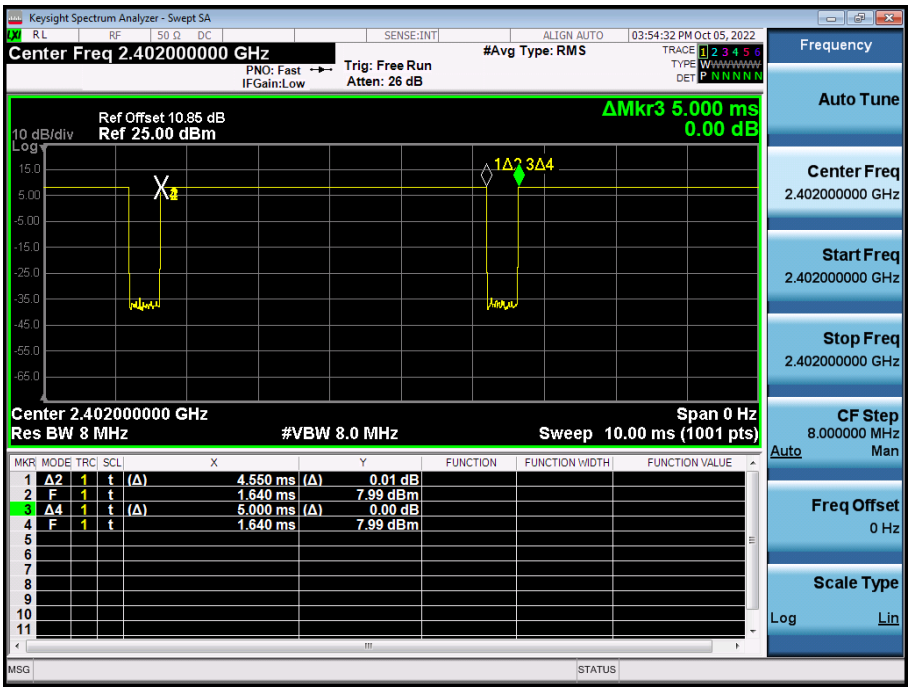
▣ 500 k Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



▣ 500 k Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)



9.2 6 dB BANDWIDTH

Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
1M(37)	0	709.4	> 500
	19	701.3	
	39	703.8	
1M(255)	0	674.4	> 500
	19	674.4	
	39	673.8	
2M(37)	0	1143.5	> 500
	19	1140.8	
	39	1139.5	
2M(255)	0	1157.4	> 500
	19	1150.0	
	39	1165.8	
125k(37)	0	661.3	> 500
	19	651.9	
	39	660.3	
125k(255)	0	645.0	> 500
	19	653.7	
	39	649.6	
500k(37)	0	666.4	> 500
	19	672.6	
	39	668.6	
500k(255)	0	681.2	> 500
	19	669.3	
	39	689.8	

Note:

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

1M Bit/s: 255 Byte

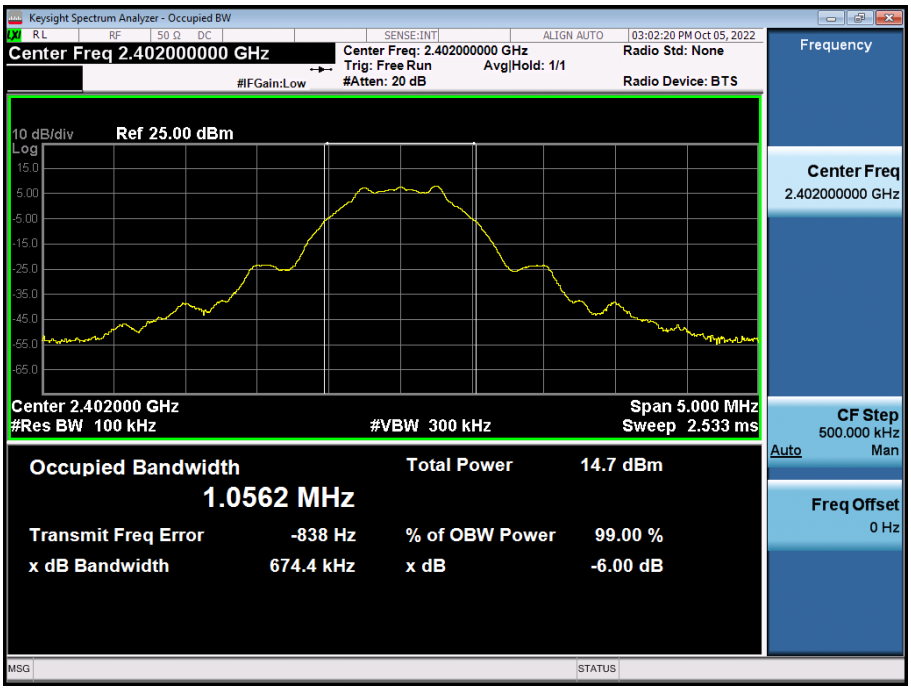
2M Bit/s: 37 Byte

125k Bit/s: 255 Byte

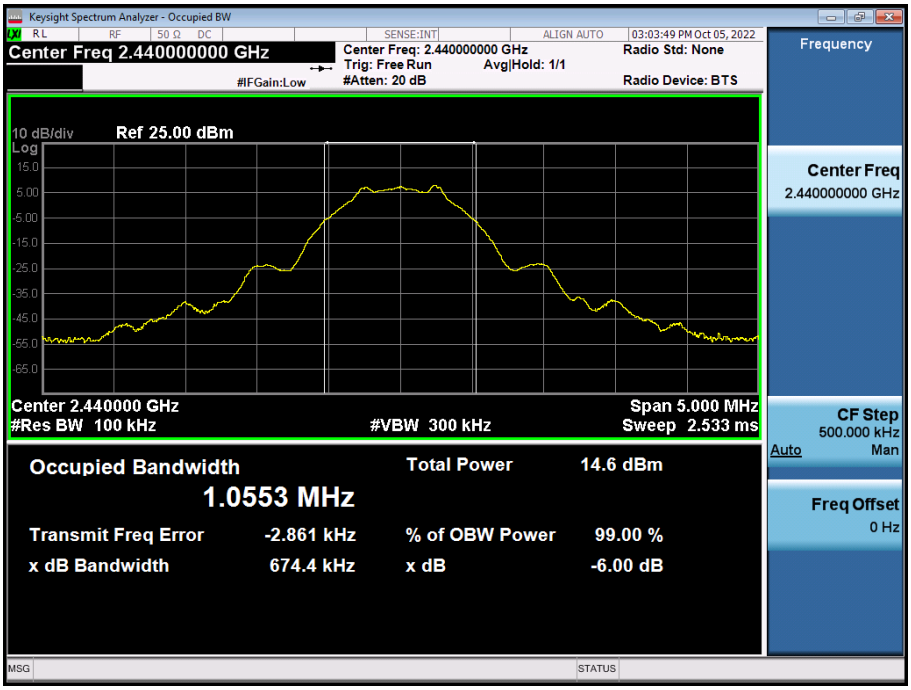
500k Bit/s: 37 Byte

▣ 1 MBit/s (255 Byte) Test Plots

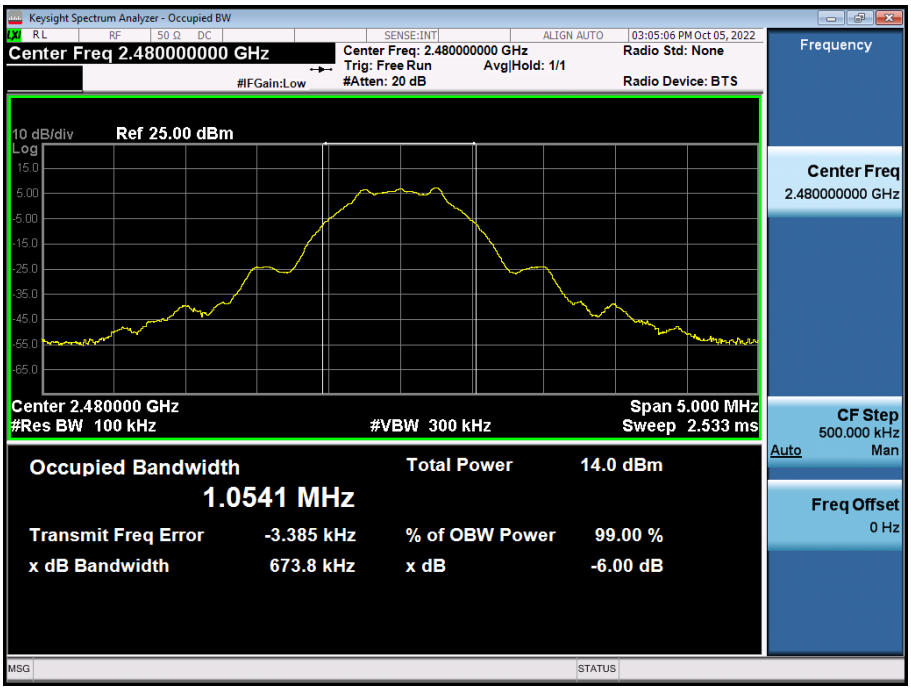
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

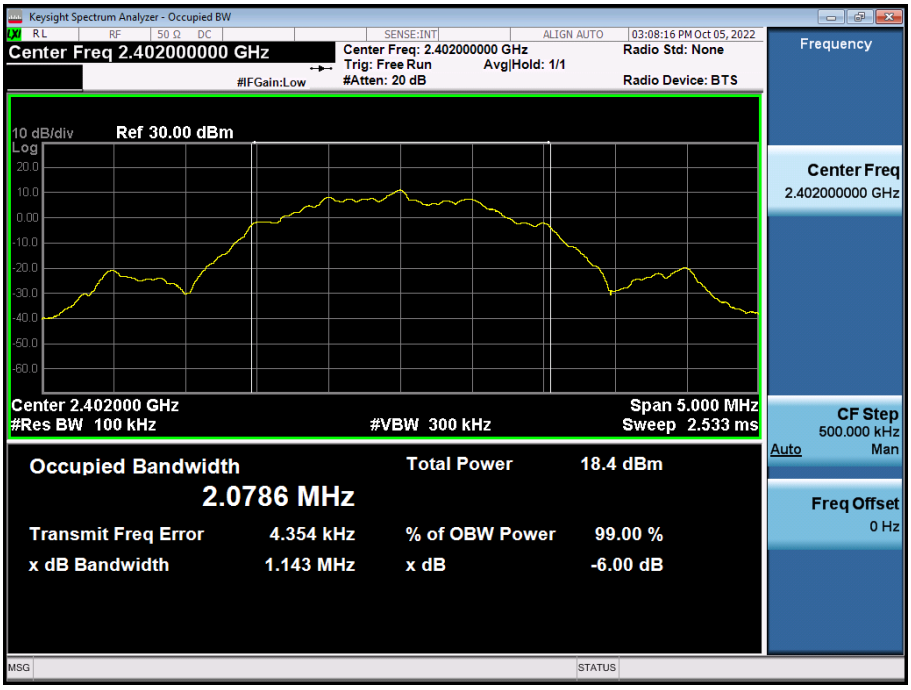


6 dB Bandwidth plot (High-CH 39)

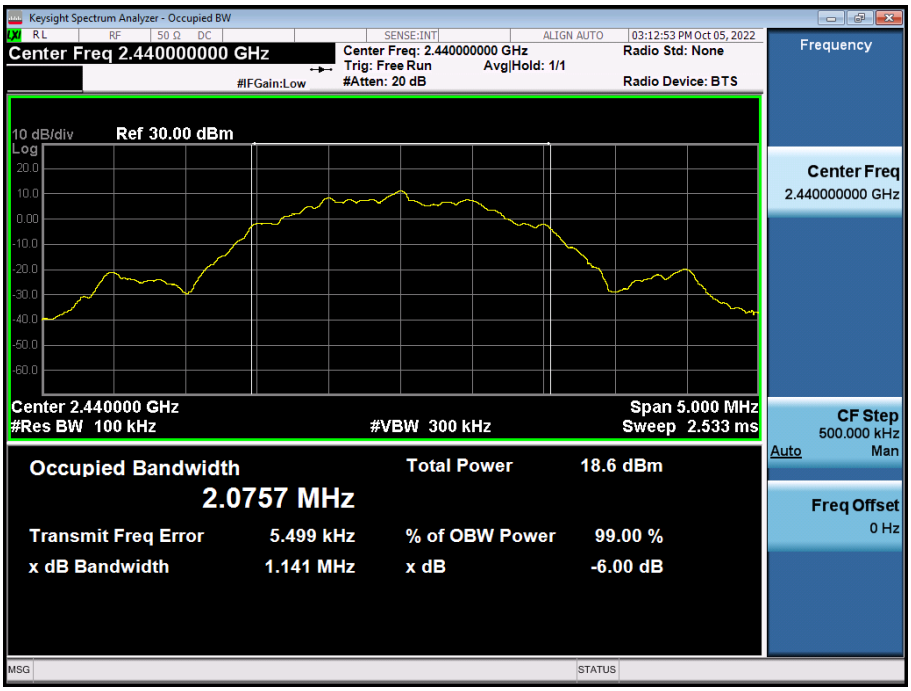


▣ 2 MBit/s (37 Byte) Test Plots

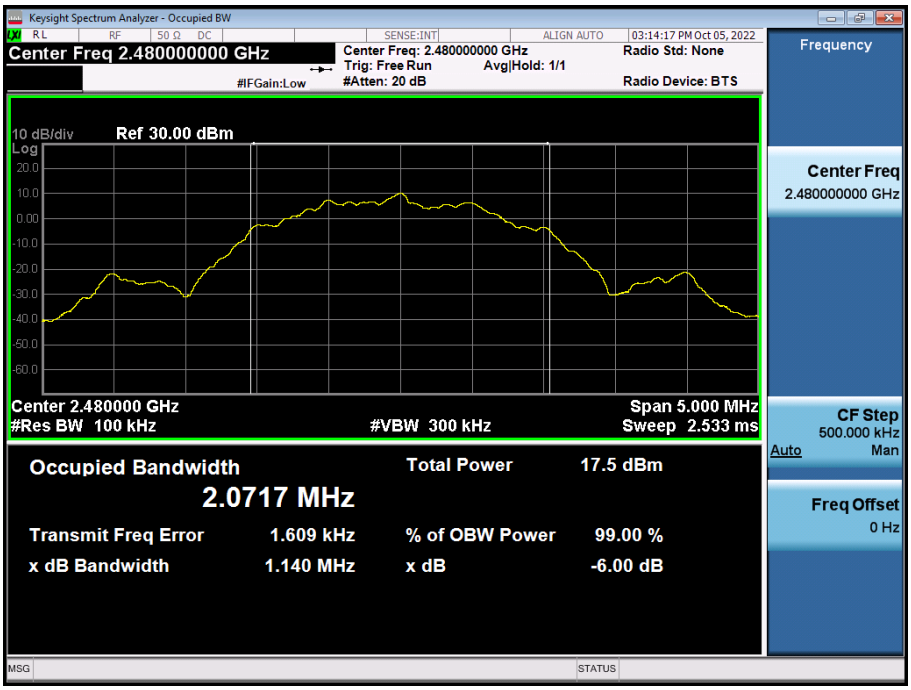
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

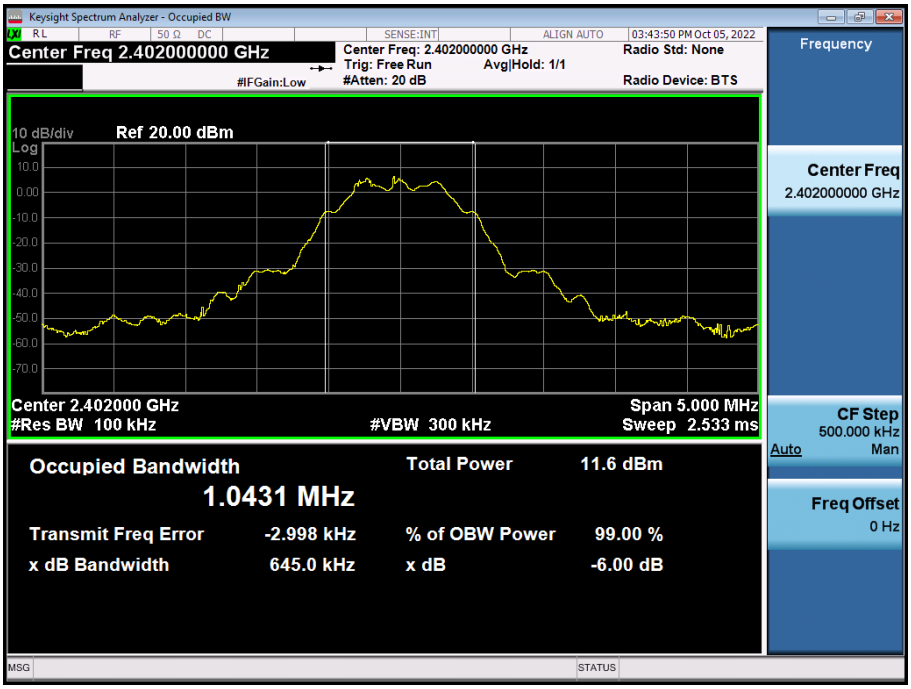


6 dB Bandwidth plot (High-CH 39)

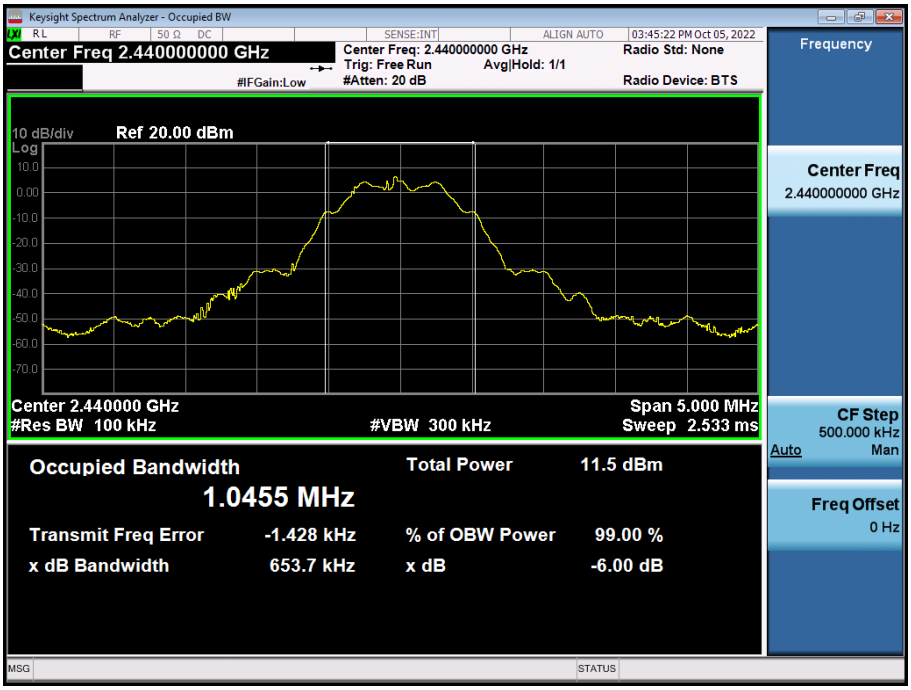


▣ 125k Bit/s(255 Byte) Test Plots

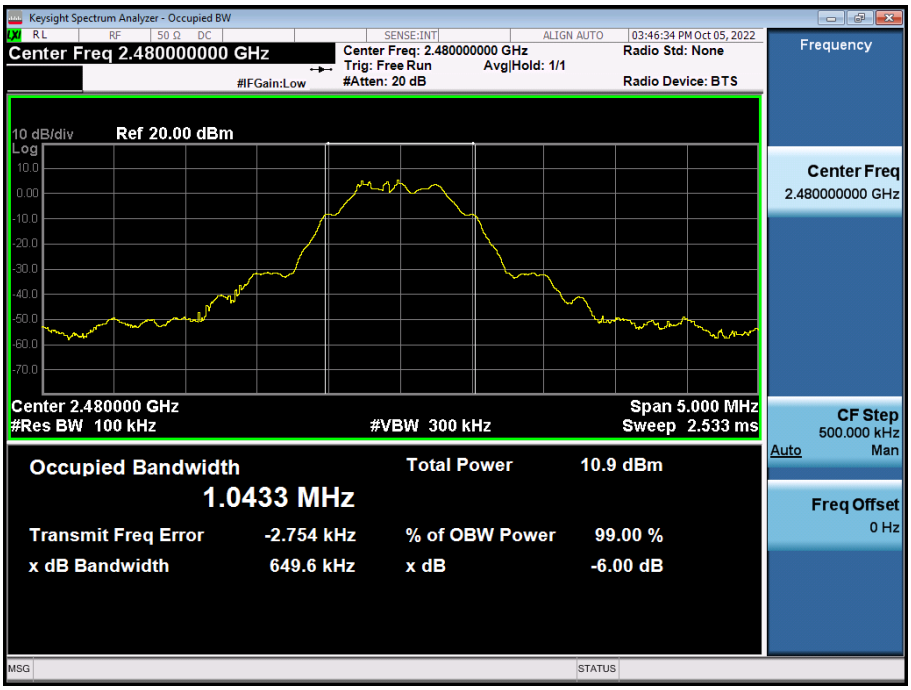
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

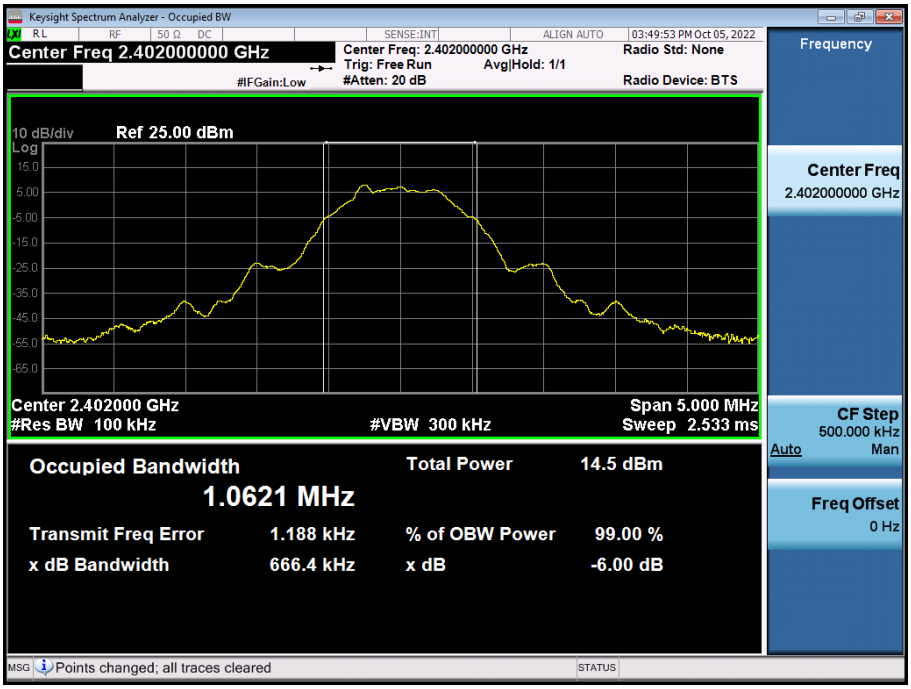


6 dB Bandwidth plot (High-CH 39)

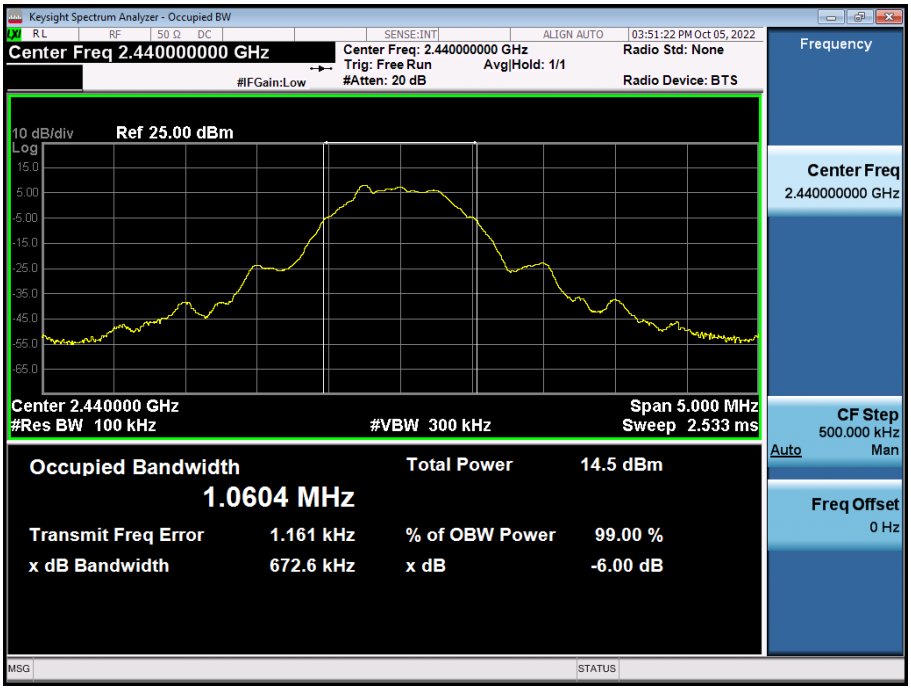


▣ 500k Bit/s(37 Byte) Test Plots

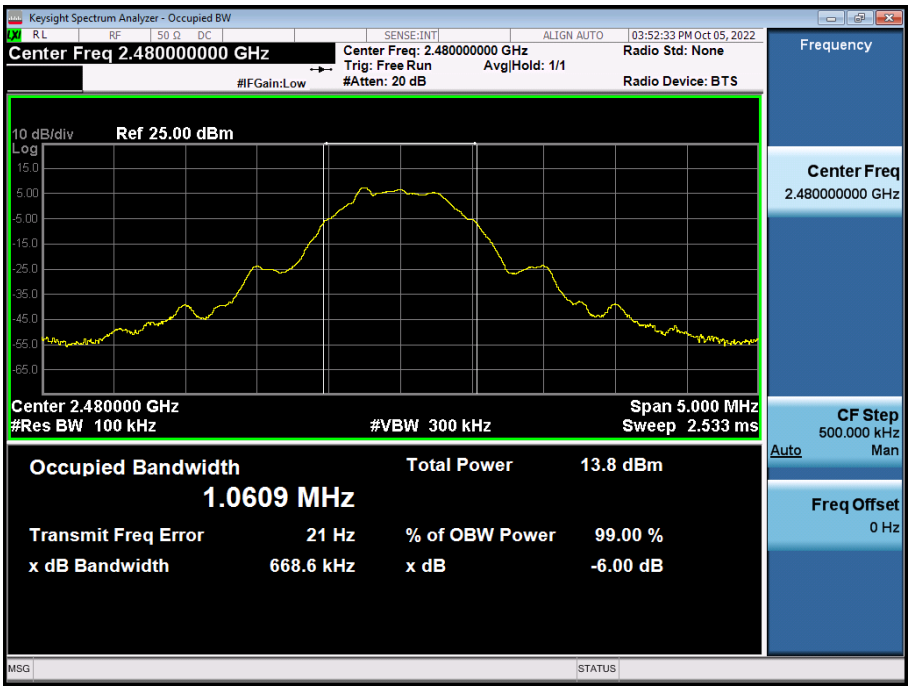
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)



6 dB Bandwidth plot (High-CH 39)



9.3 OUTPUT POWER

Peak Power

Data rate	Packet length	LE Mode		Measured Power(dBm)	Limit (dBm)
(Bit/s)	(Byte)	Frequency [MHz]	Channel		
1M	37	2402	0	8.034	30
		2440	19	8.031	
		2480	39	7.410	
	255	2402	0	7.995	
		2440	19	7.972	
		2480	39	7.340	
2M	37	2402	0	11.613	
		2440	19	11.754	
		2480	39	10.768	
	255	2402	0	11.527	
		2440	19	11.682	
		2480	39	10.653	
125k	37	2402	0	7.997	
		2440	19	8.024	
		2480	39	7.384	
	255	2402	0	8.010	
		2440	19	8.005	
		2480	39	7.353	
500k	37	2402	0	8.027	
		2440	19	8.016	
		2480	39	7.393	
	255	2402	0	7.992	
		2440	19	7.984	
		2480	39	7.356	

Average Power

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	0	5.82	2.07	7.89	30
		2440	19	5.74	2.07	7.81	
		2480	39	5.17	2.07	7.24	
	255	2402	0	7.14	0.69	7.83	
		2440	19	7.16	0.69	7.85	
		2480	39	6.48	0.69	7.17	
2M	37	2402	0	6.59	4.89	11.48	
		2440	19	6.53	4.89	11.42	
		2480	39	5.41	4.89	10.30	
	255	2402	0	8.75	2.42	11.17	
		2440	19	9.05	2.42	11.47	
		2480	39	8.09	2.42	10.51	
125k	37	2402	0	7.01	0.83	7.84	
		2440	19	7.05	0.83	7.88	
		2480	39	6.44	0.83	7.27	
	255	2402	0	7.75	0.11	7.86	
		2440	19	7.77	0.11	7.88	
		2480	39	7.09	0.11	7.20	
500k	37	2402	0	5.41	2.45	7.86	
		2440	19	5.42	2.45	7.87	
		2480	39	4.85	2.45	7.30	
	255	2402	0	7.47	0.41	7.88	
		2440	19	7.41	0.41	7.82	
		2480	39	6.94	0.41	7.35	

9.4 POWER SPECTRAL DENSITY

Frequency (MHz)	Channel No.	Mode	Test Result			
			Measured PSD (dBm/3 kHz)	Duty Cycle Factor(dB)	Total PSD (dBm/ 3kHz)	Limit
2402	0	1 MBit/s 37 Byte	-10.648	2.07	-8.582	8 dBm / 3 kHz
2440	19		-10.933	2.07	-8.867	
2480	39		-11.160	2.07	-9.094	
2402	0	1 MBit/s 255 Byte	-12.734	0.69	-12.049	
2440	19		-13.083	0.69	-12.398	
2480	39		-13.766	0.69	-13.081	
2402	0	2 MBit/s 37 Byte	-10.869	4.89	-5.982	
2440	19		-11.101	4.89	-6.214	
2480	39		-11.847	4.89	-6.960	
2402	0	2 MBit/s 255 Byte	-12.707	2.42	-10.283	
2440	19		-13.055	2.42	-10.631	
2480	39		-13.804	2.42	-11.380	
2402	0	125k 37 Byte	0.091	0.83	0.922	
2440	19		0.045	0.83	0.876	
2480	39		-1.010	0.83	-0.179	
2402	0	125k 255 Byte	1.032	0.11	1.141	
2440	19		0.975	0.11	1.084	
2480	39		0.241	0.11	0.350	
2402	0	500k 37 Byte	-6.654	2.45	-4.200	
2440	19		-6.370	2.45	-3.916	
2480	39		-7.289	0.41	-6.879	
2402	0	500k 255 Byte	-12.136	0.41	-11.726	
2440	19		-10.544	0.41	-10.134	
2480	39		-11.551	0.41	-11.141	

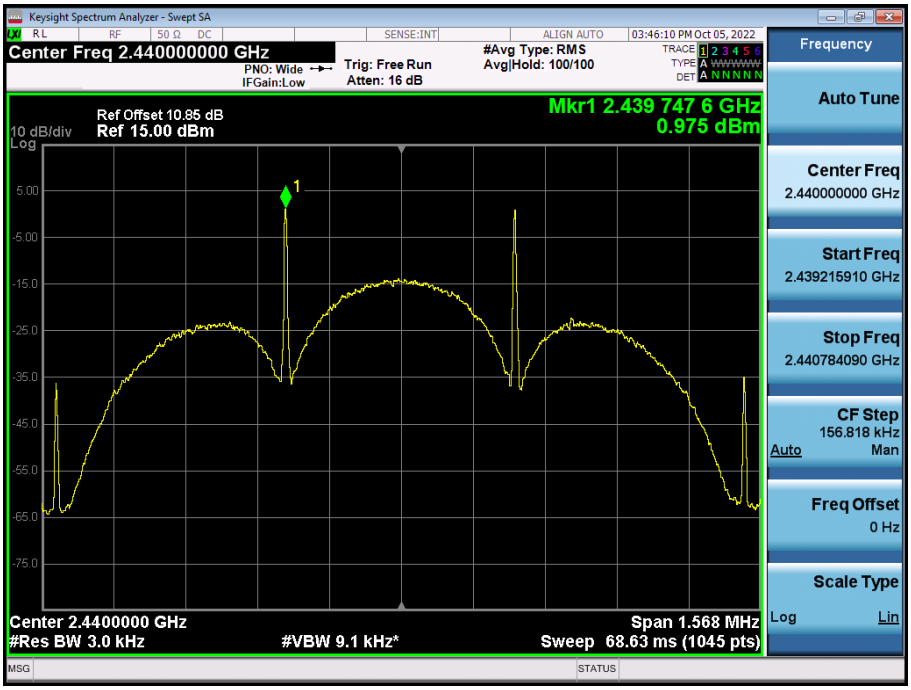
Note :

1. Spectrum measured Value not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.85 dB is offset for 2.4 GHz Band.
4. Worst case test plot was attached.(Worstcase : 125k Bit/s 255 Byte)

▣ 125k Bit/s (255 Byte) Test Plots

Power Spectral Density (Low-CH 0)

Power Spectral Density (Mid-CH 19)



Power Spectral Density (High-CH 39)

9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Result : please refer to the plot below.
In order to simplify the report, attached plots were only the worst case channel and data rate.

[BAND EDGE]

Frequency (MHz)	Mode	Channel No.	Position	Test Result	
				Measured Level (dB)	Limit (dBc)
2402	1M Bit/s 37 Byte	0	Lower	55.884	30
2480		39	Upper	59.381	30
2402	1M Bit/s 255 Byte	0	Lower	56.369	30
2480		39	Upper	58.218	30
2402	2M Bit/s 37 Byte	0	Lower	32.008	30
2480		39	Upper	56.745	30
2402	2M Bit/s 255 Byte	0	Lower	32.275	30
2480		39	Upper	56.813	30
2402	125k Bit/s 37 Byte	0	Lower	54.968	30
2480		39	Upper	63.389	30
2402	125k Bit/s 255 Byte	0	Lower	54.880	30
2480		39	Upper	61.298	30
2402	500k Bit/s 37 Byte	0	Lower	55.900	30
2480		39	Upper	59.690	30
2402	500k Bit/s 255 Byte	0	Lower	56.289	30
2480		39	Upper	58.957	30

Note :

1. In order to simplify the report, attached plots were only the worst case channel and data rate. Worst case 2M Bit/s (37 Byte)

[CONDUCTED SPURIOUS EMISSIONS]

Note :

1. In order to simplify the report, attached plots were only the worst case channel and data rate. Worst case 1M Bit/s (37 Byte)

▣ 2M Bit/s (37 Byte) Test Plots –Band Edge

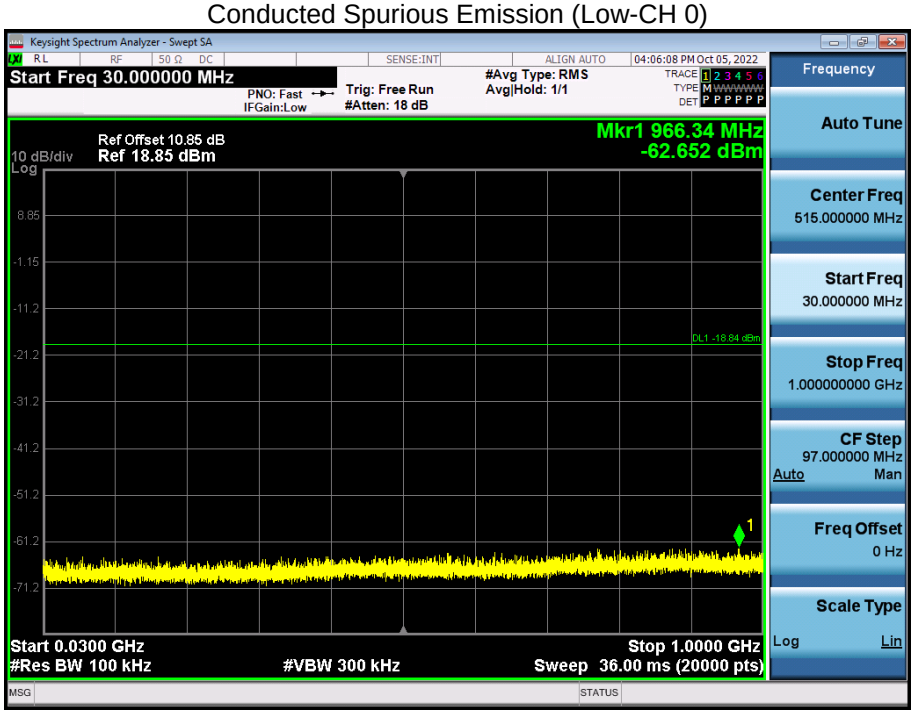
Low-CH 0

High-CH 39

▣ 2M Bit/s (37 Byte) Test Plots -Conducted Spurious Emission

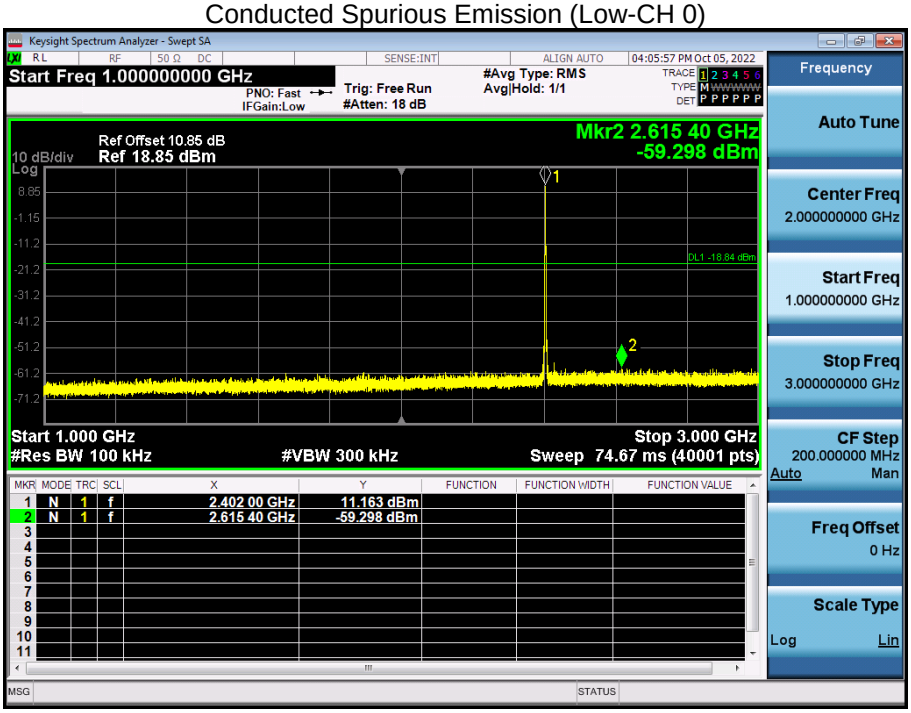
30 MHz ~ 1 GHz

Conducted Spurious Emission (Low-CH 0)



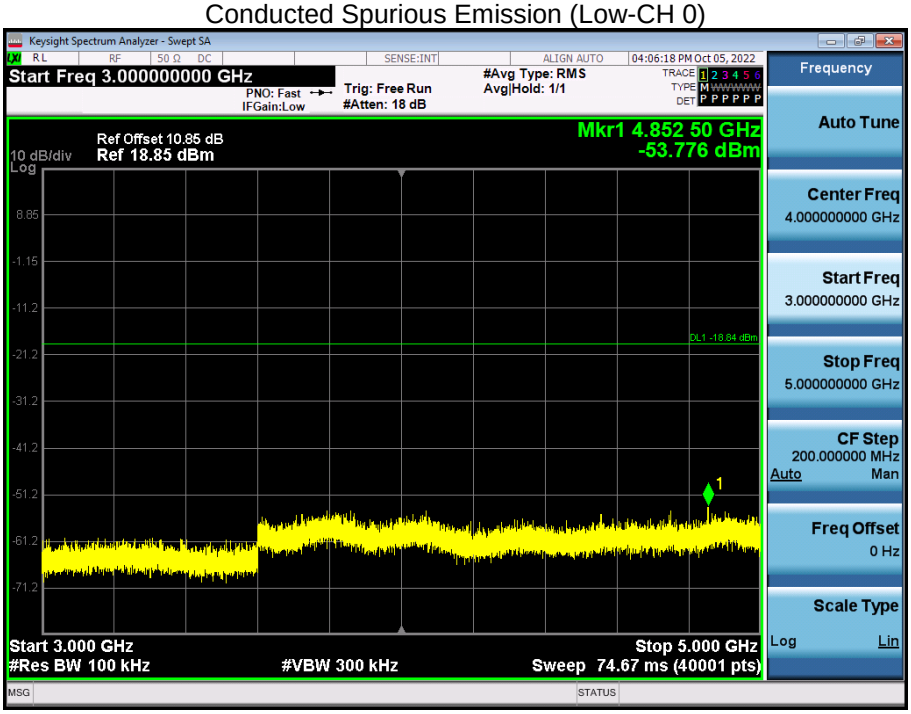
1 GHz ~ 3 GHz

Conducted Spurious Emission (Low-CH 0)



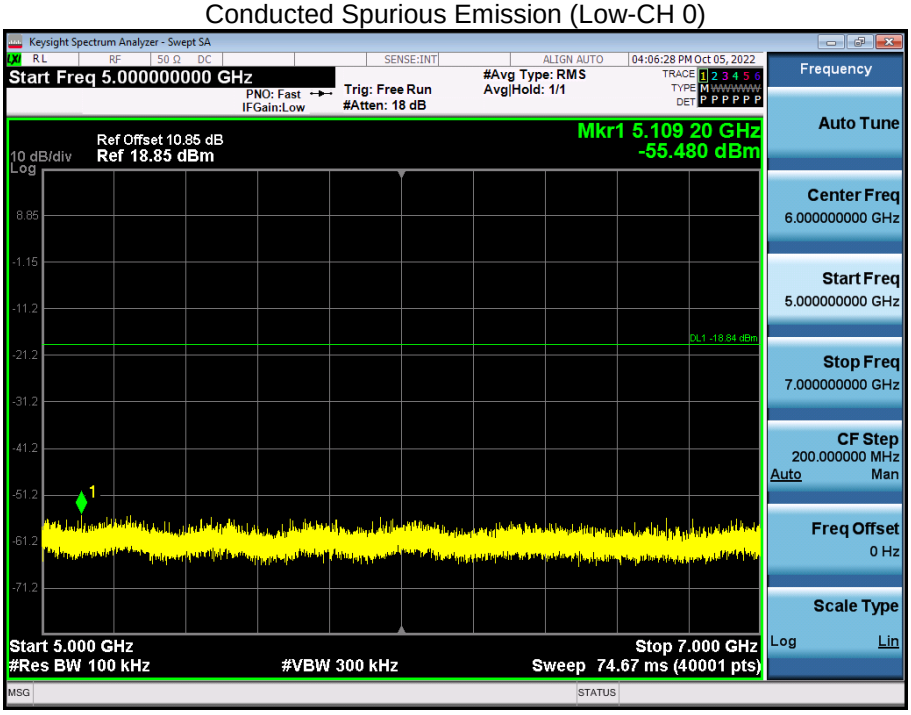
3 GHz ~ 5 GHz

Conducted Spurious Emission (Low-CH 0)



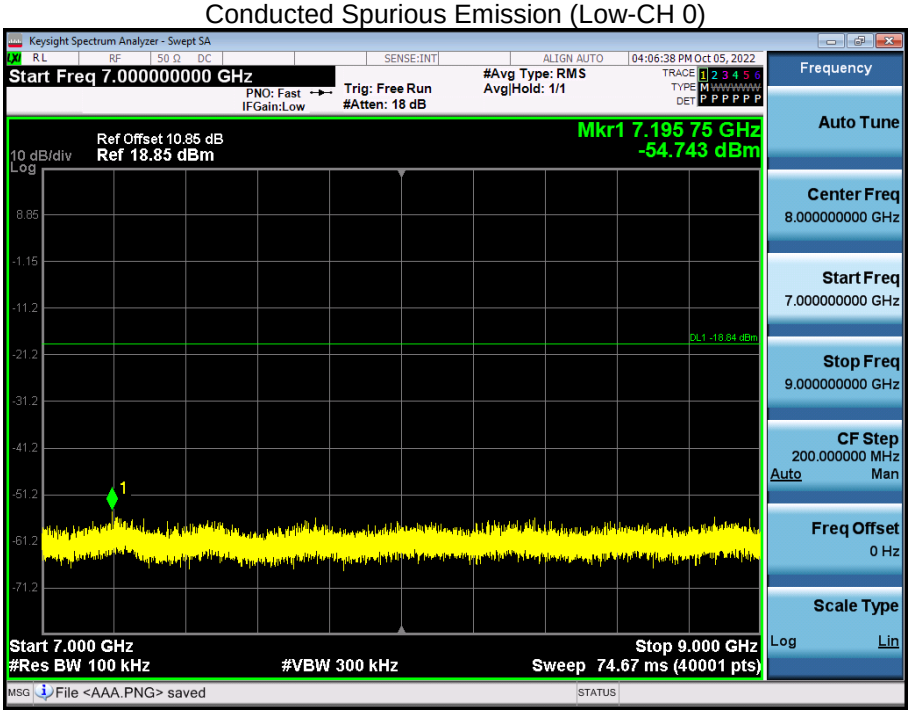
5 GHz ~ 7 GHz

Conducted Spurious Emission (Low-CH 0)



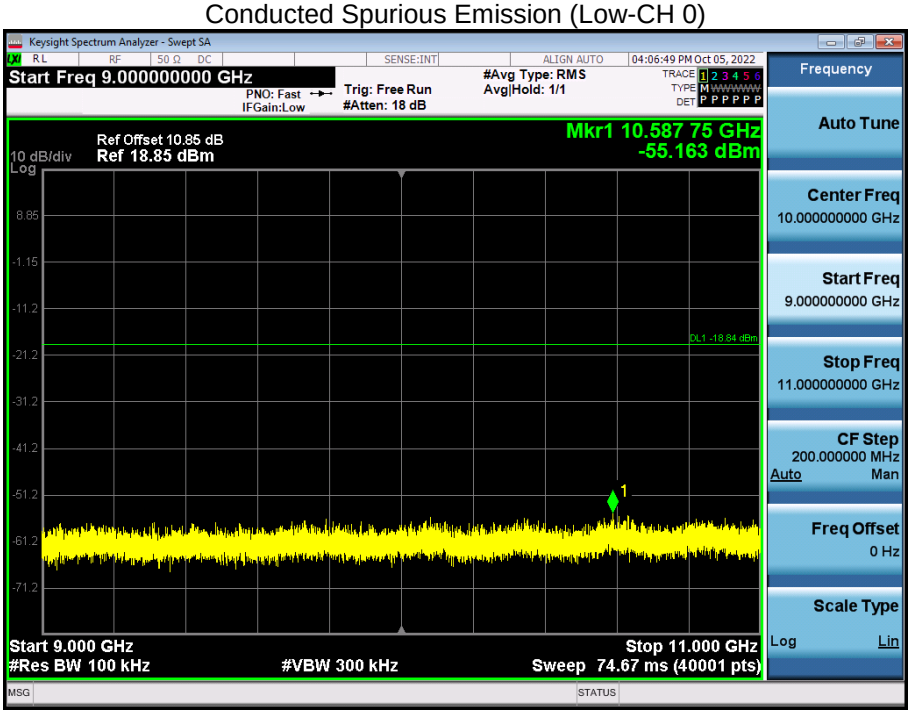
7 GHz ~ 9 GHz

Conducted Spurious Emission (Low-CH 0)



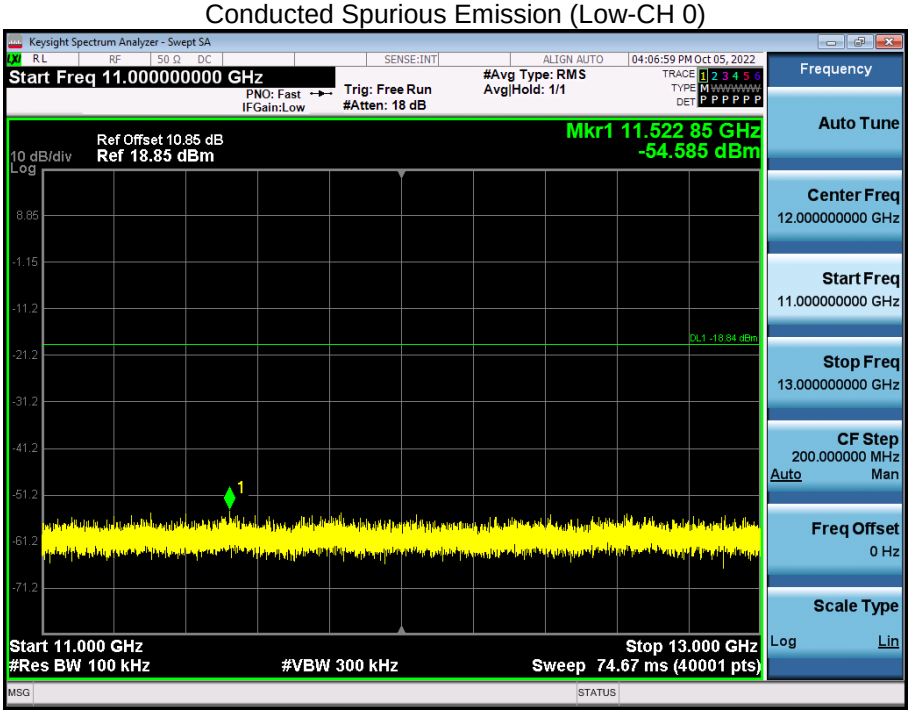
9 GHz ~ 11 GHz

Conducted Spurious Emission (Low-CH 0)



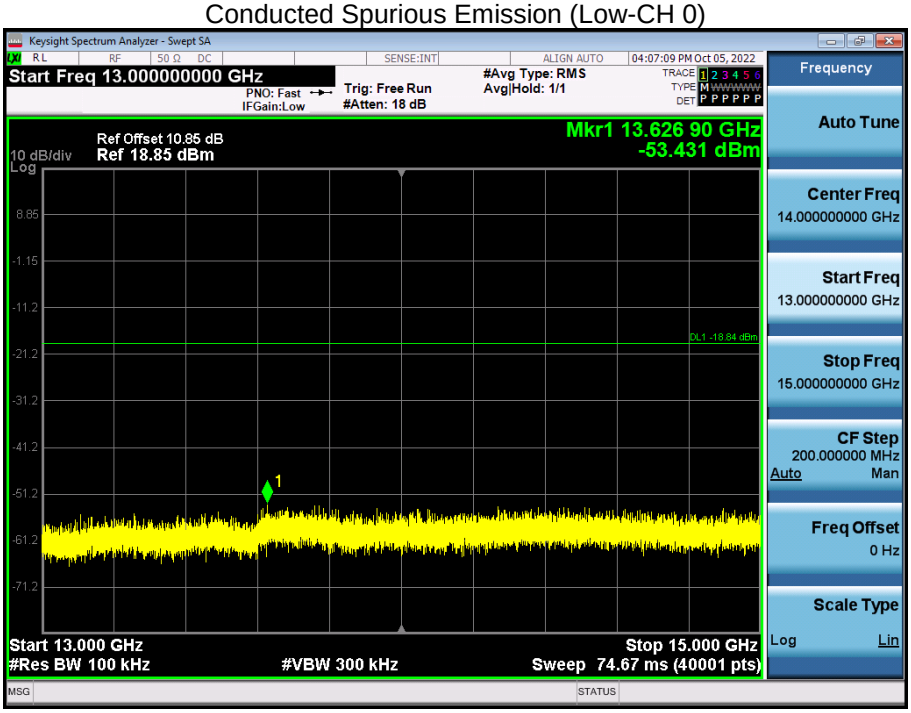
11 GHz ~ 13 GHz

Conducted Spurious Emission (Low-CH 0)



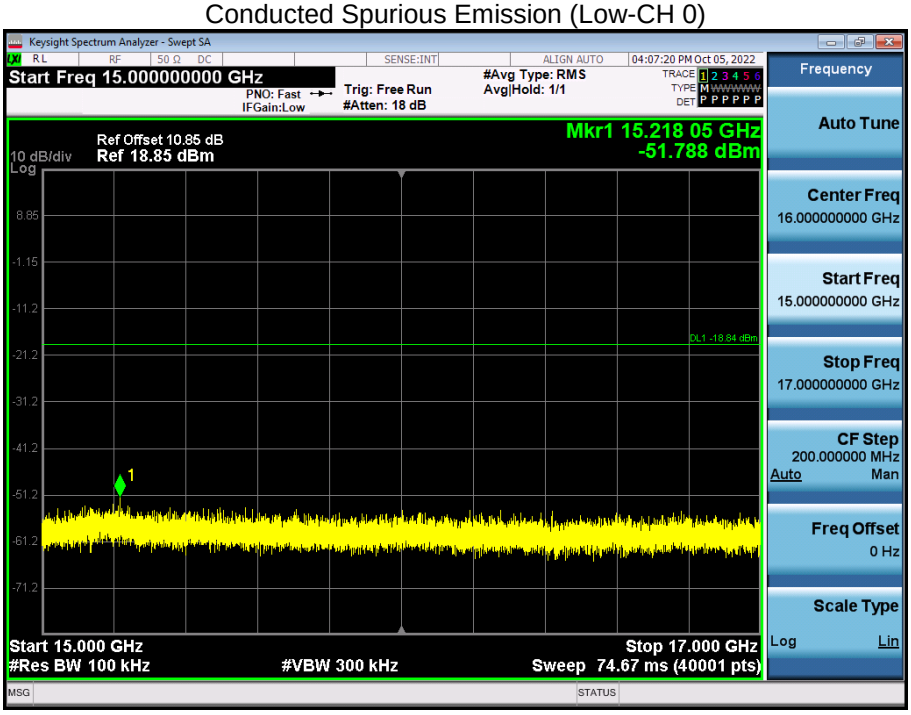
13 GHz ~ 15 GHz

Conducted Spurious Emission (Low-CH 0)



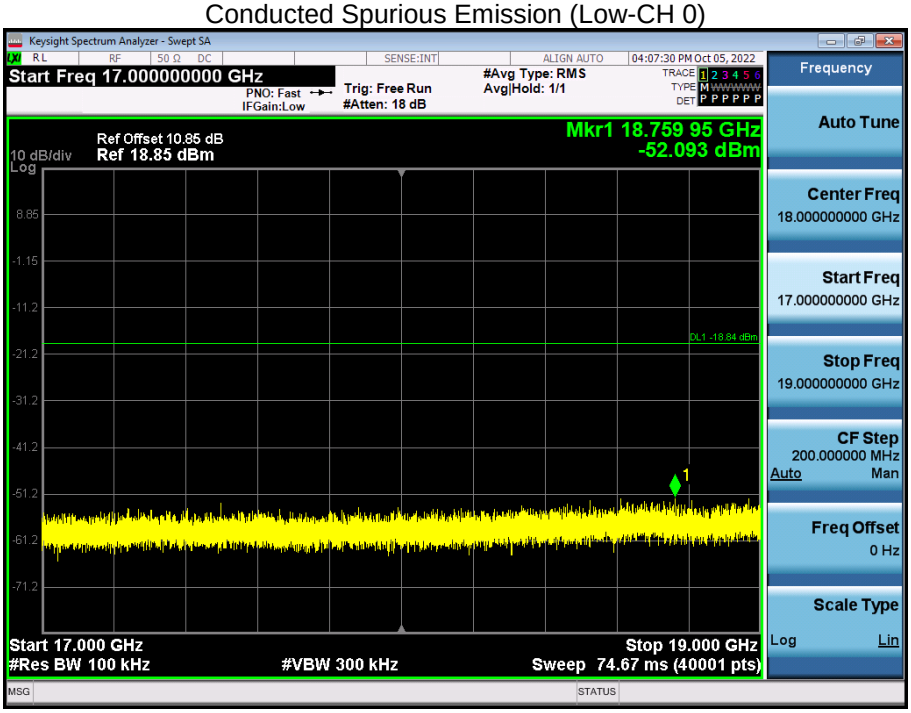
15 GHz ~ 17 GHz

Conducted Spurious Emission (Low-CH 0)



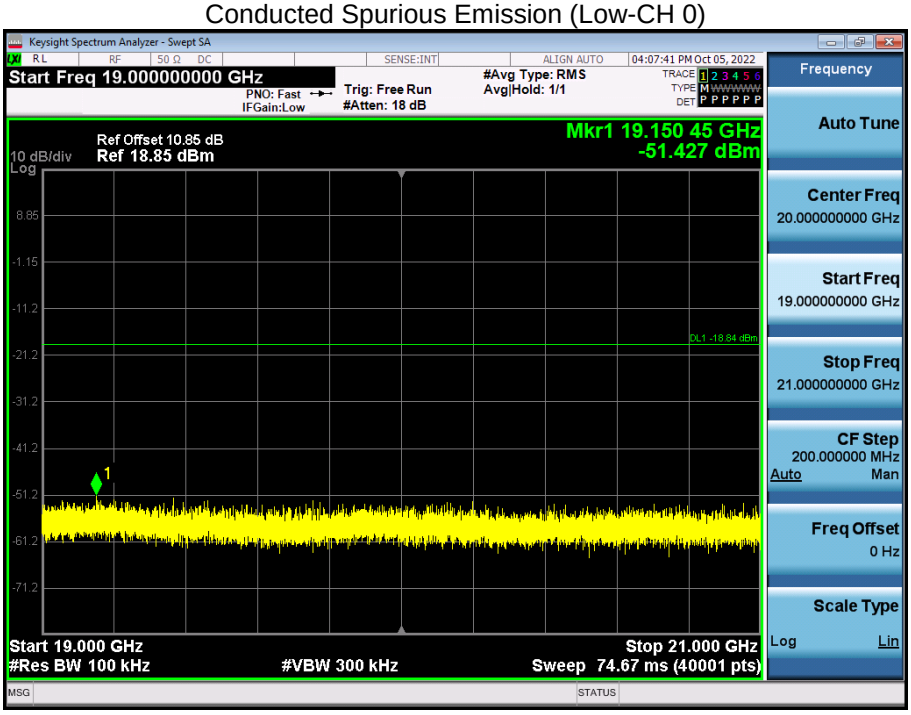
17 GHz ~ 19 GHz

Conducted Spurious Emission (Low-CH 0)



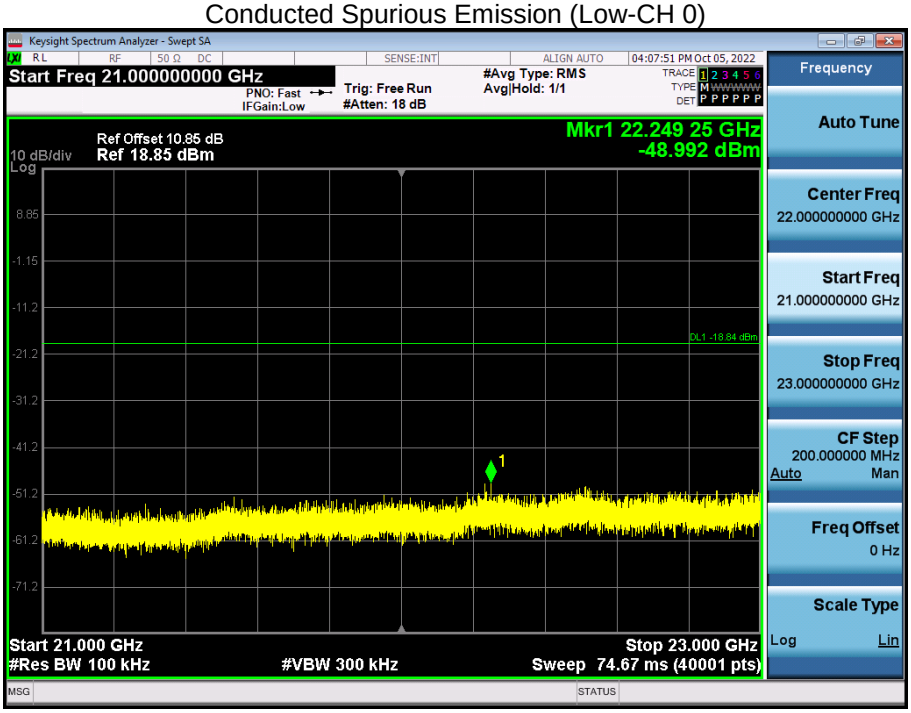
19 GHz ~ 21 GHz

Conducted Spurious Emission (Low-CH 0)



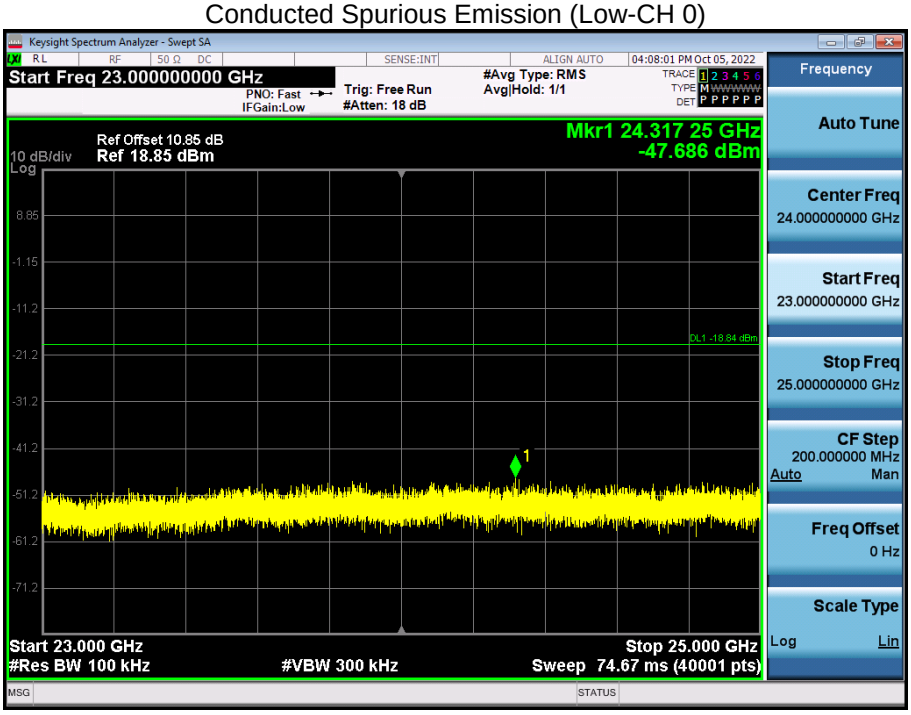
21 GHz ~ 23 GHz

Conducted Spurious Emission (Low-CH 0)



23 GHz ~ 25 GHz

Conducted Spurious Emission (Low-CH 0)



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]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/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 = 40log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBμV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

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

Mode : 1 M Bit/s (37 Bytes)

Operation Mode: CH Low

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4804	46.74	0.00	2.56	V	49.30	73.98	24.68	PK
4804	35.59	2.07	2.56	V	40.21	53.98	13.77	AV
7206	43.07	0.00	8.81	V	51.88	73.98	22.10	PK
7206	29.64	2.07	8.81	V	40.51	53.98	13.47	AV
4804	47.12	0.00	2.56	H	49.68	73.98	24.30	PK
4804	36.35	2.07	2.56	H	40.97	53.98	13.01	AV
7206	42.01	0.00	8.81	H	50.82	73.98	23.16	PK
7206	30.30	2.07	8.81	H	41.17	53.98	12.81	AV

Operation Mode: CH Mid

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4880	46.00	0.00	2.72	V	48.72	73.98	25.26	PK
4880	35.27	2.07	2.72	V	40.05	53.98	13.93	AV
7320	41.84	0.00	9.10	V	50.94	73.98	23.04	PK
7320	29.87	2.07	9.10	V	41.03	53.98	12.95	AV
4880	46.52	0.00	2.72	H	49.24	73.98	24.74	PK
4880	35.88	2.07	2.72	H	40.66	53.98	13.32	AV
7320	42.67	0.00	9.10	H	51.77	73.98	22.21	PK
7320	30.99	2.07	9.10	H	42.15	53.98	11.83	AV

Operation Mode: CH High

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4960	46.10	0.00	2.31	V	48.41	73.98	25.57	PK
4960	35.92	2.07	2.31	V	40.29	53.98	13.69	AV
7440	41.62	0.00	10.21	V	51.83	73.98	22.15	PK
7440	29.33	2.07	10.21	V	41.60	53.98	12.38	AV
4960	46.23	0.00	2.31	H	48.54	73.98	25.44	PK
4960	36.57	2.07	2.31	H	40.94	53.98	13.04	AV
7440	42.64	0.00	10.21	H	52.85	73.98	21.13	PK
7440	31.00	2.07	10.21	H	43.27	53.98	10.71	AV

Mode : 2 M Bit/s (37 Bytes)

Operation Mode: CH Low

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4804	45.16	0.00	2.56	V	47.72	73.98	26.26	PK
4804	33.22	4.89	2.56	V	40.66	53.98	13.32	AV
7206	41.91	0.00	8.81	V	50.72	73.98	23.26	PK
7206	29.68	4.89	8.81	V	43.38	53.98	10.60	AV
4804	45.31	0.00	2.56	H	47.87	73.98	26.11	PK
4804	33.54	4.89	2.56	H	40.98	53.98	13.00	AV
7206	41.98	0.00	8.81	H	50.79	73.98	23.19	PK
7206	29.72	4.89	8.81	H	43.42	53.98	10.56	AV

Operation Mode: CH Mid

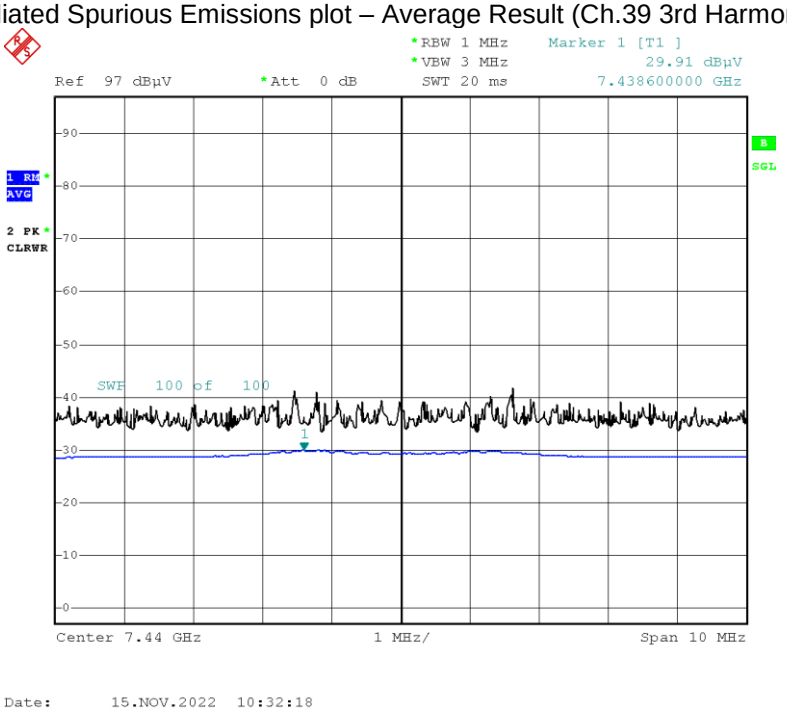
Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4880	44.71	0.00	2.72	V	47.43	73.98	26.55	PK
4880	32.72	4.89	2.72	V	40.33	53.98	13.65	AV
7320	42.37	0.00	9.10	V	51.47	73.98	22.51	PK
7320	30.19	4.89	9.10	V	44.17	53.98	9.81	AV
4880	44.66	0.00	2.72	H	47.38	73.98	26.60	PK
4880	32.73	4.89	2.72	H	40.34	53.98	13.64	AV
7320	42.84	0.00	9.10	H	51.94	73.98	22.04	PK
7320	30.24	4.89	9.10	H	44.22	53.98	9.76	AV

Operation Mode: CH High

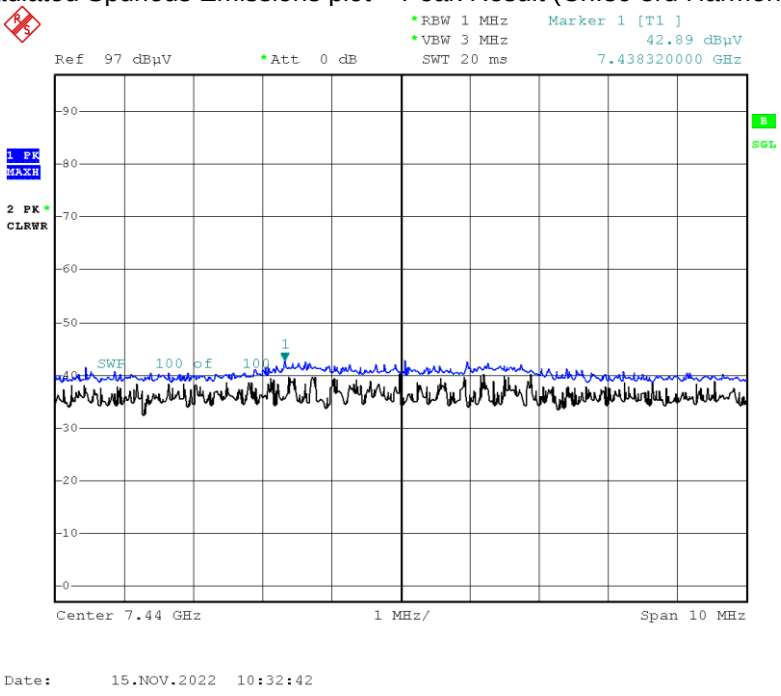
Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4960	45.24	0.00	2.31	V	47.55	73.98	26.43	PK
4960	33.10	4.89	2.31	V	40.29	53.98	13.69	AV
7440	42.49	0.00	10.21	V	52.70	73.98	21.28	PK
7440	29.79	4.89	10.21	V	44.88	53.98	9.10	AV
4960	44.08	0.00	2.31	H	46.39	73.98	27.59	PK
4960	33.05	4.89	2.31	H	40.24	53.98	13.74	AV
7440	42.89	0.00	10.21	H	53.10	73.98	20.88	PK
7440	29.91	4.89	10.21	H	45.00	53.98	8.98	AV

▣ 2 M Bit/s 37 Bytes Test Plots (Worst case : Z-H)

Radiated Spurious Emissions plot – Average Result (Ch.39 3rd Harmonic)



Radiated Spurious Emissions plot – Peak Result (Ch.39 3rd Harmonic)



Note:

Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

Mode : 1 M Bit/s (37 Bytes)

Operating Frequency 2402 MHz, 2480 MHz

Channel No. 0 CH, 39 CH

Frequency [MHz]	Measured Value [dBµV]	AF+CL+DF [dB/m]	Ant. Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
2390.0	19.27	35.43	H	54.69	73.98	19.29	PK
2390.0	8.21	35.43	H	43.64	53.98	10.34	AV
2390.0	19.59	35.43	V	55.01	73.98	18.97	PK
2390.0	8.22	35.43	V	43.64	53.98	10.34	AV
2483.5	23.55	35.57	H	59.11	73.98	14.87	PK
2483.5	8.31	35.57	H	43.88	53.98	10.10	AV
2483.5	23.33	35.57	V	58.90	73.98	15.08	PK
2483.5	8.45	35.57	V	44.01	53.98	9.97	AV

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

Mode : 2 M Bit/s (37 Bytes)

Operating Frequency 2402 MHz, 2480 MHz

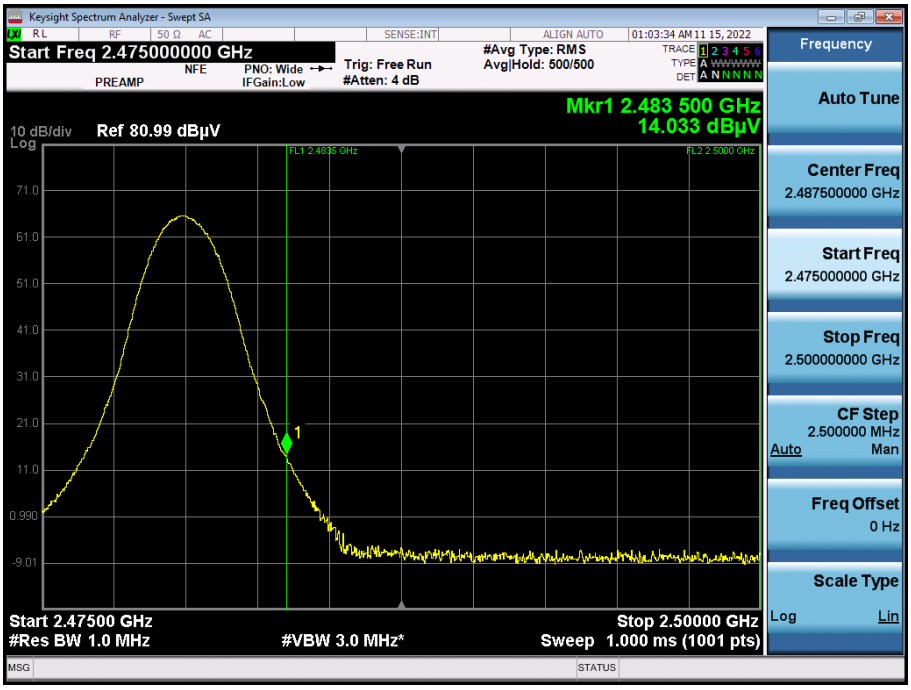
Channel No. 0 CH, 39 CH

Frequency [MHz]	Measured Value [dBµV]	AF+CL+DF [dB/m]	Ant. Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
2390.0	19.47	35.43	H	54.89	73.98	19.09	PK
2390.0	-6.09	35.43	H	29.34	53.98	24.64	AV
2390.0	19.29	35.43	V	54.72	73.98	19.26	PK
2390.0	-6.09	35.43	V	29.33	53.98	24.65	AV
2483.5	26.69	35.57	V	62.25	73.98	11.73	PK
2483.5	14.03	35.57	H	49.60	53.98	4.38	AV
2483.5	26.15	35.57	V	61.72	73.98	12.26	PK
2483.5	12.65	35.57	V	48.21	53.98	5.77	AV

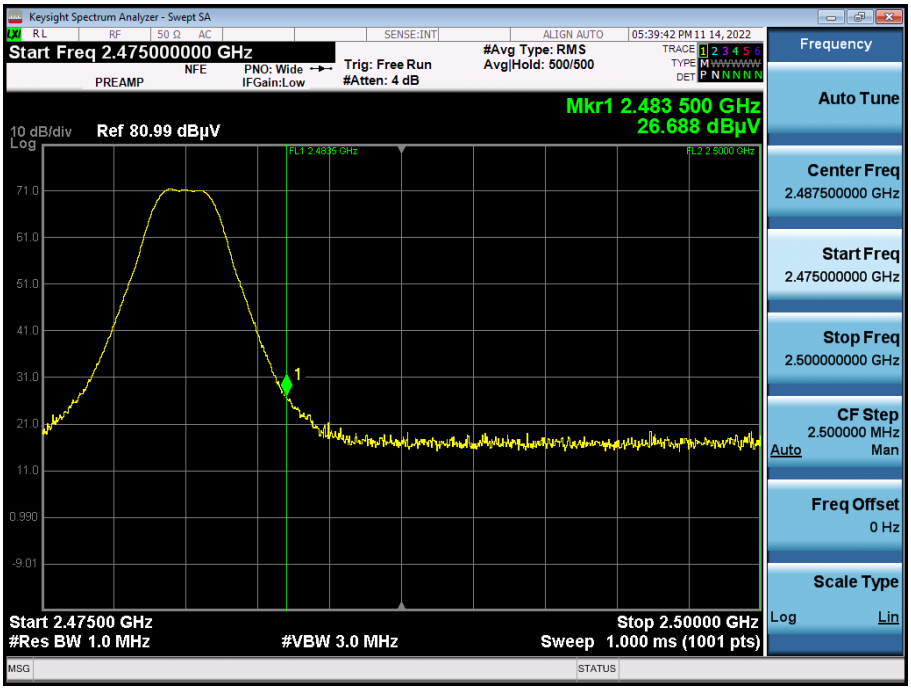
#Note : Used Average measurement method accroding to KDB 558074 Section11 Q3

▣ Mode : 2 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:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

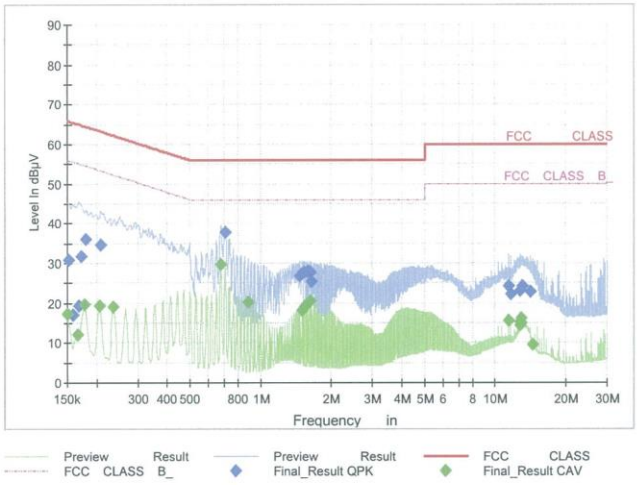
Test 1 / 2

Test Report

Common Information

EUT :	SM-A146M/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	BLE MODE_L1

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1523	30.97	65.88	34.91	9.000	L1	OFF	9.7	
0.1590	16.89	65.52	48.62	9.000	L1	OFF	9.7	
0.1680	19.26	65.06	45.80	9.000	L1	OFF	9.7	
0.1725	31.69	64.84	33.15	9.000	L1	OFF	9.7	
0.1793	35.98	64.52	28.54	9.000	L1	OFF	9.7	
0.2085	34.76	63.27	28.51	9.000	L1	OFF	9.7	
0.7070	37.79	56.00	18.21	9.000	L1	OFF	9.7	
1.4765	26.78	56.00	29.22	9.000	L1	OFF	9.7	
1.5035	27.41	56.00	28.59	9.000	L1	OFF	9.7	
1.5328	27.72	56.00	28.28	9.000	L1	OFF	9.7	
1.5935	27.85	56.00	28.15	9.000	L1	OFF	9.7	
1.6228	27.56	56.00	28.44	9.000	L1	OFF	9.7	
1.6543	25.51	56.00	30.49	9.000	L1	OFF	9.7	
11.3720	24.33	60.00	35.67	9.000	L1	OFF	10.1	
11.7140	22.16	60.00	37.84	9.000	L1	OFF	10.1	
12.7490	23.05	60.00	36.95	9.000	L1	OFF	10.1	
13.0933	24.18	60.00	35.82	9.000	L1	OFF	10.1	
14.1260	22.77	60.00	37.23	9.000	L1	OFF	10.2	

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Test 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1500	17.29	56.00	38.71	9.000	L1	OFF	9.7	
0.1658	12.01	55.17	43.16	9.000	L1	OFF	9.7	
0.1770	19.54	54.63	35.09	9.000	L1	OFF	9.7	
0.2063	19.29	53.36	34.06	9.000	L1	OFF	9.7	
0.2355	19.17	52.25	33.09	9.000	L1	OFF	9.7	
0.6778	29.61	46.00	16.39	9.000	L1	OFF	9.7	
0.8848	20.21	46.00	25.79	9.000	L1	OFF	9.7	
1.5058	18.15	46.00	27.85	9.000	L1	OFF	9.7	
1.5350	18.95	46.00	27.05	9.000	L1	OFF	9.7	
1.5643	19.25	46.00	26.75	9.000	L1	OFF	9.7	
1.5935	19.86	46.00	26.14	9.000	L1	OFF	9.7	
1.6228	20.47	46.00	25.53	9.000	L1	OFF	9.7	
11.3720	15.44	50.00	34.56	9.000	L1	OFF	10.1	
12.7490	14.48	50.00	35.52	9.000	L1	OFF	10.1	
12.8030	15.23	50.00	34.77	9.000	L1	OFF	10.1	
12.8615	14.92	50.00	35.08	9.000	L1	OFF	10.1	
12.8908	16.02	50.00	33.98	9.000	L1	OFF	10.1	
14.4973	9.53	50.00	40.47	9.000	L1	OFF	10.2	

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Conducted Emissions (Line 2)

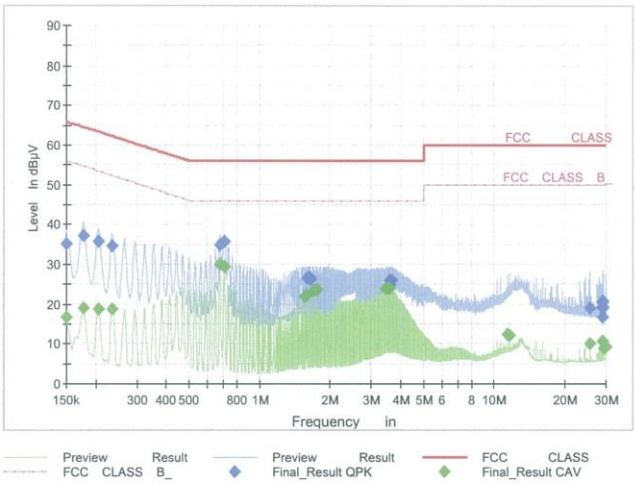
Test 1 / 2

Test Report

Common Information

EUT :	SM-A146M/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	BLE MODE_N

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1500	35.17	66.00	30.83	9.000	N	OFF	9.6	
0.1770	37.27	64.63	27.36	9.000	N	OFF	9.6	
0.2063	35.87	63.36	27.49	9.000	N	OFF	9.6	
0.2355	34.65	62.25	27.61	9.000	N	OFF	9.6	
0.6800	34.84	56.00	21.16	9.000	N	OFF	9.7	
0.7070	35.74	56.00	20.26	9.000	N	OFF	9.7	
1.5913	26.51	56.00	29.49	9.000	N	OFF	9.7	
1.6228	26.85	56.00	29.15	9.000	N	OFF	9.7	
1.6498	26.23	56.00	29.77	9.000	N	OFF	9.7	
3.5690	24.77	56.00	31.23	9.000	N	OFF	9.8	
3.5960	25.99	56.00	30.01	9.000	N	OFF	9.8	
3.6545	25.83	56.00	30.17	9.000	N	OFF	9.8	
25.5110	18.92	60.00	41.08	9.000	N	OFF	10.7	
28.9378	19.02	60.00	40.98	9.000	N	OFF	10.8	
28.9423	20.88	60.00	39.12	9.000	N	OFF	10.8	
28.9535	20.51	60.00	39.49	9.000	N	OFF	10.8	
28.9603	19.45	60.00	40.55	9.000	N	OFF	10.8	
28.9648	16.65	60.00	43.35	9.000	N	OFF	10.8	

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Test 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)	Comment
0.1500	16.85	56.00	39.15	9.000	N	OFF	9.6	
0.1770	18.96	54.63	35.67	9.000	N	OFF	9.6	
0.2063	18.78	53.36	34.58	9.000	N	OFF	9.6	
0.2355	18.86	52.25	33.40	9.000	N	OFF	9.6	
0.6778	30.03	46.00	15.97	9.000	N	OFF	9.7	
0.7070	29.42	46.00	16.58	9.000	N	OFF	9.7	
1.5620	22.01	46.00	23.99	9.000	N	OFF	9.7	
1.5913	22.34	46.00	23.66	9.000	N	OFF	9.7	
1.7105	23.27	46.00	22.73	9.000	N	OFF	9.7	
1.7690	23.56	46.00	22.44	9.000	N	OFF	9.7	
3.4790	24.06	46.00	21.94	9.000	N	OFF	9.8	
3.5960	23.84	46.00	22.16	9.000	N	OFF	9.8	
11.3743	12.52	50.00	37.48	9.000	N	OFF	10.1	
11.7185	12.07	50.00	37.93	9.000	N	OFF	10.1	
25.5088	10.20	50.00	39.80	9.000	N	OFF	10.7	
28.9558	10.56	50.00	39.44	9.000	N	OFF	10.8	
29.3000	8.90	50.00	41.10	9.000	N	OFF	10.8	
29.9885	9.26	50.00	40.74	9.000	N	OFF	10.8	

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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	08/22/2023	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/07/2023	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	03/04/2023	Annual
Signal Analyzer	N9030A	Keysight	MY55410508	09/06/2023	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Agilent	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2023	Annual
Power Splitter	11667B	Hewlett Packard	10545	02/03/2023	Annual
DC Power Supply	E3646A	Agilent	MY40002937	12/14/2022	Annual
Attenuator(10 dB)(DC-26.5 GHz)	8493C-010	Agilent	08285	06/21/2023	Annual
Attenuator(20 dB)	18N-20dB	Rohde & Schwarz	8	03/07/2023	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

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)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM2090	Emco	060520	N/A	N/A
Turn Table	N/A	Ets	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	08/16/2024	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1191	11/18/2023	Biennial
Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Amp &Filter Bank Switch Controller	FBSM-01A	TNM system	0	N/A	N/A
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/06/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/13/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/13/2023	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	02/07/2023	Annual
ATT(3 dB) + LNA2(6~18 GHz)	18B-03, CBL06185030	WEINSCHEL CERNEX	N/A	12/22/2022	Annual
ATT(10 dB) + LNA1(0.1~18 GHz)	56-10, CBLU1183540B-01	Api tech, CERNEX	N/A	12/22/2022	Annual
High Pass Filter	WHKX10-2700-3000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
Thru	COAXIAL ATTENUATOR	T&M SYSTEM	N/A	12/22/2022	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/11/2023	Annual
Spectrum Analyzer	FSP(9 kHz ~ 30 GHz)	Rohde & Schwarz	836650/016	09/06/2023	Annual
Spectrum Analyzer	FSV40-N(9 kHz ~ 30 GHz)	Rohde & Schwarz	101068-SZ	09/07/2023	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-2211-FC028-P